

---

# SPECIFICATION

100% BID DOCUMENT SUBMISSION

VA Project No. 515-14-103

---

## REPLACE WINDOWS, VARIOUS LOCATIONS

Battle Creek VA Medical Center  
Battle Creek, Michigan

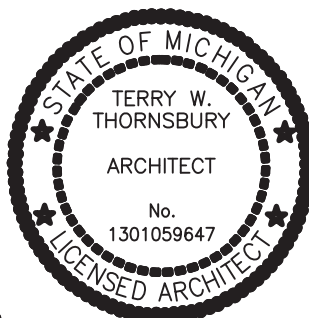


2020 East Washington Boulevard  
Suite 200  
Fort Wayne, Indiana 46803  
PH: 260.424.4830  
[www.viridian-design.net](http://www.viridian-design.net)

Volume 1 of 1

---

Issued: July 5, 2018



*Terry W. Thornsby*

**DEPARTMENT OF VETERANS AFFAIRS  
VHA MASTER SPECIFICATIONS**

**TABLE OF CONTENTS  
Section 00 01 10**

|             | <b>DIVISION 00 - SPECIAL SECTIONS</b>                | <b>DATE</b> |
|-------------|--|-------------|
| 00 01 15    | List of Drawing Sheets                               | 07-15       |
|             |  |             |
|             | <b>DIVISION 01 - GENERAL REQUIREMENTS</b>            |             |
|             |  |             |
| 01 00 00    | General Requirements                                 | 10-17       |
| 01 32 16.15 | Project Schedules (Small Projects - Design/Bid/Build | 04-13       |
| 01 33 23    | Shop Drawings, Product Data, and Samples             | 05-17       |
| 01 35 26    | Safety Requirements                                  | 02-17       |
| 01 57 19    | Temporary Environmental Controls                     | 01-11       |
| 01 74 19    | Construction Waste Management                        | 09-13       |
| 01 81 13    | Sustainable Construction Requirements                | 10-17       |
|             |  |             |
|             | <b>DIVISION 02 - EXISTING CONDITIONS</b>             |             |
|             |  |             |
| 02 41 00    | Demolition   | 08-17       |
| 02 82 11    | Traditional Asbestos Abatement                       | 09-15       |
| 02 83 33.13 | Lead-Based Paint Removal and Disposal                | 08-16       |
|             |  |             |
|             |  |             |
|             |  |             |
|             | <b>DIVISION 04 - MASONRY</b>                         |             |
|             |  |             |
| 04 01 00    | Maintenance of Masonry                               | 02-16       |
| 04 05 13    | Masonry Mortaring                                    | 10-17       |
|             |  |             |
|             | <b>DIVISION 06 - WOOD, PLASTICS AND COMPOSITES</b>   |             |
|             |  |             |
| 06 10 00    | Rough Carpentry                                      | 10-17       |
|             |  |             |
|             | <b>DIVISION 07 - THERMAL AND MOISTURE PROTECTION</b> |             |
|             |  |             |
| 07 21 13    | Thermal Insulation                                   | 10-17       |
| 07 24 00    | Exterior Insulation and Finish Systems               | 02-16       |
| 07 92 00    | Joint Sealants                                       | 10-17       |
|             |  |             |
|             | <b>DIVISION 08 - OPENINGS</b>                        |             |
|             |  |             |
| 08 11 13    | Hollow Metal Doors and Frames                        | 08-16       |
| 08 41 13    | Aluminum-Framed Entrances and Storefronts            | 08-16       |
| 08 51 13    | Aluminum Windows                                     | 02-16       |
| 08 56 66    | Detention Window Screens                             | 02-16       |
| 08 71 00    | Door Hardware  | 01-16       |
| 08 80 00    | Glazing  | 10-15       |

|            |  |       |
|------------|--|-------|
| 08 80 00.1 | Metal Window Panels                                |       |
|            |  |       |
|            | <b>DIVISION 09 - FINISHES</b>                      |       |
|            |  |       |
| 09 06 00   | Schedule for Finishes                              | 04-15 |
| 09 22 16   | Non-Structural Metal Framing                       | 05-16 |
| 09 23 00   | Gypsum Plastering                                  | 10-15 |
| 09 29 00   | Gypsum Board                                       | 11-14 |
| 09 30 13   | Ceramic/Porcelain Tiling                           | 09-15 |
| 09 51 00   | Acoustical Ceilings                                | 12-16 |
| 09 72 16   | Vinyl-Coated Fabric Wall Covering                  | 10-15 |
| 09 91 00   | Painting   | 01-16 |
|            |  |       |
|            | <b>DIVISION 12 - FURNISHINGS</b>                   |       |
|            |  |       |
| 12 24 00   | Window Shades                                      | 08-17 |
| 12 36 00   | Countertops  | 12-15 |
|            |  |       |
|            | <b>DIVISION 26 - ELECTRICAL</b>                    |       |
|            |  |       |
| 26 05 11   | Requirements for Electrical Installations          | 01-16 |
| 26 05 19   | Low-Voltage Electrical Power Conductors and Cables | 01-17 |
| 26 05 33   | Raceway and Boxes for Electrical Systems           | 01-18 |
| 26 27 26   | Wiring Devices                                     | 01-18 |
|            |  |       |
|            | <b>DIVISION 32 - EXTERIOR IMPROVEMENTS</b>         |       |
|            |  |       |
| 32 90 00   | Planting   | 08-16 |
|            |  |       |

## APPENDIX A

- Asbestos Reports

**SECTION 00 01 15**  
**LIST OF DRAWING SHEETS**

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

| <u>Drawing No.</u>  | <u>Title</u>  |
|---------------------|---|
|                     | GENERAL INFORMATION                                   |
| GI001               | Cover Sheet   |
| GI002               | Architectural Abbreviations and Symbols               |
| GI003               | Site Campus Map, Contractor Staging, and              |
| Hazardous Materials |   |
| GI004               | Infection Control General Information - Class<br>I&II |
| GI005               | Infection Control General Information - Class<br>III  |
| GI006               | Infection Control General Information - Class<br>IV   |
| Building #1:        |   |
|                     | <b>ARCHITECTURAL</b>                                  |
| 01.AS401            | Architectural Exterior Elevations                     |
| 01.AS701            | Architectural Window Schedule                         |
| 01.AS702            | Architectural Window Schedule, Elevations and         |
| Details             |   |
| Building #3:        |   |
|                     | <b>ARCHITECTURAL</b>                                  |
| 03.AS401            | Architectural Exterior Elevations                     |
| 03.AS701            | Architectural Window Schedule                         |
| 03.AS702            | Architectural Window, Schedule, Elevations and        |
| Details             |   |
| Building #4:        |   |
|                     | <b>ARCHITECTURAL</b>                                  |
| 04.AS401            | Architectural Exterior Elevations                     |
| 04.AS701            | Architectural Window Schedule                         |
| 04.AS702            | Architectural Window Schedule                         |

04.AS703 Architectural Window Elevations and Details

Building #5:

**ARCHITECTURAL**

05.AS401 Architectural Exterior Elevations

05.AS701 Architectural Window Schedule

05.AS702 Architectural Window Schedule

05.AS703 Architectural Window Elevations and Details

Building #6:

**ARCHITECTURAL**

06.AS401 Architectural Exterior Elevations

06.AS701 Architectural Window Schedule

06.AS702 Architectural Window Elevations and Details

Building #9:

**ARCHITECTURAL**

09.AS401 Architectural Exterior Elevations

09.AS701 Architectural Window Schedule

09.AS702 Architectural Window Schedule

09.AS703 Architectural Window Elevations and Details

Building #14:

**ARCHITECTURAL**

14.AS401 Architectural Exterior Elevations

14.AS402 Architectural Exterior Elevations

14.AS701 Architectural Window Schedule

14.AS702 Architectural Window Schedule

14.AS703 Architectural Window Schedule

14.AS704 Architectural Window Schedule

14.AS705 Architectural Window Elevations and Details

Building #25:

**ARCHITECTURAL**

25.AS401 Architectural Exterior Elevations

25.AS701 Architectural Window Schedule, Elevations and  
Details

## Building #85:

**ARCHITECTURAL**

|          |                                      |
|----------|--------------------------------------|
| 85.AS401 | Architectural Exterior Elevations    |
| 85.AS701 | Architectural Window Schedule        |
| 85.AS702 | Architectural Elevations and Details |

## Building #136:

**ARCHITECTURAL**

|           |  |
|-----------|--|
| 136.AS401 | Architectural Exterior Elevations          |
| 136.AS701 | Architectural Window Schedule              |
| 136.AS702 | Architectural Window Elevation and Details |

## All Buildings:

**ARCHITECTURAL**

|        |                                  |
|--------|----------------------------------|
| AS1101 | Finish Sheet and General Details |
|--------|----------------------------------|

- - - E N D - - -

**SECTION 01 00 00  
GENERAL REQUIREMENTS**

**TABLE OF CONTENTS**

|  |                    |
|--|--------------------|
| 1.1 SAFETY REQUIREMENTS .....  | 1                  |
| 1.2 GENERAL INTENTION .....  | 1                  |
| 1.3 STATEMENT OF BID ITEM(S) .....   | 1                  |
| 1.4 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR .....   | 2                  |
| 1.5 CONSTRUCTION SECURITY REQUIREMENTS.....  | <a href="#">2</a>  |
| 1.6 OPERATIONS AND STORAGE AREAS .....   | 3                  |
| 1.7 ALTERATIONS.....   | <a href="#">9</a>  |
| 1.8 DISPOSAL AND RETENTION .....   | 10                 |
| 1.9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT,<br>UTILITIES, AND IMPROVEMENTS ..... | 11                 |
| 1.10 RESTORATION .....   | <a href="#">12</a> |
| 1.11 PHYSICAL DATA .....   | 12                 |
| 1.12 AS-BUILT DRAWINGS .....   | 13                 |
| 1.13 USE OF ROADWAYS.....  | 13                 |
| 1.14 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT .....                                    | <a href="#">14</a> |
| 1.15 TEMPORARY USE OF EXISTING ELEVATORS.....  | <a href="#">16</a> |
| 1.16 TEMPORARY TOILETS.....  | 16                 |
| 1.17 AVAILABILITY AND USE OF UTILITY SERVICES.....   | 16                 |
| 1.18 INSTRUCTIONS.....   | 17                 |
| 1.19 RELOCATED EQUIPMENT / ITEMS.....  | 19                 |
| 1.20 HISTORIC PRESERVATION .....   | <a href="#">20</a> |

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

**1.1 SAFETY REQUIREMENTS**

Refer to section 01 35 26, SAFETY REQUIREMENTS for safety and infection control requirements.

**1.2 GENERAL INTENTION**

- A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for the Battle Creek Veterans Affairs Medical Center in Battle Creek, Michigan- Replace Windows in Various Locations as required by drawings and specifications.
- B. Visits to the site by Bidders shall only be allowed during the pre-bid conference. All prospective bidders will be escorted to the sites by the COR. No prospective bidders shall be allowed to enter patient treatment areas without an escort."
- C. Offices of \_Viridian Architectural Design, Inc., as Architect-Engineers, shall render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.
- D. 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.

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

- A. BID ITEM I, The Statement of Bid Item(s) is located within the solicitation Information and Instruction to Bidders section. ALL



PRICING IS TO BE ENTERED IN BLOCK 17 OF THE SF1442 SOLICITATION OFFER PAGE (BLOCK 17) OR THE BID SCHEDULE IF SO INCLUDED WITH THE SOLICITATION..

#### **1.4 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR**

- A. Drawings and contract documents may be obtained from the website where the solicitation is posted. Additional copies shall be at Contractor's expense.

#### **1.5 CONSTRUCTION SECURITY REQUIREMENTS**

A. Security Plan:

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

B. Security Procedures:

1. General Contractor's employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.
2. Before starting work the General Contractor shall give one week's notice to the COR. This notice is separate from any notices required for utility shutdown described later in this section.
3. No photography of VA premises is allowed without written permission of the Contracting Officer.
4. VA reserves the right to close down or shut down the project site and order General Contractor's employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.

C. Key Control:

1. The General Contractor shall provide duplicate keys and lock combinations to the Contracting officers representative COR 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 COR for permanent installation. See Section 08 71 00, DOOR HARDWARE and coordinate.

D. Motor Vehicle Restrictions

1. Vehicle authorization request shall be required for any vehicle entering the site and such request shall be submitted 24 hours before the date and time of access. Access shall be restricted to picking up and dropping off materials and supplies.
2. A limited number of (2 to 5) permits shall be issued for General Contractor and its employees for parking in designated areas only.

**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 COR. 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. Working space and space available for storing materials shall be as determined by the COR.
- D. Workmen are subject to rules of Medical Center applicable to their conduct.
- E. Execute work in such a manner as to interfere as little as possible with work being done by others. Keep roads clear of construction materials, debris, standing construction equipment and vehicles at all times.
- F. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are not permitted in buildings that are occupied, during construction, jointly by patients or medical personnel, and Contractor's personnel, except as permitted by COR where required by limited working space.
1. Do not store materials and equipment in other than assigned areas.
  2. Where access by Medical Center personnel to vacated portions of buildings is not required, storage of Contractor's materials and equipment shall be permitted subject to fire and safety requirements.
- G. Utilities Services: Where necessary to cut existing pipes, electrical wires, conduits, cables, of utility services, or of fire protection systems or communications systems (except telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COR. All such actions shall be coordinated with the COR involved:
1. The proposed work within and around certain buildings shall be scheduled and coordinated with the COR. The Contractor shall provide a comprehensive schedule of each window in accordance with the following.
    - a. Work within and around Building 1.
    - b. Work within and around Building 3 shall occur on weekends.

c. Work within and around Building 4 shall occur on weekdays shall be

grouped in accordance the following: (D105 D106 D107 D108 E100 E101 F100 F101) (D206 D207 D208 E200 F200 F201) (D102 D103 D104 D202 D203 D204 D205) (A103 A104 A105 A205 A206 C100 C101 C200 C201 D100 D101 D200 D201) (E107 E108 E109 E205 E206 E207 E208 E209 G100 G101 G200 G201 H100 H101 H102 H200 H201 H202) (E102 E103 E104 E105 E106 E201 E202 E203 E204) (H204 H205 H206) (A100 A101 A102 A200 A201 A202 A203 A204 B200 B201 H203 H207 H208) (B100 B101 H103 H104 H105 H106 H107) (the last group may need to be completed individually and shall be coordinated with COR and pharmacy).

d. Work within and around Building 5 effecting kitchen operations shall occur outside of normal working hours.

e. Work within and around Building 9 shall occur during normal working hours; windows shall be grouped by room.

f. Work within and around Building 14 shall occur during normal working hours; the Contractor will be allowed one room per floor (usually both floors, one above the other); windows shall be grouped by room; Contractor to provide and maintain schedule.

g. Work within and around Building 25 shall be coordinated with the COR and the Fire Service; Contractor shall be responsible for temporary relocation of furniture (250# lockers, beds, chairs) related to windows A100, B100, B102, & C103. Windows shall be replaced in the following groups (A100) (B100) (B101) (C103) (A101 A012 A013) (A104 A105 A106) (C102) (C101) (C100).

h. Work within and around Building 85 shall occur during normal working hours and shall be coordinated with Consolidated Work Therapy through the COR.

i. Work within and around Building 136 shall occur during normal working hours.

#### H. Phasing:

The Medical Center must maintain its operation 24 hours a day 7 days a week. Therefore, any interruption in service must be scheduled and coordinated with the COR to ensure that no lapses in operation occur. It is the CONTRACTOR'S responsibility to develop a work plan and schedule detailing, at a minimum, the procedures to be employed, the equipment and materials to be used, the interim life safety measure to be used during the work, and a schedule defining the duration of the work with milestone subtasks. The work to be outlined shall include: All work as outlined in the construction documents.

To insure such executions, Contractor shall furnish the COR with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the COR two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such phasing dates to insure accomplishment of this work in successive phases mutually agreeable to Medical Center Director, COR and Contractor, as follows:

**Phase I: As described in the construction documents.**

**Phase II: As described in the construction documents.**

- I. Building(s) No.(s) as outlined in construction documents shall be occupied during performance of work.

Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations shall not be hindered. Contractor shall permit access to Department of Veterans Affairs personnel and patients through other construction areas which serve as routes of access to such affected areas and equipment. These routes whether access or egress shall be isolated

from the construction area by temporary partitions and have walking surfaces, lighting etc to facilitate patient and staff access.

Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations shall continue during the construction period.

- J. Construction Fence: Before construction operations begin, Contractor shall provide a chain link construction fence, 2.1m (six feet) minimum height, around the construction area indicated on the drawings. Provide gates as required for access with necessary hardware, including hasps and padlocks. Fasten fence fabric to terminal posts with tension bands and to line posts and top and bottom rails with tie wires spaced at maximum 375mm (15 inches). Bottom of fences shall extend to 25mm (one inch) above grade. Remove the fence when directed by COR.
- K. When a building and/or construction site is turned over to Contractor, Contractor shall accept entire responsibility including upkeep and maintenance therefore:
1. Contractor shall maintain a minimum temperature of 4 degrees C (40 degrees F) at all times, except as otherwise specified.
  2. Contractor shall maintain in operating condition existing fire protection and alarm equipment. In connection with fire alarm equipment, Contractor shall make arrangements for pre-inspection of site with Fire Department or Company (Department of Veterans Affairs or municipal) whichever shall be required to respond to an alarm from Contractor's employee or watchman.
- L. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COR.

1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of COR. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without a detailed work plan, the COR prior knowledge and written approval. Refer to specification Sections 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, for additional requirements.
  2. Contractor shall submit a request to interrupt any such services to COR, in writing, 7 days in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
  3. Contractor shall be advised (in writing) of approval of request, or of which other date and/or time such interruption shall cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
  4. Major interruptions of any system shall be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the COR.
  5. In case of a contract construction emergency, service shall be interrupted on approval of COR. Such approval shall be confirmed in writing as soon as practical.
  6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.
- M. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged at the main, branch or panel they originate from. The lines shall not be capped in finished areas, but shall be

removed and sealed, capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.

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

1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles.

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

#### **1.7 ALTERATIONS**

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

1. Existing condition and types of flooring, doors, windows, walls and other surfaces not required to be altered throughout affected areas of building.
2. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, venetian blinds, shades, , required by drawings to be either reused or relocated, or both.
3. Shall note any discrepancies between drawings and existing conditions at site.
4. Shall designate areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and COR.



- B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of COR, to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which shall be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract shall be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).
- C. Re-Survey: Five days before expected partial or final inspection date, the Contractor and COR together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of flooring, doors, windows, walls and other surfaces as compared with conditions of same as noted in first condition survey report:
1. Re-survey report shall also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures; and, shall form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workmen in executing work of this contract.
- D. Protection: Provide the following protective measures:
1. Wherever existing roof surfaces are disturbed they shall be protected against water infiltration. In case of leaks, they shall be repaired immediately upon discovery.
  2. Temporary protection against damage for portions of existing structures and grounds where work is to be done, materials handled and equipment moved and/or relocated.
  3. Protection of interior of existing structures at all times, from damage, dust and weather inclemency. Wherever work is performed, floor surfaces that are to remain in place shall be adequately protected prior to starting work, and this protection shall be maintained intact until all work in the area is completed.

**1.8 DISPOSAL AND RETENTION**

- A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:
1. Reserved items which are to remain property of the Government are noted on drawings or in specifications as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by COR.
  2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center.
  3. Items of portable equipment and furnishings located in rooms and spaces in which work is to be done under this contract shall remain the property of the Government. When rooms and spaces are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused shall be removed by the Government in advance of work to avoid interfering with Contractor's operation.

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

- A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract in accordance with Specification Section 32 90 00 Planting. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that shall remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

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

**(FAR 52.236-9)**

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

**1.10 RESTORATION**

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

#### **1.11 PHYSICAL DATA**

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

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

- B. Government does not guarantee that other materials will not be encountered nor that proportions, conditions or character of several materials will not vary from those indicated by explorations. Bidders are expected to examine site of work and logs of borings; and, after investigation, decide for themselves character of materials and make their bids accordingly.

**1.12 AS-BUILT DRAWINGS**

- A. The contractor shall maintain two full size sets of as-built drawings which shall 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 COR review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built drawings in the electronic version (scanned PDF) to the COR within 15 calendar days after each completed phase and after the acceptance of the project by the COR.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.

**1.13 USE OF ROADWAYS**

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

**1.14 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT**

- A. Use of new installed mechanical and electrical equipment to provide heat, ventilation, plumbing, light and power shall be permitted subject to written approval and compliance with the following provisions:
  - 1. Permission to use each unit or system shall be given by COR in writing. If the equipment is not installed and maintained in accordance with the written agreement and following provisions, the COR will withdraw permission for use of the equipment.
  - 2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems, i.e. transformers, relays,

- circuit breakers, fuses, conductors, motor controllers and their overload elements shall be properly sized, coordinated and adjusted. Installation of temporary electrical equipment or devices shall be in accordance with NFPA 70, National Electrical Code, (2014 Edition), Article 590, *Temporary Installations*. Voltage supplied to each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.
3. Units shall be properly lubricated, balanced, and aligned. Vibrations shall be eliminated.
  4. Automatic temperature control systems for preheat coils shall function properly and all safety controls shall function to prevent coil freeze-up damage.
  5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced at completion of construction and prior to testing and balancing of system.
  6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government. Boilers, pumps, feedwater heaters and auxiliary equipment shall be operated as a complete system and be fully maintained by operating personnel. Boiler water shall be given complete and continuous chemical treatment.
- B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Government.
- C. This paragraph shall not reduce the requirements of the mechanical and electrical specifications sections.

- D. Any damage to the equipment or excessive wear due to prolonged use shall be repaired replaced by the contractor at the contractor's expense.

#### **1.15 TEMPORARY USE OF EXISTING ELEVATORS**

- A. Use of existing elevators for handling building materials and Contractor's personnel shall be permitted subject to following provisions:
1. Contractor makes all arrangements with the COR for use of elevators. The COR will ascertain that elevators are in proper condition. Contractor may use the service elevators Personnel for operating elevators shall not be provided by the Department of Veterans Affairs.
  2. Contractor covers and provides maximum protection of following elevator components:
    - a. Entrance jambs, heads soffits and threshold plates.
    - b. Entrance columns, canopy, return panels and inside surfaces of car enclosure walls.
    - c. Finish flooring.
  3. Government shall accept hoisting ropes of elevator and rope of each speed governor if they are worn under normal operation. However, if these ropes are damaged by action of foreign matter such as sand, lime, grit, stones, etc., during temporary use, they shall be removed and replaced by new hoisting ropes at the contractors expense.
  4. If brake lining of elevators are excessively worn or damaged during temporary use, they shall be removed and replaced by new brake lining at the contractors expense.
  5. All parts of main controller, starter, relay panel, selector, etc., worn or damaged during temporary use shall be removed and replaced with new parts at the contractors expense, if recommended by elevator inspector after elevator is released by Contractor.

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

#### **1.16 TEMPORARY TOILETS**

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

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

- A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The amount to be paid by the Contractor for chargeable electrical services shall be the prevailing rates charged to the Government. The Contractor shall carefully conserve any utilities furnished without charge.
- B. The Contractor, at Contractor's expense and in a workmanlike manner, in compliance with code and as satisfactory to the COR, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of electricity used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia and repair restore the infrastructure as required.
- C. Heat: Furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, shall not be permitted. Maintain minimum temperatures as specified for various materials:



D. Electricity (for Construction and Testing): Furnish all temporary electric services.

1. Obtain electricity by connecting to the Medical Center electrical distribution system. The Contractor shall meter and pay for electricity required for electric cranes and hoisting devices, electrical welding devices and any electrical heating devices providing temporary heat. Electricity for all other uses is available at no cost to the Contractor.

E. Water (for Construction and Testing): Furnish temporary water service.

1. Obtain water by connecting to the Medical Center water distribution system. Provide reduced pressure backflow preventer at each connection as per code. Water is available at no cost to the Contractor.
2. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted. Failure to stop leakage or other wastes shall be cause for revocation (at COR discretion) of use of water from Medical Center's system.

#### **1.18 INSTRUCTIONS**

- A. Contractor shall furnish Maintenance and Operating manuals (hard copies and electronic) and verbal instructions when required by the various sections of the specifications and as hereinafter specified.
- B. Manuals: Maintenance and operating manuals and one compact disc (four hard copies and one electronic copy each) for each separate piece of equipment and finish material shall be delivered to the COR coincidental with the delivery of the equipment and finish material to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment and finish material. 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 shall 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 shall not be accepted.

- C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed training to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training shall 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 COR and shall be considered concluded only when the COR is satisfied in regard to complete and thorough coverage. The contractor shall submit a course outline with associated material to the COR for review and approval prior to scheduling training to ensure the subject matter covers the expectations of the VA and the contractual requirements. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the COR, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

#### **1.19 RELOCATED EQUIPMENT / ITEMS**

- A. Contractor shall disconnect, dismantle as necessary, remove and reinstall in new location, all existing equipment and items shown to be relocated by the Contractor.

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

#### **1.20 HISTORIC PRESERVATION**

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

- - - E N D - - -

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

**PART 1- GENERAL**

**1.1 DESCRIPTION:**

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

**1.2 CONTRACTOR'S REPRESENTATIVE:**

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

**1.3 CONTRACTOR'S CONSULTANT:**

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

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

#### **1.4 COMPUTER PRODUCED SCHEDULES**

- A. The contractor shall provide monthly, to the Department of Veterans Affairs (VA), all computer-produced time/cost schedules and reports generated from monthly project updates. This monthly computer service shall 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 PDF format. These shall be submitted with and substantively support the contractor's monthly payment request and the signed look ahead report. The COR shall identify the five different report formats that the contractor shall provide.
- B. The contractor shall be responsible for the correctness and timeliness of the computer-produced reports. The Contractor shall also responsible for the accurate and timely submittal of the updated project schedule and all CPM data necessary to produce the computer reports and payment request that is specified.
- C. The VA will report errors in computer-produced reports to the Contractor's representative within ten calendar days from receipt of reports. The Contractor shall reprocess the computer-produced reports and associated diskette(s), when requested by the Contracting Officer's representative, to correct errors which affect the payment and schedule for the project.

#### **1.5 THE COMPLETE PROJECT SCHEDULE SUBMITTAL**

- A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three blue line copies of the interim schedule on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file in the previously approved CPM schedule program. The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost. Each activity/event on the computer-produced schedule shall contain as

a minimum, but not limited to, activity/event ID, activity/event description, duration, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start or start-to-start without lead or lag constraints. Activity/event date constraints, not required by the contract, shall 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 Representative's separate approval of the Project Schedule shall not excuse the contractor of this requirement. Logic events (non-work) shall be permitted where necessary to reflect proper logic among work events, but shall 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 shall provide their requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.

- B. Within 30 calendar days after receipt of the complete project interim Project Schedule and the complete final Project Schedule, the Contracting Officer or his representative, will do one or both of the following:
1. Notify the Contractor concerning his actions, opinions, and objections.
  2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan shall 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

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

- C. The approved baseline schedule and the computer-produced schedule(s) generated there from shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.
- D. The Complete Project Schedule shall contain approximately 10 work activities/events.

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

- A. The Contractor shall cost load all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves shall be used by the Contracting Officer Representative to assist him in determining approval or disapproval of the cost loading. Negative work activity/event cost data shall 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, 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 shall perform the work.
- D. The Contractor shall cost load work activities/events for all BID ITEMS including ASBESTOS ABATEMENT. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

**1.7 PROJECT SCHEDULE REQUIREMENTS**

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

1. Show activities/events as:
  - a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
  - b. Contracting Officer Representative'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 COR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals shall not be less than 20 work days.
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 shall 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 Representative 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 COR. 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 COR's approval of the Project Schedule.
- D. Compact Disk Requirements and CPM Activity/Event Record Specifications: Submit to the VA an electronic file(s) containing one file of the data required to produce a schedule, reflecting all the activities/events of the complete project schedule being submitted.

#### **1.8 PAYMENT TO THE CONTRACTOR:**

- A. Monthly, the contractor shall submit an application and certificate for payment using VA Form 10-6001a 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 shall 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.

**1.9 PAYMENT AND PROGRESS REPORTING**

- A. Monthly schedule update meetings shall be held on dates mutually agreed to by the COR 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 COR three work days in advance of the schedule update meeting. Job progress shall 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 shall 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 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 COR 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 COR. 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 COR within fourteen (14) calendar days of completing the regular schedule update. **Before inserting the contract changes durations, care shall be taken to ensure that only the original durations shall be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor shall 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 shall 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, Contracting Officer Representative, 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 shall 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 shall occur after each monthly project schedule update meeting utilizing the resulting schedule reports from that schedule update. If the project is behind schedule, discussions shall include ways to prevent further slippage as well as ways to improve the project schedule status, when appropriate.

#### **1.10 RESPONSIBILITY FOR COMPLETION**

- A. If it becomes apparent from the current revised monthly progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:
1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
  2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
  3. Reschedule the work in conformance with the specification requirements.

- B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the COR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.

#### **1.11 CHANGES TO THE SCHEDULE**

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

contract change, man hours expended in analyzing the change, and the total cost of the change.

- E. The cost of revisions to the Project Schedule not resulting from contract changes is the responsibility of the Contractor.

#### **1.12 ADJUSTMENT OF CONTRACT COMPLETION**

- A. The contract completion time shall 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 COR 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 shall clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer Representative 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, shall not be the basis for a change to the contract completion date. The Contracting Officer Representative 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 Representative's decision.
- C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer Representative 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.

- - - E N D - - -

**SECTION 01 33 23****SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES****PART 1 - GENERAL****1.1 DESCRIPTION**

- A. This specification defines the general requirements and procedures for submittals. A submittal is information submitted for VA review to establish compliance with the contract documents.
- B. Detailed submittal requirements are found in the technical sections of the contract specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective technical specifications at no additional cost to the government.
- C. VA approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work will be removed and replaced at the Contractor's expense.

**1.2 DEFINITIONS**

- A. Preconstruction Submittals: Submittals which are required prior to issuing contract notice to proceed or starting construction. For example, Certificates of insurance; Surety bonds; Site-specific safety plan; Construction progress schedule; Schedule of values; Submittal register; List of proposed subcontractors.
- B. Shop Drawings: Drawings, diagrams, and schedules specifically prepared to illustrate some portion of the work. Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be integrated and coordinated.
- C. Product Data: Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions, and brochures, which describe and illustrate size, physical appearance, and other characteristics of materials, systems, or equipment for some portion of the work. Samples of warranty language when the contract requires extended product warranties.

- D. Samples: Physical examples of materials, equipment, or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged. Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project. Field samples and mock-ups constructed to establish standards by which the ensuing work can be judged.
- E. Design Data: Calculations, mix designs, analyses, or other data pertaining to a part of work.
- F. Test Reports: Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work. Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.
- G. Certificates: Document required of Contractor, or of a manufacturer, supplier, installer, or subcontractor through Contractor. The purpose is to document procedures, acceptability of methods, or personnel qualifications for a portion of the work.
- H. Manufacturer's Instructions: Pre-printed material describing installation of a product, system, or material, including special notices and (MSDS) concerning impedances, hazards, and safety precautions.
- I. Manufacturer's Field Reports: Documentation of the testing and verification actions taken by manufacturer's representative at the job site on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must indicate whether the material, product, or system has passed or failed the test.
- J. Operation and Maintenance Data: Manufacturer data that is required to operate, maintain, troubleshoot, and repair equipment, including manufacturer's help, parts list, and product line documentation. This data shall be incorporated in an operations and maintenance manual.
- K. Closeout Submittals: Documentation necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a phase of construction on a multi-phase contract.



**1.3 SUBMITTAL REGISTER**

- A. The submittal register will list items of equipment and materials for which submittals are required by the specifications. This list may not be all inclusive and additional submittals may be required by the specifications. The Contractor is not relieved from supplying submittals required by the contract documents but which have been omitted from the submittal register.
- B. The submittal register will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period.
- C. The VA will provide the initial submittal register in electronic format via Submittal Exchange. Thereafter, the Contractor shall track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the VA via Submittal Exchange.
- D. The Contractor shall update the submittal register as submittal actions occur and maintain the submittal register at the project site until final acceptance of all work by Contracting Officer.
- E. The Contractor shall submit formal monthly updates to the submittal register in electronic format. Each monthly update shall document actual submission and approval dates for each submittal.

**1.4 SUBMITTAL SCHEDULING**

- A. Submittals are to be scheduled, submitted, reviewed, and approved prior to the acquisition of the material or equipment.
- B. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow time for potential resubmittal.
- C. No delay costs or time extensions will be allowed for time lost in late submittals or resubmittals.
- D. All submittals are required to be approved prior to the start of the specified work activity.

**1.5 SUBMITTAL PREPARATION**

- A. Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.
- B. Collect required data for each specific material, product, unit of work, or system into a single submittal. Prominently mark choices, options,

and portions applicable to the submittal. Partial submittals will not be accepted for expedition of construction effort. Submittal will be returned without review if incomplete.

- C. If available product data is incomplete, provide Contractor-prepared documentation to supplement product data and satisfy submittal requirements.
- D. All irrelevant or unnecessary data shall be removed from the submittal to facilitate accuracy and timely processing. Submittals that contain the excessive amount of irrelevant or unnecessary data will be returned with review.
- E. Provide a transmittal form for each submittal with the following information:
  - 1. Project title and location.
  - 2. Construction contract number.
  - 3. Date of the drawings and revisions.
  - 4. Name, address, and telephone number of subcontractor, supplier, manufacturer, and any other subcontractor associated with the submittal.
  - 5. List paragraph number of the specification section and sheet number of the contract drawings by which the submittal is required.
  - 6. When a resubmission, add alphabetic suffix on submittal description. For example, submittal 18 would become 18A, to indicate resubmission.
  - 7. Product identification and location in project.
- F. The Contractor is responsible for reviewing and certifying that all submittals are in compliance with contract requirements before submitting for VA review. Proposed deviations from the contract requirements are to be clearly identified. All deviations submitted must include a side by side comparison of item being proposed against item specified. Failure to point out deviations will result in the VA requiring removal and replacement of such work at the Contractor's expense.
- G. Stamp, sign, and date each submittal transmittal form indicating action taken.
- H. Stamp used by the Contractor on the submittal transmittal form to certify that the submittal meets contract requirements is to be similar to the following:

|   |
|---|
| CONTRACTOR  |
| (Firm Name)   |
| _____ Approved  |
| _____ Approved with corrections as noted on submittal data and/or<br>attached sheets(s) |
| SIGNATURE: _____  |
| TITLE: _____  |
| DATE: _____   |

#### 1.6 SUBMITTAL FORMAT AND TRANSMISSION

- A. Provide submittals in electronic format, with the exception of material samples. Use PDF as the electronic format, unless otherwise specified or directed by the Contracting Officer.
- B. Compile the electronic submittal file as a single, complete document. Name the electronic submittal file specifically according to its contents.
- C. Electronic files must be of sufficient quality that all information is legible. Generate PDF files from original documents so that the text included in the PDF file is both searchable and can be copied. If documents are scanned, Optical Character Resolution (OCR) routines are required.
- D. Submit electronic submittal documents through Submittal Exchange.

- E. Provide hard copies of submittals when requested by the Contracting Officer. Up to 3 additional hard copies of any submittal may be requested at the discretion of the Contracting Officer, at no additional cost to the VA.

#### **1.7 SAMPLES**

- A. Submit two sets of physical samples showing range of variation, for each required item.
- B. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified.
- C. When color, texture, or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.
- D. Before submitting samples, the Contractor is to ensure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.
- E. The VA reserves the right to disapprove any material or equipment which previously has proven unsatisfactory in service.
- F. Physical samples supplied maybe requested back for use in the project after reviewed and approved.

#### **1.8 OPERATION AND MAINTENANCE DATA**

- A. Submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.
- B. In the event the Contractor fails to deliver O&M Data within the time limits specified, the Contracting Officer may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

#### **1.9 TEST REPORTS**

SRE may require specific test after work has been installed or completed which could require contractor to repair test area at no additional cost to contract.

**1.10 VA REVIEW OF SUBMITTALS AND RFIS**

- A. The VA will review all submittals for compliance with the technical requirements of the contract documents. The Architect-Engineer for this project will assist the VA in reviewing all submittals and determining contractual compliance. Review will be only for conformance with the applicable codes, standards and contract requirements.
- B. Period of review for submittals begins when the VA COR receives submittal from the Contractor.
- C. Period of review for each resubmittal is the same as for initial submittal.
- D. VA review period is 15 working days for submittals.
- E. VA review period is 10 working days for RFIs.
- F. The VA will return submittals to the Contractor with the following notations:
  - 1. "Approved": authorizes the Contractor to proceed with the work covered.
  - 2. "Approved as noted": authorizes the Contractor to proceed with the work covered provided the Contractor incorporates the noted comments and makes the noted corrections.
  - 3. "Disapproved, revise and resubmit": indicates noncompliance with the contract requirements or that submittal is incomplete. Resubmit with appropriate changes and corrections. No work shall proceed for this item until resubmittal is approved.
  - 4. "Not reviewed": indicates submittal does not have evidence of being reviewed and approved by Contractor or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals after taking appropriate action.

**1.11 APPROVED SUBMITTALS**

- A. The VA approval of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing, and other information are satisfactory.
- B. VA approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project.

Non-compliant material incorporated in the work will be removed and replaced at the Contractor's expense.

- C. After submittals have been approved, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.
- D. Retain a copy of all approved submittals at project site, including approved samples.

#### **1.12 WITHHOLDING OF PAYMENT**

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

- - - E N D - - -

**SECTION 01 35 26**  
**SAFETY REQUIREMENTS**

**TABLE OF CONTENTS**

|      |  |                    |
|------|--|--------------------|
| 1.1  | APPLICABLE PUBLICATIONS .....  | 2                  |
| 1.2  | DEFINITIONS .....  | 3                  |
| 1.3  | REGULATORY REQUIREMENTS .....  | 5                  |
| 1.4  | ACCIDENT PREVENTION PLAN (APP) .....   | 5                  |
| 1.5  | ACTIVITY HAZARD ANALYSES (AHAs) .....  | <a href="#">10</a> |
| 1.6  | PRECONSTRUCTION CONFERENCE .....   | 12                 |
| 1.7  | "SITE SAFETY AND HEALTH OFFICER" (SSHO) and "COMPETENT PERSON"<br>(CP) ..... | 13                 |
| 1.8  | TRAINING .....   | <a href="#">13</a> |
| 1.9  | INSPECTIONS .....  | 15                 |
| 1.10 | ACCIDENTS, OSHA 300 LOGS, AND MAN-HOURS .....                                | 16                 |
| 1.11 | PERSONAL PROTECTIVE EQUIPMENT (PPE) .....                                    | 17                 |
| 1.12 | INFECTION CONTROL .....  | <a href="#">17</a> |
| 1.13 | FIRE SAFETY .....  | 25                 |
| 1.14 | ELECTRICAL .....   | 27                 |
| 1.15 | FALL PROTECTION .....  | 29                 |
| 1.16 | SCAFFOLDS AND OTHER WORK PLATFORMS .....                                     | 30                 |
| 1.17 | CRANES .....   | 31                 |
| 1.18 | CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT) .....                           | 31                 |
| 1.19 | CONFINED SPACE ENTRY .....   | 32                 |
| 1.20 | WELDING AND CUTTING .....  | 32                 |
| 1.21 | LADDERS .....  | 32                 |
| 1.22 | FLOOR & WALL OPENINGS .....  | 33                 |

**SECTION 01 35 26**  
**SAFETY REQUIREMENTS**

**1.1 APPLICABLE PUBLICATIONS:**

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

B. American Society of Safety Engineers (ASSE):

A10.1-2011.....Pre-Project & Pre-Task Safety and Health  
Planning

A10.34-2012.....Protection of the Public on or Adjacent to  
Construction Sites

A10.38-2013.....Basic Elements of an Employer's Program to  
Provide a Safe and Healthful Work Environment  
American National Standard Construction and  
Demolition Operations

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

E84-2013.....Surface Burning Characteristics of Building  
Materials

D. The Facilities Guidelines Institute (FGI):

FGI Guidelines-2010Guidelines for Design and Construction of  
Healthcare Facilities

E. National Fire Protection Association (NFPA):

10-2013.....Standard for Portable Fire Extinguishers

30-2012.....Flammable and Combustible Liquids Code

51B-2014.....Standard for Fire Prevention During Welding,  
Cutting and Other Hot Work

70-2014.....National Electrical Code

70B-2013.....Recommended Practice for Electrical Equipment  
Maintenance



70E-2015 .....Standard for Electrical Safety in the Workplace

99-2012.....Health Care Facilities Code

241-2013.....Standard for Safeguarding Construction,  
Alteration, and Demolition Operations

F. The Joint Commission (TJC)

TJC Manual .....Comprehensive Accreditation and Certification  
Manual

G. U.S. Nuclear Regulatory Commission

10 CFR 20 .....Standards for Protection Against Radiation

H. U.S. Occupational Safety and Health Administration (OSHA):

29 CFR 1904 .....Reporting and Recording Injuries & Illnesses

29 CFR 1910 .....Safety and Health Regulations for General  
Industry

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

CPL 2-0.124.....Multi-Employer Citation Policy

I. VHA Directive 2005-007

**1.2 DEFINITIONS:**

A. Critical Lift. A lift with the hoisted load exceeding 75% of the crane's maximum capacity; lifts made out of the view of the operator (blind picks); lifts involving two or more cranes; personnel being hoisted; and special hazards such as lifts over occupied facilities, loads lifted close to power-lines, and lifts in high winds or where other adverse environmental conditions exist; and any lift which the crane operator believes is critical.

B. OSHA "Competent Person" (CP). One who is capable of identifying existing and predictable hazards in the surroundings and working conditions which are unsanitary, hazardous or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them (see 29 CFR 1926.32(f)).

- C. "Qualified Person" means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.
- D. High Visibility Accident. Any mishap which may generate publicity or high visibility.
- E. Accident/Incident Criticality Categories:

No impact - near miss incidents that should be investigated but are not required to be reported to the VA;

Minor incident/impact - incidents that require first aid or result in minor equipment damage (less than \$5000). These incidents shall be investigated but are not required to be reported to the VA;

Moderate incident/impact - Any work-related injury or illness that results in:

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

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

Major incident/impact - Any mishap that leads to fatalities, hospitalizations, amputations, and losses of an eye as a result of

contractors' activities. Or any incident which leads to major property damage (greater than \$20,000) and/or may generate publicity or high visibility. These incidents shall be investigated and are required to be reported to the VA as soon as practical, but not later than 2 hours after the incident.

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

### **1.3 REGULATORY REQUIREMENTS:**

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

### **1.4 ACCIDENT PREVENTION PLAN (APP):**

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

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

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

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

**g. SAFETY AND HEALTH INSPECTIONS.**

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

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

- 1) Exposure data (man-hours worked);
- 2) Accident investigation reports;

3) Project site injury and illness logs.

**i. PLANS (PROGRAMS, PROCEDURES) REQUIRED.** Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable occupational risks in site-specific compliance and accident prevention plans. These Plans shall include procedures for addressing the risks associates with the following:

- 1) Emergency response ;
- 2) Contingency for severe weather;
- 3) Fire Prevention ;
- 4) Medical Support;
- 5) Posting of emergency telephone numbers;
- 6) Prevention of alcohol and drug abuse;
- 7) Site sanitation (housekeeping, drinking water, toilets);
- 8) Night operations and lighting ;
- 9) Hazard communication program;
- 10) Welding/Cutting "Hot" work ;
- 11) Electrical Safe Work Practices (Electrical LOTO/NFPA 70E);
- 12) General Electrical Safety
- 13) Hazardous energy control (Machine LOTO);
- 14) Site-Specific Fall Protection & Prevention;
- 15) Excavation/trenching;
- 16) Asbestos abatement;
- 17) Lead abatement;
- 18) Crane Critical lift;
- 19) Respiratory protection;

- 20) Health hazard control program;
- 21) Radiation Safety Program;
- 22) Abrasive blasting;
- 23) Heat/Cold Stress Monitoring;
- 24) Crystalline Silica Monitoring (Assessment);
- 25) Demolition plan (to include engineering survey);
- 26) Formwork and shoring erection and removal;
- 27) PreCast Concrete.

- C. Submit the APP to the Contracting Officer Representative for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP.
- D. Once accepted by the Contracting Officer Representative, the APP and attachments shall be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP shall be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.
- E. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Contracting Officer Representative. Should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34) and the environment.

#### **1.5 ACTIVITY HAZARD ANALYSES (AHAS):**

- A. AHAs are also known as Job Hazard Analyses, Job Safety Analyses, and Activity Safety Analyses. Before beginning each work activity involving a type of work presenting hazards not experienced in previous



project operations or where a new work crew or sub-contractor is to perform the work, the Contractor(s) performing that work activity shall prepare an AHA (Example electronic AHA forms can be found on the US Army Corps of Engineers web site)

- B. AHAs shall define the activities being performed and identify the work sequences, the specific anticipated hazards, site conditions, equipment, materials, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk.
- C. Work shall not begin until the AHA for the work activity has been accepted by the Contracting Officer Representative and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.
  - 1. The names of the Competent/Qualified Person(s) required for a particular activity (for example, excavations, scaffolding, fall protection, other activities as specified by OSHA and/or other State and Local agencies) shall be identified and included in the AHA. Certification of their competency/qualification shall be submitted to the Government Designated Authority (GDA) for acceptance prior to the start of that work activity.
  - 2. The AHA shall be reviewed and modified as necessary to address changing site conditions, operations, or change of competent/qualified person(s).
    - a. If more than one Competent/Qualified Person is used on the AHA activity, a list of names shall be submitted as an attachment to the AHA. Those listed shall be Competent/Qualified for the type of work involved in the AHA and familiar with current site safety issues.
    - b. If a new Competent/Qualified Person (not on the original list) is added, the list shall be updated (an administrative action not requiring an updated AHA). The new person shall acknowledge in writing that he or she has reviewed the AHA and is familiar with current site safety issues.

3. Submit AHAs to the Contracting Officer Representative for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES for review at least 15 calendar days prior to the start of each phase. Subsequent AHAs as shall be formatted as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.
4. The AHA list shall be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.
5. Develop the activity hazard analyses using the project schedule as the basis for the activities performed. All activities listed on the project schedule shall require an AHA. The AHAs shall be developed by the contractor, supplier, or subcontractor and provided to the prime contractor for review and approval and then submitted to the Contracting Officer Representative.

#### **1.6 PRECONSTRUCTION CONFERENCE:**

- A. Contractor representatives who have a responsibility or significant role in implementation of the accident prevention program, as required by 29 CFR 1926.20(b)(1), on the project shall attend the preconstruction conference to gain a mutual understanding of its implementation. This includes the project superintendent, subcontractor superintendents, and any other assigned safety and health professionals.
- B. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that shall be developed and implemented during the performance of the contract. This list of proposed AHAs shall be reviewed at the conference and an agreement shall be reached between the Contractor and the Contracting Officer's representative as to which phases shall require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.
- C. Deficiencies in the submitted APP shall be brought to the attention of the Contractor within 14 days of submittal, and the Contractor shall

revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

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

- A. The Prime Contractor shall designate a minimum of one SSHO at each project site that shall be identified as the SSHO to administer the Contractor's safety program and government-accepted Accident Prevention Plan. Each subcontractor shall designate a minimum of one CP in compliance with 29 CFR 1926.20 (b) (2) that shall be identified as a CP to administer their individual safety programs.
- B. Further, all specialized Competent Persons for the work crews shall be supplied by the respective contractor as required by 29 CFR 1926 (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).
- C. These Competent Persons can have collateral duties as the subcontractor's superintendent and/or work crew lead persons as well as fill more than one specialized CP role (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations). However, the SSHO shall be a separate qualified individual from the Prime Contractor's Superintendent and/or Quality Control Manager with duties only as the SSHO.
- D. The SSHO or an equally-qualified Designated Representative/alternate shall maintain a presence on the site during construction operations. CPs shall maintain presence during their construction activities in accordance with above mentioned clause. A listing of the designated SSHO and all known CPs shall be submitted prior to the start of work as part of the APP with the training documentation and/or AHA as listed in Section 1.8 below.
- E. The repeated presence of uncontrolled hazards during a contractor's work operations shall result in the designated CP as being deemed incompetent and result in the required removal of the employee in accordance with FAR Clause 52.236-5: Material and Workmanship, Paragraph (c).

**1.8 TRAINING:**

- A. The designated Prime Contractor SSHO shall meet the requirements of all applicable OSHA standards and be capable (through training, experience, and qualifications) of ensuring that the requirements of 29 CFR 1926.16 and other appropriate Federal, State and local requirements are met for the project. As a minimum the SSHO shall have completed the OSHA 30-hour Construction Safety class and have five (5) years of construction industry safety experience or three (3) years if he/she possesses a Certified Safety Professional (CSP) or certified Construction Safety and Health Technician (CSHT) certification or have a safety and health degree from an accredited university or college.
- B. All designated CPs shall have completed the OSHA 30-hour Construction Safety course within the past 5 years.
- C. In addition to the OSHA 30 Hour Construction Safety Course, all CPs with high hazard work operations such as operations involving asbestos, electrical, cranes, demolition, work at heights/fall protection, fire safety/life safety, ladder, rigging, scaffolds, and trenches/excavations shall have a specialized formal course in the hazard recognition & control associated with those high hazard work operations. Documented "repeat" deficiencies in the execution of safety requirements shall require retaking the requisite formal course.
- D. All other construction workers shall have the OSHA 10-hour Construction Safety Outreach course and any necessary safety training to be able to identify hazards within their work environment.
- E. Submit training records associated with the above training requirements to the Contracting Officer Representative for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance.
- F. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the SSHO or his/her designated representative. As a minimum, this briefing shall include information on the site-specific hazards, construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, emergency procedures,

accident reporting etc. Documentation shall be provided to the COR that individuals have undergone contractor's safety briefing.

- G. Ongoing safety training shall be accomplished in the form of weekly documented safety meeting.

#### **1.9 INSPECTIONS:**

- A. The SSHO shall conduct frequent and regular safety inspections (daily) of the site and each of the subcontractors CPs shall conduct frequent and regular safety inspections (daily) of the their work operations as required by 29 CFR 1926.20(b)(2). Each week, the SSHO shall conduct a formal documented inspection of the entire construction areas with the subcontractors' "Trade Safety and Health CPs" present in their work areas. Coordinate with, and report findings and corrective actions weekly to Contracting Officer Representative.
- B. A Certified Safety Professional (CSP) with specialized knowledge in construction safety or a certified Construction Safety and Health Technician (CSHT) shall randomly conduct a monthly site safety inspection. The CSP or CSHT can be a corporate safety professional or independently contracted. The CSP or CSHT shall provide their certificate number on the required report for verification as necessary.
1. Results of the inspection shall be documented with tracking of the identified hazards to abatement.
  2. The Contracting Officer Representative shall be notified immediately prior to start of the inspection and invited to accompany the inspection.
  3. Identified hazard and controls shall be discussed to come to a mutual understanding to ensure abatement and prevent future reoccurrence.
  4. A report of the inspection findings with status of abatement shall be provided to the Contracting Officer Representative within one week of the onsite inspection.

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

- A. A. The prime contractor shall establish and maintain an accident reporting, recordkeeping, and analysis system to track and analyze all injuries and illnesses, high visibility incidents, and accidental property damage (both government and contractor) that occur on site. Notify the Contracting Officer Representative as soon as practical, but no more than four hours after any accident meeting the definition of a Moderate or Major incidents, High Visibility Incidents, , or any weight handling and hoisting equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, and PPE used ). Preserve the conditions and evidence on the accident site until the Contracting Officer Representative determine whether a government investigation shall be conducted.
- B. Conduct an accident investigation for all Minor, Moderate and Major incidents as defined in paragraph DEFINITIONS, and property damage accidents resulting in at least \$20,000 in damages, to establish the root cause(s) of the accident. Complete the VA Form 2162 (or equivalent) , and provide the report to the Contracting Officer Representative within 5 calendar days of the accident. The Contracting Officer Representative shall provide copies of any required or special forms.
- C. A summation of all man-hours worked by the contractor and associated sub-contractors for each month shall be reported to the Contracting Officer Representative monthly.
- D. A summation of all Minor, Moderate, and Major incidents experienced on site by the contractor and associated sub-contractors for each month shall be provided to the Contracting Officer Representative monthly. The contractor and associated sub-contractors' OSHA 300 logs shall be made available to the Contracting Officer Representative as requested.

**1.11 PERSONAL PROTECTIVE EQUIPMENT (PPE):**

- A. PPE is governed in all areas by the nature of the work the employee is performing. For example, specific PPE required for performing work on electrical equipment is identified in NFPA 70E, Standard for Electrical Safety in the Workplace.
- B. Mandatory PPE includes:
1. Hard Hats - unless written authorization is given by the Contracting Officer Representative in circumstances of work operations that have limited potential for falling object hazards such as during finishing work or minor remodeling. With authorization to relax the requirement of hard hats, if a worker becomes exposed to an overhead falling object hazard, then hard hats would be required in accordance with the OSHA regulations.
  2. Safety glasses - unless written authorization is given by the Contracting Officer Representative appropriate safety glasses meeting the ANSI Z.87.1 standard shall be worn by each person on site.
  3. Appropriate Safety Shoes - based on the hazards present, safety shoes meeting the requirements of ASTM F2413-11 shall be worn by each person on site unless written authorization is given by the Contracting Officer Representative.
  4. Hearing protection - Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks.

**1.12 INFECTION CONTROL**

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

B. B. An AHA associated with infection control shall be performed by VA personnel in accordance with FGI Guidelines (i.e. Infection Control Risk Assessment (ICRA)). The ICRA procedure found on the American Society for Healthcare Engineering (ASHE) website shall be utilized. Risk classifications of Class II or lower shall require approval by the Contracting Officer Representative before beginning any construction work. Risk classifications of Class III or higher shall require a permit before beginning any construction work. Infection Control permits will be issued through the COR. The Infection Control Permits shall be posted outside the appropriate construction area. More than one permit may be issued for a construction project if the work is located in separate areas requiring separate classes. The required infection control precautions with each class are as follows:

1. Class I requirements:

a. During Construction Work:

- 1) Notify the Contracting Officer Representative.
- 2) Execute work by methods to minimize raising dust from construction operations.
- 3) Ceiling tiles: Immediately replace a ceiling tiles displaced for visual inspection.

b. Upon Completion:

- 1) Clean work area upon completion of task
- 2) Notify the Contracting Officer Representative

2. Class II requirements:

a. During Construction Work:

- 1) Notify the Contracting Officer Representative 2) Provide active means to prevent airborne dust from dispersing into atmosphere such as wet methods or tool mounted dust collectors where possible.
- 3) Water mist work surfaces to control dust while cutting.



- 4) Seal unused doors with duct tape.
- 5) Block off and seal air vents.
- 6) Remove or isolate HVAC system in areas where work is being performed.

b. Upon Completion:

- 1) Wipe work surfaces with cleaner/disinfectant.
- 2) Contain construction waste before transport in tightly covered containers.
- 3) Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.
- 4) Upon completion, restore HVAC system where work was performed
- 5) Notify the Contracting Officer Representative

3. Class III requirements:

a. During Construction Work:

- 1) Obtain permit from the Contracting Officer Representative 2)  
Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system.
- 3) Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.
- 4) Maintain negative air pressure, 0.01 inches of water gauge, within work site utilizing HEPA equipped air filtration units and continuously monitored with a digital display, recording and alarm instrument, which shall be calibrated on installation, maintained with periodic calibration and monitored by the contractor.

5) Contain construction waste before transport in tightly covered containers.

6) Cover transport receptacles or carts. Tape covering unless solid lid.

b. Upon Completion:

1) Do not remove barriers from work area until completed project is inspected by the Contracting Officer Representative and thoroughly cleaned by the VA Environmental Services Department.

2) Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.

3) Vacuum work area with HEPA filtered vacuums.

4) Wet mop area with cleaner/disinfectant.

5) Upon completion, restore HVAC system where work was performed.

6) Return permit to the Contracting Officer Representative

4. Class IV requirements:

a. During Construction Work:

1) Obtain permit from the Contracting Officer Representative

2) Isolate HVAC system in area where work is being done to prevent contamination of duct system.

3) Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.

4) Maintain negative air pressure, 0.01 inches of water gauge, within work site utilizing HEPA equipped air filtration units and continuously monitored with a digital display, recording

and alarm instrument, which shall be calibrated on installation, maintained with periodic calibration and monitored by the contractor.5) Seal holes, pipes, conduits, and punctures.

- 5) Seal holes, pipes, conduits, and punctures.
- 6) Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave work site.
- 7) All personnel entering work site are required to wear shoe covers. Shoe covers shall be changed each time the worker exits the work area.

b. Upon Completion:

- 1) Do not remove barriers from work area until completed project is inspected by the Contracting Officer Representative with thorough cleaning by the VA Environmental Services Dept.
- 2) Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.
- 3) Contain construction waste before transport in tightly covered containers.
- 4) Cover transport receptacles or carts. Tape covering unless solid lid.
- 5) Vacuum work area with HEPA filtered vacuums.
- 6) Wet mop area with cleaner/disinfectant.
- 7) Upon completion, restore HVAC system where work was performed.
- 8) Return permit to the Contracting Officer Representative

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

1. Class III and IV - closed door with masking tape applied over the frame and door is acceptable for projects that can be contained in a single room.
2. Construction, demolition or reconstruction not capable of containment within a single room shall have the following barriers erected and made presentable on hospital occupied side:
  - a. Class III & IV (where dust control is the only hazard, and an agreement is reached with the COR and Medical Center) - Airtight plastic barrier that extends from the floor to ceiling. Seams shall be sealed with duct tape to prevent dust and debris from escaping
  - b. Class III & IV - Drywall barrier erected with joints covered or sealed to prevent dust and debris from escaping.
  - c. Class III & IV - Seal all penetrations in existing barrier airtight
  - d. Class III & IV - Barriers at penetration of ceiling envelopes, chases and ceiling spaces to stop movement air and debris
  - e. Class IV only - Anteroom or double entrance openings that allow workers to remove protective clothing or vacuum off existing clothing
  - f. Class III & IV - At elevators shafts or stairways within the field of construction, overlapping flap minimum of two feet wide of polyethylene enclosures for personnel access.

D. Products and Materials:

1. Sheet Plastic: Fire retardant polystyrene, 6-mil thickness meeting local fire codes
2. Barrier Doors: Self Closing fire-rated solid core wood in steel frame, painted
3. Dust proof one-hour fire-rated drywall
4. High Efficiency Particulate Air-Equipped filtration machine rated at 95% capture of 0.3 microns including pollen, mold spores and dust

- particles. HEPA filters shall have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Maintenance of equipment and replacement of the HEPA filters and other filters shall be in accordance with manufacturer's instructions.
5. Exhaust Hoses: Heavy duty, flexible steel reinforced; Ventilation Blower Hose
  6. Adhesive Walk-off Mats: Provide minimum size mats of 24 inches x 36 inches
  7. Disinfectant: Hospital-approved disinfectant or equivalent product
  8. Portable Ceiling Access Module
- E. Before any construction on site begins, all contractor personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.
- F. A dust control program shall be establish and maintained as part of the contractor's infection preventive measures in accordance with the FGI Guidelines for Design and Construction of Healthcare Facilities. Prior to start of work, prepare a plan detailing project-specific dust protection measures with associated product data, including periodic status reports, and submit to COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- G. Medical center Infection Control personnel shall monitor for airborne disease (e.g. aspergillosis) during construction. A baseline of conditions shall be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality with safe thresholds established.
- H. In general, the following preventive measures shall be adopted during construction to keep down dust and prevent mold.
1. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building

openings. HEPA filtration is required where the exhaust dust may reenter the medical center.

2. Exhaust hoses shall be exhausted so that dust is not reintroduced to the medical center.
3. Adhesive Walk-off/Carpet Walk-off Mats shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.
4. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Vacuum shall utilize HEPA filtration. Maintain surrounding area frequently. Remove debris as it is created. Transport these outside the construction area in containers with tightly fitting lids.
5. The contractor shall not haul debris through patient-care areas without prior approval of the COR and the Medical Center. When, approved, debris shall be hauled in enclosed dust proof containers or wrapped in plastic and sealed with duct tape. No sharp objects should be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust. All equipment, tools, material, etc. transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down.
6. There shall be no standing water during construction. This includes water in equipment drip pans and open containers within the construction areas. All accidental spills shall be cleaned up and dried within 12 hours. Remove and dispose of porous materials that remain damp for more than 72 hours.
7. At completion, remove construction barriers and ceiling protection carefully, outside of normal work hours. Vacuum and clean all surfaces free of dust after the removal.

#### I. Final Cleanup:

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

2. Perform HEPA vacuum cleaning of all surfaces in the construction area. This includes walls, ceilings, cabinets, furniture (built-in or free standing), partitions, flooring.
3. All new air ducts shall be cleaned prior to final inspection.

J. Exterior Construction

1. Contractor shall verify that dust shall not be introduced into the medical center through intake vents, or building openings. HEPA filtration on intake vents is required where dust may be introduced.
2. Dust created from disturbance of soil such as from vehicle movement shall be wetted with use of a water truck as necessary
3. All cutting, drilling, grinding, sanding, or disturbance of materials shall be accomplished with tools equipped with either local exhaust ventilation (i.e. vacuum systems) or wet suppression controls.

**1.13 FIRE SAFETY**

- A. Fire Safety Plan: Establish and maintain a site-specific fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to Contracting Officer Representative for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. This plan may be an element of the Accident Prevention Plan.
- B. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
- C. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- D. Temporary Construction Partitions:
  1. Install and maintain temporary construction partitions to provide smoke-tight separations between the areas that are described in

- phasing requirements and adjoining areas. Construct partitions of gypsum board on both sides of metal steel studs. Extend the partitions through suspended ceilings to floor slab deck or roof. Seal joints and penetrations. At door openings, install Class C,  $\frac{3}{4}$  hour fire/smoke rated doors with self-closing devices.
2. Install one-hour fire-rated temporary construction partitions as shown on drawings to maintain integrity of existing exit stair enclosures, exit passageways, fire-rated enclosures of hazardous areas, horizontal exits, smoke barriers, vertical shafts and openings enclosures.
  3. Close openings in smoke barriers and fire-rated construction to maintain fire ratings. Seal penetrations with listed through-penetration firestop materials in accordance with Section 07 84 00, FIRESTOPPING.
- E. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.
- F. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with Contracting Officer Representative.
- G. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Contracting Officer Representative.
- H. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- I. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- J. Standpipes: Install and extend standpipes up with each floor in accordance with 29 CFR 1926 and NFPA 241. Do not charge wet standpipes subject to freezing until weather protected.



- K. Sprinklers: Install, test and activate new automatic sprinklers prior to removing existing sprinklers.
- L. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with Contracting Officer Representative. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the COR.
- M. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Contracting Officer Representative.
- N. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with COR. Obtain permits from Fire Service each day.
- O. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Contracting Officer Representative.
- P. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.
- Q. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.
- R. If required, submit documentation to the COR that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.

#### **1.14 ELECTRICAL**

- A. All electrical work shall comply with NFPA 70 (NEC), NFPA 70B, NFPA 70E, 29 CFR Part 1910 Subpart J - General Environmental Controls, 29

CFR Part 1910 Subpart S - Electrical, and 29 CFR 1926 Subpart K in addition to other references required by contract.

- B. All qualified persons performing electrical work under this contract shall be licensed journeyman or master electricians. All apprentice electricians performing under this contract shall be deemed unqualified persons unless they are working under the immediate supervision of a licensed electrician or master electrician.
- C. All electrical work shall be accomplished de-energized and in the Electrically Safe Work Condition ( refer to NFPA 70E for Work Involving Electrical Hazards, including Exemptions to Work Permit). Any Contractor, subcontractor or temporary worker who fails to fully comply with this requirement is subject to immediate termination. Only in rare circumstance where achieving an electrically safe work condition prior to beginning work would increase or cause additional hazards, or is infeasible due to equipment design or operational limitations is energized work permitted. The Contracting Officer Representative with approval of the Medical Center Director shall make the determination if the circumstances would meet the exception outlined above. An AHA specific to energized work activities shall be developed, reviewed, and accepted prior to the start of that work.
  - 1. Development of a Hazardous Electrical Energy Control Procedure is required prior to de-energization. A single Simple Lockout/Tagout Procedure for multiple work operations can only be used for work involving qualified person(s) de-energizing one set of conductors or circuit part source. Task specific Complex Lockout/Tagout Procedures are required at all other times.
  - 2. Verification of the absence of voltage after de-energization and lockout/tagout is considered "energized electrical work" (live work) under NFPA 70E, and shall only be performed by qualified persons wearing appropriate shock protective (voltage rated) gloves and arc rate personal protective clothing and equipment, using Underwriters Laboratories (UL) tested and appropriately rated contact electrical testing instruments or equipment appropriate for the environment in which they shall be used.

3. Personal Protective Equipment (PPE) and electrical testing instruments shall be readily available for inspection by the Contracting Officer Representative.
- D.** Before beginning any electrical work, an Activity Hazard Analysis (AHA) shall be conducted to include Shock Hazard and Arc Flash Hazard analyses (NFPA Tables can be used only as a last alternative and it is strongly suggested a full Arc Flash Hazard Analyses be conducted). Work shall not begin until the AHA for the work activity has been accepted by the Contracting Officer Representative and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.
- E.** Ground-fault circuit interrupters. GFCI protection shall be provided where an employee is operating or using cord- and plug-connected tools related to construction activity supplied by 125-volt, 15-, 20-, or 30-ampere circuits. Where employees operate or use equipment supplied by greater than 125-volt, 15-, 20-, or 30- ampere circuits, GFCI protection or an assured equipment grounding conductor program shall be implemented in accordance with NFPA 70E - 2015, Chapter 1, Article 110.4(C) (2) ..

#### **1.15 FALL PROTECTION**

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

not require FP. No worker shall be allowed in the area between the roof or floor edge and the WLS without FP. FP is required when working outside the WLS.

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

#### **1.16 SCAFFOLDS AND OTHER WORK PLATFORMS**

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

**1.17 CRANES**

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

**1.18 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)**

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

**1.19 CONFINED SPACE ENTRY**

- A. All confined space entry shall comply with 29 CFR 1910.146 except for specifically referenced operations in 29 CFR 1926 such as excavations/trenches [1926.651(g)].
- B. A site-specific Confined Space Entry Plan (including permitting process) shall be developed and submitted to the COR.

**1.20 WELDING AND CUTTING**

As specified in section 1.14, Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with COR. Obtain permits from the BC VAMC Fire Service each day. Designate contractor's responsible project-site fire prevention program manager to permit hot work.

**1.21 LADDERS**

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

similar wording, and withdrawn from service until restored to a condition meeting their original design.

## **1.22 FLOOR & WALL OPENINGS**

- A. All floor and wall openings shall comply with 29 CFR 1926 Subpart M.
- B. Floor and roof holes/openings are any that measure over 2 in (51 mm) in any direction of a walking/working surface which persons may trip or fall into or where objects may fall to the level below. Skylights located in floors or roofs are considered floor or roof hole/openings.
- C. All floor, roof openings or hole into which a person can accidentally walk or fall through shall be guarded either by a railing system with toeboards along all exposed sides or a load-bearing cover. When the cover is not in place, the opening or hole shall be protected by a removable guardrail system or shall be attended when the guarding system has been removed, or other fall protection system.
  - 1. Covers shall be capable of supporting, without failure, at least twice the weight of the worker, equipment and material combined.
  - 2. Covers shall be secured when installed, clearly marked with the word "HOLE", "COVER" or "Danger, Roof Opening-Do Not Remove" or color-coded or equivalent methods (e.g., red or orange "X"). Workers shall be made aware of the meaning for color coding and equivalent methods.
  - 3. Roofing material, such as roofing membrane, insulation or felts, covering or partly covering openings or holes, shall be immediately cut out. No hole or opening shall be left unattended unless covered.
  - 4. Non-load-bearing skylights shall be guarded by a load-bearing skylight screen, cover, or railing system along all exposed sides.
  - 5. Workers are prohibited from standing/walking on skylights.

- - - E N D - - -

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



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

#### **1.2 QUALITY CONTROL**

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

#### **1.3 REFERENCES**

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

#### **1.4 SUBMITTALS**

- A. In accordance with Section, 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
  1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, the Contractor shall meet with the COR 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 COR 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 shall include measures for marking the limits of use areas. This plan shall be incorporated within the Erosion Control Plan.
- B. Approval of the Contractor's Environmental Protection Plan shall not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

#### **1.5 PROTECTION OF ENVIRONMENTAL RESOURCES**

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

- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the COR. 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 shall 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. 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. 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. Handle and dispose of solid wastes in such a manner that shall 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.
  7. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
  8. Handle discarded materials other than those included in the solid waste category as directed by the COR.
- 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.
- D. Protection of Fish and Wildlife Resources: Keep construction activities under surveillance, management, and control to minimize interference with, disturbance of, or damage to fish and wildlife. Prior to beginning construction operations, list species that require specific attention along with measures for their protection.

- E. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of Michigan regulations and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.
1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
  2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
  3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
  4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- F. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the COR. Maintain noise-produced work at or below the decibel levels and within the time periods specified.
1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00p.m unless otherwise permitted by local ordinance or the COR. 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,<br>STATIONARY | 80 | PNEUMATIC TOOLS    | 80 |
| PUMPS                 | 75 |                    |    |
| GENERATORS            | 75 | SAWS               | 75 |
| COMPRESSORS           | 75 | VIBRATORS          | 75 |

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

General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at 900 to 1800 mm (three to six feet) in front of any building face.

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

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

- - - E N D - - -

**SECTION 01 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 the following:
  - 1. Waste Management Plan development and implementation.
  - 2. Techniques to minimize waste generation.
  - 3. Sorting and separating of waste materials.
  - 4. Salvage of existing materials and items for reuse or resale.
  - 5. Recycling of materials that cannot be reused or sold.
- D. At a minimum the following waste categories shall be diverted from landfills:
  - 1. Soil.
  - 2. Inerts (eg, concrete, masonry and asphalt).
  - 3. Clean dimensional wood and palette wood.
  - 4. Green waste (biodegradable landscaping materials).
  - 5. Engineered wood products (plywood, particle board and I-joists).
  - 6. Metal products (eg, steel, wire, beverage containers, copper).
  - 7. Cardboard, paper and packaging.
  - 8. Bitumen roofing materials.
  - 9. Plastics (eg, ABS, PVC).
  - 10. Carpet and/or pad.
  - 11. Gypsum board.
  - 12. Insulation.
  - 13. Paint.
  - 14. Fluorescent lamps.

**1.2 RELATED WORK**

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



### 1.3 QUALITY ASSURANCE

- A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction /Demolition waste includes products of the following:
1. Excess or unusable construction materials.
  2. Packaging used for construction products.
  3. Poor planning and/or layout.
  4. Construction error.
  5. Over ordering.
  6. Weather damage.
  7. Contamination.
  8. Mishandling.
  9. Breakage.
- B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that shall be generated by demolition and construction.
- C. Contractor shall develop and implement procedures to recycle construction and demolition waste to a minimum of 50 percent.
- D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.
- E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website <http://www.wbdg.org/tools/cwm.php> provides a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects.
- F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas shall 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, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.
- I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.
- J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.
- K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.

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

#### **1.5 SUBMITTALS**

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:
- B. Prepare and submit to the Contracting Officer Representative (COR) a written demolition debris management plan. The plan shall include, the following information:
1. Procedures to be used for debris management.
  2. Techniques to be used to minimize waste generation.
  3. Analysis of the estimated job site waste to be generated:

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

#### **1.6 APPLICABLE PUBLICATIONS**

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

#### **1.7 RECORDS**

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

**PART 2 - PRODUCTS****2.1 MATERIALS**

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

**PART 3 - EXECUTION****3.1 COLLECTION**

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

**3.2 DISPOSAL**

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

**3.3 REPORT**

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

- - - E N D - - -

## CONSTRUCTION & DEMOLITION DIVERSION AND DISPOSAL MONTHLY SUMMARY

Note: This form coorelates to the requireiments of Construction Waste Management Specification (CWMS) 01 74 19.

Instructions: Contractor shall complete form and provide to the VAMC Project COR on a monthly basis. Use additional forms if necessary. Project COR shall control all monthly documents in project file. At conclusion of project, COR shall give a copy of all monthly summaries to the facilities GEMS Coordinator.

|                         |  |                      |  |
|-------------------------|--|----------------------|--|
| <b>Reporting Month:</b> |  | <b>COR:</b>          |  |
| <b>Project Number:</b>  |  | <b>Project Name:</b> |  |

| Date of Disposal Activity                                    | Type of Waste<br>(include brief description of waste - see Section 1.1 D of CWMS 01 74 19 for specific waste category examples) | Weight in Pounds<br>DISPOSED<br><br>(waste that was not diverted - e.g. waste that was landfilled or incinerated) | Weight in Pounds<br>DIVERTED<br><br>(waste that was diverted - e.g. waste that was sent to be recycled, reused and/or recovered) | Name of Destination Facility<br><br>(e.g. ABC Landfill, ABC Incinerator, ABC Recycler, ABC Reuse/Recovery, etc.) | Net Total Costs | Savings/Refund |
|--|---|---|--|--|-----------------|----------------|
|  |   |   |  |  |                 |                |
|  |   |   |  |  |                 |                |
|  |   |   |  |  |                 |                |
|  |   |   |  |  |                 |                |
| <b>Total Weight</b><br><br>Waste DISPOSED and Waste DIVERTED |   | 0   | 0  | <b>Total Cost (-) or Savings (+)</b>   | \$0             |                |

|   |   |   |
|---|---|---|
| <b>PERCENTATGE DIVERTED</b>   | = | $\frac{\text{Total Waste Diverted}}{(\text{Waste Diverted}) + (\text{Waste Disposed})}$ |
| <b>PERCENTATGE DIVERTED</b><br>(Excel Formula will automatically populate if electronic excel form is utilized) | = | #DIV/0!   |
| <b>PERCENTATGE DIVERTED</b><br>(Use this area if you are calculating the diversion percentage on hardcopy form) | = | $\frac{\text{_____}}{(\text{_____}) + (\text{_____})} = \text{_____}\%$                 |

## CONSTRUCTION & DEMOLITION DIVERSION AND DISPOSAL MONTHLY SUMMARY

Note: This form coorelates to the requireiments of Construction Waste Management Specification (CWMS) 01 74 19.

Instructions: Contractor shall complete form and provide to the VAMC Project COR on a monthly basis. Use additional forms if necessary. Project COR shall control all monthly documents in project file. At conclusion of project, COR shall give a copy of all monthly summaries to the facilities GEMS Coordinator.

|                         |  |                      |  |
|-------------------------|--|----------------------|--|
| <b>Reporting Month:</b> |  | <b>COR:</b>          |  |
| <b>Project Number:</b>  |  | <b>Project Name:</b> |  |

| Date of Disposal Activity                                    | Type of Waste<br>(include brief description of waste - see Section 1.1 D of CWMS 01 74 19 for specific waste category examples) | Weight in Pounds<br>DISPOSED<br><br>(waste that was not diverted - e.g. waste that was landfilled or incinerated) | Weight in Pounds<br>DIVERTED<br><br>(waste that was diverted - e.g. waste that was sent to be recycled, reused and/or recovered) | Name of Destination Facility<br><br>(e.g. ABC Landfill, ABC Incinerator, ABC Recycler, ABC Reuse/Recovery, etc.) | Net Total Costs | Savings/Refund |
|--|---|---|--|--|-----------------|----------------|
|  |   |   |  |  |                 |                |
|  |   |   |  |  |                 |                |
|  |   |   |  |  |                 |                |
|  |   |   |  |  |                 |                |
| <b>Total Weight</b><br><br>Waste DISPOSED and Waste DIVERTED |   | 0   | 0  | <b>Total Cost (-) or Savings (+)</b>   | \$0             |                |

|   |   |   |
|---|---|---|
| <b>PERCENTATGE DIVERTED</b>   | = | $\frac{\text{Total Waste Diverted}}{(\text{Waste Diverted}) + (\text{Waste Disposed})}$ |
| <b>PERCENTATGE DIVERTED</b><br>(Excel Formula will automatically populate if electronic excel form is utilized) | = | #DIV/0!   |
| <b>PERCENTATGE DIVERTED</b><br>(Use this area if you are calculating the diversion percentage on hardcopy form) | = | $\frac{\text{_____}}{(\text{_____}) + (\text{_____})} = \text{_____}\%$                 |



**SECTION 01 81 13****SUSTAINABLE CONSTRUCTION REQUIREMENTS****PART 1 - GENERAL****1.1 DESCRIPTION**

- A. This Section describes general requirements and procedures to comply with federal mandates and U.S. Department of Veterans Affairs (VA) policies for sustainable construction as summarized in the VA Sustainable Design Manual.
- B. The Design Professional has selected materials and utilized integrated design processes that achieve the Government's objectives. Contractor is responsible to maintain and support these objectives in developing means and methods for performing work and in proposing product substitutions or changes to specified processes. By submitting a change or substitution of materials or processes, contractor shall demonstrate its diligence in performing the level of investigation and comparison required under federal mandates and VA policies.

**1.2 RELATED WORK**

- A. Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS.
- B. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT.

**1.3 DEFINITIONS**

- A. Total Materials Cost: A tally of actual material cost from specification divisions 03 through 10, 31 (applicable to foundations) and 32 (applicable to paving, site improvements, and planting). Alternatively, 45 percent of total construction hard costs in those specification divisions.
- B. Recycled Content: Recycled content of materials is defined according to Federal Trade Commission Guides for the Use of Environmental Marketing Claims (16 CFR Part 260). Recycled content value of a material assembly is determined by weight. Recycled fraction of assembly is multiplied by cost of assembly to determine recycled content value.
  - 1. "Post-Consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
  - 2. "Pre-Consumer" material is defined as material diverted from waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a

process and capable of being reclaimed within the same process that generated it.

- C. **Biobased Products:** Biobased products are derived from plants and other renewable agricultural, marine, and forestry materials and provide an alternative to conventional petroleum derived products. Biobased products include diverse categories such as lubricants, cleaning products, inks, fertilizers, and bioplastics.
- D. **Low Pollutant-Emitting Materials:** Materials and products which are minimally odorous, irritating, or harmful to comfort and well-being of installers and occupants.
- E. **Volatile Organic Compounds (VOC):** Chemicals that are emitted as gases from certain solids or liquids. VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects.

#### **1.4 REFERENCE STANDARDS**

- A. Carpet and Rug Institute Green Label Plus program.
- B. U.S. Department of Agriculture BioPreferred program (USDA BioPreferred).
- C. U.S. Environmental Protection Agency Comprehensive Procurement Guidelines (CPG).
- D. U.S. Environmental Protection Agency WaterSense Program (WaterSense).
- E. U.S. Environmental Protection Agency ENERGY STAR Program (ENERGY STAR).
- F. U. S. Department of Energy Federal Energy Management Program (FEMP).
- G. Green Electronic Council EPEAT Program (EPEAT).

#### **1.5 SUBMITTALS**

- A. All submittals to be provided by contractor to COR and Architect.
- B. Sustainability Action Plan:
  - 1. Submit documentation as required by this section; provide additional copies of typical submittals required under technical sections when sustainable construction requires copies of record submittals.
  - 2. Within 30 days after Preconstruction Meeting provide a narrative plan for complying with requirements stipulated within this section.
  - 3. Sustainability Action Plan shall:
    - a. Make reference to sustainable construction submittals defined by this section.
    - b. Address all items listed under PERFORMANCE CRITERIA.
    - c. Indicate individual(s) responsible for implementing the plan.
- C. **Low Pollutant-Emitting Materials Tracking Spreadsheet:** Within 30 days after Preconstruction Meeting provide a preliminary Low Pollutant-

Emitting Materials Tracking Spreadsheet. The Low Pollutant-Emitting Materials Tracking Spreadsheet shall be an electronic file and include all materials on Project in categories described under Low Pollutant-Emitting Materials in 01 81 13.

D. Construction Indoor Air Quality (IAQ) Management Plan:

1. Not more than 30 days after Preconstruction Meeting provide a Construction IAQ Management Plan as an electronic file including descriptions of the following:
  - a. Instruction procedures for meeting or exceeding minimum requirements of ANSI/SMACNA 008-2008, Chapter 3, including procedures for HVAC Protection, Source Control, Pathway Interruption, Housekeeping, and Scheduling.
  - b. Instruction procedures for protecting absorptive materials stored on-site or installed from moisture damage.
  - c. Schedule of submission of photographs of on-site construction IAQ management measures such as protection of ducts and on-site stored oil installed absorptive materials.
  - d. Instruction procedures if air handlers shall be used during construction, including a description of filtration media to be used at each return air grille.

E. Product Submittals:

1. Recycled Content: Submit product data from manufacturer indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content (excluding MEP systems equipment and components).
2. Biobased Content: Submit product data for products to be installed or used which are included in any of the USDA BioPreferred program's product categories. Data to include percentage of biobased content and source of biobased material.
3. Low Pollutant-Emitting Materials: Submit product data confirming compliance with relevant requirements for all materials on Project in categories described under Low Pollutant-Emitting Materials in 01 81 13.
4. For applicable products and equipment, submit product documentation confirming Energy Star label FEMP certification, WaterSense, and/or EPEAT certification.

- F. Sustainable Construction Progress Reports: Concurrent with each Application for Payment, submit a Sustainable Construction Progress Report to confirm adherence with Sustainability Action Plan.
1. Include narratives of revised strategies for bringing work progress into compliance with plan and product submittal data and calculations to demonstrate compliance with thresholds based on materials costs.
  2. Include updated and current Project Materials Cost Data Spreadsheet.
  3. Include updated and current Low Pollutant-Emitting Materials Tracking Spreadsheet.
  4. Include construction waste tracking, in tons or cubic yards, including waste description, whether diverted or landfilled, hauler, and percent diverted for comingled quantities; and excluding land-clearing debris and soil. Provide haul receipts and documentation of diverted percentages for comingled wastes.
- G. Closeout Submittals: Within 14 days after Substantial Completion provide the following:
1. Final version of Project Material Cost Data Spreadsheet.
  2. Final version of Low Pollutant-Emitting Materials Tracking Spreadsheet.
  3. Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for filtration media installed at return air grilles during construction if permanently installed air handling units are used during construction.
  4. Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for final filtration media in air handling units.
  5. Minimum 18 construction photographs including six photographs taken on three different occasions during construction of ANSI/SMACNA 008-2008, Chapter 3 approaches employed, along with a brief description of each approach, documenting implementation of IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.
  6. Flush-out Documentation:
    - a. Product data for filtration media used during flush-out.
    - b. Product data for filtration media installed immediately prior to occupancy.

- c. Signed statement describing building air flush-out procedures including dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.

#### **1.6 QUALITY ASSURANCE**

- A. Preconstruction Meeting: After award of Contract and prior to commencement of Work, schedule and conduct meeting with COR and Architect to discuss the Project Sustainable Action Plan content as it applies to submittals, project delivery, required Construction Indoor Air Quality (IAQ) Management Plan, and other Sustainable Construction Requirements. The purpose of this meeting is to develop a mutual understanding of the Sustainable Construction Requirements and coordination of contractor's management of these requirements with the Contracting Officer and the Construction Quality Manager.
- B. Construction Job Conferences: Status of compliance with Sustainable Construction Requirements of these specifications shall be an agenda item at regular job meetings conducted during the course of work at the site.

#### **1.7 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. Green Seal Standard GS-11, Paints, 1st Edition, May 20, 1993.
- C. Green Seal Standard GC-36, Commercial Adhesives, October 19, 2000.
- D. ASHRAE Standard 52.2-2007.

### **PART 2 - PRODUCTS**

#### **2.1 PERFORMANCE CRITERIA**

- A. Construction waste diversion from landfill disposal shall comprise at least 50 percent of total construction waste. Alternative daily cover (ADC) does not qualify as material diverted from disposal.
- B. Low Pollutant-Emitting Materials:
  - 1. Adhesives, sealants and sealant primers applied on site within the weatherproofing membrane shall comply with VOC limits of SCAQMD Rule 1168:
    - a. Non-Flooring Adhesives and Sealants:
      - 1) Drywall and Panel Adhesives: 50 g/L.
      - 2) Multipurpose Construction Adhesives: 70 g/L.
      - 3) Structural Glazing Adhesives: 100 g/L.

- 4) Metal-to-Metal Substrate Adhesives: 30 g/L.
  - 5) Plastic Foam Substrate Adhesive: 50 g/L.
  - 6) Porous Material (Except Wood) Substrate Adhesive: 50 g/L.
  - 7) Wood Substrate Adhesive: 30 g/L.
  - 8) Fiberglass Substrate Adhesive: 80 g/L.
  - 9) Architectural Non-Porous Sealant Primer: 250 g/L.
  - 10) Architectural Porous Sealant Primer: 775 g/L.
  - 11) Other Sealant Primer: 750 g/L.
  - 12) PVC Welding Adhesives: 510 g/L.
  - 13) CPVC Welding Adhesives: 490 g/L.
  - 14) ABS Welding Adhesives: 325 g/L.
  - 15) Plastic Cement Welding Adhesives: 250 g/L.
  - 16) Adhesive Primer for Plastic: 550 g/L.
  - 17) Contact Adhesive: 80 g/L.
  - 18) Special Purpose Contact Adhesive: 250 g/L.
  - 19) Structural Wood Member Adhesive: 140 g/L.
  - 20) Sheet Applied Rubber Lining Operations: 850 g/L.
  - 21) Top and Trim Adhesive: 250 g/L.
  - 22) Architectural Sealants: 250 g/L.
  - 23) Other Sealants: 420 g/L.
2. Aerosol adhesives applied on site within the weatherproofing membrane shall comply with the following Green Seal GS-36.
    - a. Aerosol Adhesive, General-Purpose Mist Spray: 65 percent VOCs by weight.
    - b. Aerosol Adhesive, General-Purpose Web Spray: 55 percent VOCs by weight.
    - c. Special-Purpose Aerosol Adhesive (All Types): 70 percent VOCs by weight.
  3. Paints and coatings applied on site within the weatherproofing membrane shall comply with the following criteria:
    - a. VOC content limits for paints and coatings established in Green Seal Standard GS-11.
    - b. VOC content limit for anti-corrosive and anti-rust paints applied to interior ferrous metal substrates of 250 g/L established in Green Seal GC-03.
    - c. Comply with the following VOC content limits:
      - 1) Anti-Corrosive/Antirust Paints: 250 g/L.
      - 2) Clear Wood Finish, Lacquer: 550 g/L.

- 3) Clear Wood Finish, Sanding Sealer: 350 g/L.
- 4) Clear Wood Finish, Varnish: 350 g/L.
- 5) Interior Flat Paint, Coating or Primer: 50 g/L.
- 6) Interior Non-Flat Paint, Coating or Primer: 150 g/L.
- 7) Sealers and Undercoaters: 200 g/L.
- 8) Stain: 250 g/L.
- 9) Concrete Curing Compounds: 350 g/L.
- 10) Magnesite Cement Coatings: 450 g/L.
- 11) Pigmented Lacquer: 550 g/L.
- 12) Waterproofing Sealers: 250 g/L.
- 13) Wood Preservatives: 350 g/L.

### **PART 3 - EXECUTION**

#### **3.1 FIELD QUALITY CONTROL**

##### **A. Construction Indoor Air Quality Management:**

1. During construction, meet or exceed recommended control measures of ANSI/SMACNA 008-2008, Chapter 3.
2. Protect stored on-site and installed absorptive materials from moisture damage.
3. If permanently installed air handlers are used during construction, filtration media with a minimum efficiency reporting value (MERV) of 8 shall be used at each return air grille, as determined by ASHRAE Standard 52.2-1999 (with errata but without addenda). Replace all filtration media immediately prior to occupancy.
4. Perform building flush-out as follows:
  - a. After construction ends, prior to occupancy and with interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 degrees Fahrenheit and a relative humidity no higher than 60 percent. OR
  - b. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. of outdoor air per sq. ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. of outside air or design minimum outside air rate determined in Prerequisite EQ 1, whichever is greater. During each day of flush-out period, ventilation shall begin a

minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14000 cu. ft./sq. ft. of outside air has been delivered to the space.

-----END-----



**SECTION 02 41 00  
DEMOLITION**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

This section specifies demolition and removal of portions of buildings, utilities, and other structures shown.

**1.2 RELATED WORK:**

- B. Safety Requirements: Section 01 35 26 Safety Requirements Article, ACCIDENT PREVENTION PLAN (APP).
- C. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- D. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- E. Asbestos Removal: Section 02 82 11, TRADITIONAL ASBESTOS ABATEMENT.
- F. Lead Paint: Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.
- G. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- H. Construction Waste Management: Section 017419 CONSTRUCTION WASTE MANAGEMENT.
- I. Infectious Control: Section 01 35 26, SAFETY REQUIREMENTS, Article 1.12, INFECTION CONTROL.

**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 Section 01 35 26, SAFETY REQUIREMENTS< ACCIDENT PREVENTION, Article 1.4.
- B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.
- C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.

- D. Provide enclosed dust chutes with control gates from each floor to carry debris to truck beds and govern flow of material into truck. Provide overhead bridges of tight board or prefabricated metal construction at dust chutes to protect persons and property from falling debris.
- E. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.
- F. In addition to previously listed fire and safety rules to be observed in performance of work, include following:
  - 1. No wall or part of wall shall be permitted to fall outwardly from structures.
  - 2. Maintain at least one stairway in each structure in usable condition to highest remaining floor. Keep stairway free of obstructions and debris until that level of structure has been removed.
  - 3. 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.
  - 4. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.
- G. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center; any damaged items shall be repaired or replaced as approved by the Contracting Officer Representative (COR). 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 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 shall have COR's approval.

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

I. The work shall comply with the requirements of Section 01 35 26, SAFETY REQUIREMENTS, Article 1.12, INFECTION CONTROL.

#### **1.4 UTILITY SERVICES:**

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

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

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

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

##### **3.1 DEMOLITION:**

A. Completely demolish and remove the existing replacement window system to include window, blocking and all other materials, hardware, and fasteners associated with the existing window system.

B. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by the Contractor 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 COR. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 600 mm (24 inches) square to permit drainage. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.

C. Remove and legally dispose of all materials, other than earth to remain as part of project work, from any trash dumps shown. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. The removal of hazardous material shall be referred to Hazardous Materials specifications.

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

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

- - - E N D - - -

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

**TABLE OF CONTENTS**

|  |    |
|--|----|
| 1.1 SUMMARY OF THE WORK .....  | 1  |
| 1.1.1 CONTRACT DOCUMENTS AND RELATED REQUIREMENTS .....                | 1  |
| 1.1.2 EXTENT OF WORK .....   | 1  |
| 1.1.3 RELATED WORK .....   | 1  |
| 1.1.4 TASKS .....  | 1  |
| 1.1.5 CONTRACTORS USE OF PREMISES .....                                | 2  |
| 1.2 VARIATIONS IN QUANTITY .....                                       | 2  |
| 1.3 STOP ASBESTOS REMOVAL .....  | 2  |
| 1.4 DEFINITIONS .....  | 3  |
| 1.4.1 GENERAL .....  | 3  |
| 1.4.2 GLOSSARY .....   | 3  |
| 1.4.3 REFERENCED STANDARDS ORGANIZATIONS .....                         | 9  |
| 1.5 APPLICABLE CODES AND REGULATIONS .....                             | 11 |
| 1.5.1 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS ..... | 11 |
| 1.5.2 ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITY .....               | 11 |
| 1.5.3 FEDERAL REQUIREMENTS .....                                       | 11 |
| 1.5.4 STATE REQUIREMENTS .....   | 12 |
| 1.5.5 LOCAL REQUIREMENTS .....   | 12 |
| 1.5.6 STANDARDS .....  | 12 |
| 1.5.7 EPA GUIDANCE DOCUMENTS .....                                     | 12 |
| 1.5.8 NOTICES .....  | 12 |
| 1.5.9 PERMITS/LICENSES .....   | 13 |
| 1.5.10 POSTING AND FILING OF REGULATIONS .....                         | 13 |
| 1.5.11 VA RESPONSIBILITIES .....                                       | 13 |
| 1.5.12 EMERGENCY ACTION PLAN AND ARRANGEMENTS .....                    | 13 |
| 1.5.13 PRE-CONSTRUCTION MEETING .....                                  | 14 |
| 1.6 PROJECT COORDINATION .....   | 15 |
| 1.6.1 PERSONNEL .....  | 15 |
| 1.7 RESPIRATORY PROTECTION .....                                       | 16 |
| 1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM .....                   | 16 |
| 1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR .....                 | 16 |
| 1.7.3 SELECTION AND USE OF RESPIRATORS .....                           | 16 |
| 1.7.4 MINIMUM RESPIRATORY PROTECTION .....                             | 16 |

|   |    |
|---|----|
| 1.7.5 MEDICAL WRITTEN OPINION .....   | 16 |
| 1.7.6 RESPIRATOR FIT TEST .....   | 17 |
| 1.7.7 RESPIRATOR FIT CHECK .....  | 17 |
| 1.7.8 MAINTENANCE AND CARE OF RESPIRATORS .....                                 | 17 |
| 1.7.9 SUPPLIED AIR SYSTEMS .....  | 17 |
| 1.8 WORKER PROTECTION .....   | 17 |
| 1.8.1 TRAINING OF ABATEMENT PERSONNEL .....                                     | 17 |
| 1.8.2 MEDICAL EXAMINATIONS .....  | 17 |
| 1.8.3 REGULATED AREA ENTRY PROCEDURE .....                                      | 18 |
| 1.8.4 DECONTAMINATION PROCEDURE .....   | 18 |
| 1.8.5 REGULATED AREA REQUIREMENTS .....   | 18 |
| 1.9 DECONTAMINATION FACILITIES .....  | 18 |
| 1.9.1 DESCRIPTION .....   | 18 |
| 1.9.2 GENERAL REQUIREMENTS .....  | 19 |
| 1.9.3 TEMPORARY FACILITIES TO THE PDF AND W/EDF .....                           | 19 |
| 1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF) .....                            | 19 |
| 1.9.5 WASTE/EQUIPMENT DECONTAMINATION FACILITY (W/EDF) .....                    | 21 |
| 1.9.6 WASTE/EQUIPMENT DECONTAMINATION PROCEDURES .....                          | 22 |
| PART 2 - PRODUCTS, MATERIALS, AND EQUIPMENT .....                               | 22 |
| 2.1 MATERIALS AND EQUIPMENT .....   | 22 |
| 2.1.1 GENERAL REQUIREMENTS .....  | 22 |
| 2.2 MONITORING, INSPECTION AND TESTING .....                                    | 23 |
| 2.2.1 GENERAL .....   | 23 |
| 2.2.2 SCOPE OF SERVICES OF THE VPIH/CIH CONSULTANT .....                        | 24 |
| 2.2.3 MONITORING, INSPECTION AND TESTING BY ABATEMENT CONTRACTOR CPIH/CIH ..... | 25 |
| 2.3 ASBESTOS HAZARD ABATEMENT PLAN .....  | 26 |
| 2.4 SUBMITTALS .....  | 26 |
| 2.4.1 PRE-START MEETING SUBMITTALS .....  | 26 |
| 2.4.2 SUBMITTALS DURING ABATEMENT .....   | 28 |
| 2.4.3 SUBMITTALS AT COMPLETION OF ABATEMENT .....                               | 28 |
| 2.5 ENCAPSULANTS .....  | 29 |
| 2.5.1 TYPES OF ENCAPSULANTS .....   | 29 |
| 2.5.2 PERFORMANCE REQUIREMENTS .....  | 29 |
| 2.5.3 CERTIFICATES OF COMPLIANCE .....  | 29 |
| PART 3 - EXECUTION .....  | 29 |
| 3.1 REGULATED AREA PREPARATIONS .....   | 29 |
| 3.1.1 SITE SECURITY .....   | 29 |

|   |    |
|---|----|
| 3.1.2 SIGNAGE AND POWER MANAGEMENT .....  | 30 |
| 3.1.3 NEGATIVE PRESSURE FILTRATION SYSTEM .....   | 31 |
| 3.1.3.1 DESIGN AND LAYOUT .....   | 31 |
| 3.1.3.2 NEGATIVE AIR MACHINES (HEPA UNITS) .....  | 31 |
| 3.1.3.3 PRESSURE DIFFERENTIAL .....   | 33 |
| 3.1.3.4 MONITORING .....  | 33 |
| 3.1.3.5 AUXILIARY GENERATOR .....   | 33 |
| 3.1.3.6 SUPPLEMENTAL MAKE-UP-AIR INLETS .....   | 33 |
| 3.1.3.7 TESTING THE SYSTEM .....  | 33 |
| 3.1.3.8 DEMONSTRATION OF THE NEGATIVE PRESSURE FILTRATION SYSTEM .....                      | 33 |
| 3.1.3.9 USE OF THE NEGATIVE PRESSURE FILTRATION SYSTEM DURING ABATEMENT<br>OPERATIONS ..... | 34 |
| 3.1.3.10 DISMANTLING THE SYSTEM .....   | 34 |
| 3.1.4 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA .....                       | 35 |
| 3.1.4.1 GENERAL .....   | 35 |
| 3.1.4.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA .....                               | 35 |
| 3.1.4.3 CONTROLLING ACCESS TO THE REGULATED AREA .....                                      | 35 |
| 3.1.4.4 CRITICAL BARRIERS .....   | 35 |
| 3.1.4.5 PRIMARY BARRIERS .....  | 35 |
| 3.1.4.6 SECONDARY BARRIERS .....  | 36 |
| 3.1.4.7 EXTENSION OF THE REGULATED AREA .....   | 36 |
| 3.1.4.8 FIRESTOPPING .....  | 36 |
| 3.1.5 SANITARY FACILITIES .....   | 36 |
| 3.1.6 PERSONAL PROTECTIVE EQUIPMENT .....   | 36 |
| 3.1.7 PRE-CLEANING .....  | 37 |
| 3.1.8 PRE-ABATEMENT ACTIVITIES .....  | 38 |
| 3.1.8.1 PRE-ABATEMENT MEETING .....   | 38 |
| 3.1.8.2 PRE-ABATEMENT CONSTRUCTION AND OPERATIONS.....                                      | 38 |
| 3.1.8.3 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS .....                                    | 38 |
| 3.2 REMOVAL OF ACM .....  | 39 |
| 3.2.1 WETTING ACM .....   | 39 |
| 3.2.2 SECONDARY BARRIERS AND WALKWAYS .....   | 39 |
| 3.2.3 WET REMOVAL OF ACM .....  | 40 |
| 3.2.4 WET REMOVAL OF AMOSITE .....  | 41 |
| 3.3 LOCKDOWN ENCAPSULATION .....  | 41 |
| 3.3.1 GENERAL .....   | 41 |
| 3.3.2 DELIVERY AND STORAGE .....  | 41 |

|  |    |
|--|----|
| 3.3.3 WORKER PROTECTION .....  | 41 |
| 3.3.4 ENCAPSULATION OF SCRATCH COAT PLASTER OR PIPING .....  | 41 |
| 3.3.5 SEALING EXPOSED EDGES .....  | 42 |
| 3.4 DISPOSAL OF ACM WASTE MATERIALS .....  | 42 |
| 3.4.1 GENERAL .....  | 42 |
| 3.4.2 PROCEDURES .....   | 42 |
| 3.5 PROJECT DECONTAMINATION .....  | 42 |
| 3.5.1 GENERAL .....  | 42 |
| 3.5.2 REGULATED AREA CLEARANCE .....   | 43 |
| 3.5.3 WORK DESCRIPTION .....   | 43 |
| 3.5.4 PRE-DECONTAMINATION CONDITIONS .....   | 43 |
| 3.5.5 FIRST CLEANING .....   | 43 |
| 3.5.6 PRE-CLEARANCE INSPECTION AND TESTING .....   | 43 |
| 3.5.7 LOCKDOWN ENCAPSULATION OF ABATED SURFACES .....  | 44 |
| 3.6 FINAL VISUAL INSPECTIONS AND AIR CLEARANCE TESTING .....   | 44 |
| 3.6.1 GENERAL .....  | 44 |
| 3.6.2 FINAL VISUAL INSPECTION .....  | 44 |
| 3.6.3 FINAL AIR CLEARANCE TESTING .....  | 44 |
| 3.6.4 FINAL AIR CLEARANCE PROCEDURES .....   | 44 |
| 3.6.5 CLEARANCE SAMPLING USING PCM - LESS THAN 260LF/160SF: .....  | 45 |
| 3.6.6 CLEARANCE SAMPLING USING TEM - EQUAL TO OR MORE THAN 260LF/160SF: ...  | 45 |
| 3.6.7 LABORATORY TESTING OF PCM CLEARANCE SAMPLES .....  | 46 |
| 3.6.8 LABORATORY TESTING OF TEM SAMPLES .....  | 46 |
| 3.6.9 LABORATORY TESTING OF BULK SAMPLES .....   | 46 |
| 3.7 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE .....   | 46 |
| 3.7.1 COMPLETION OF ABATEMENT WORK .....   | 46 |
| 3.7.2 CERTIFICATE OF COMPLETION BY CONTRACTOR .....  | 46 |
| 3.7.3 WORK SHIFTS .....  | 47 |
| 3.7.4 RE-INSULATION .....  | 47 |
| ATTACHMENT #1 .....  | 48 |
| ATTACHMENT #2 .....  | 49 |
| ATTACHMENT #3 .....  | 50 |
| ATTACHMENT #4 .....  | 51 |
| ATTACHMENT #5 " Asbestos Inspection, Battle Creek Veterans Affairs Medical<br>Center" prepared by Alliance Environmental Group, Inc<br>..... | 52 |



**PART 1 - GENERAL****1.1 SUMMARY OF THE WORK****1.1.1 CONTRACT DOCUMENTS AND RELATED REQUIREMENTS**

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

**1.1.2 EXTENT OF WORK**

- A. Below is a brief description of the estimated quantities of asbestos containing materials to be abated. These quantities are for informational purposes only and are based on the best information available at the time of the specification preparation. The Contractor shall satisfy himself as the actual quantities to be abated. Nothing in this section shall be interpreted as limiting the extent of work otherwise required by this contract and related documents.
- B. Removal, clean-up and disposal of asbestos containing materials (ACM) and asbestos/waste contaminated elements in an appropriate regulated area.

**NOTE: Refer to Full Report "Asbestos Inspection, Battle Creek Veterans Affairs Medical Center" prepared by Alliance Environmental Group, Inc., Dated December 16, 2016, attached to end of this specification.**

**1.1.3 RELATED WORK**

- B. Section 02 41 00, DEMOLITION.
- C. Division 08, OPENINGS
- D. Division 09, FINISHES

**1.1.4 TASKS**

The work tasks are summarized briefly as follows:

- A. Pre-abatement activities including pre-abatement meeting(s), inspection(s), notifications, permits, submittal approvals, regulated area preparations, emergency procedures arrangements, and standard operating procedures for asbestos abatement work.

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

#### **1.1.5 CONTRACTORS USE OF PREMISES**

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

#### **1.2 VARIATIONS IN QUANTITY**

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

#### **1.3 STOP ASBESTOS REMOVAL**

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

satisfaction of the VA. Standby time and costs for corrective actions shall be borne by the Contractor, including the VPIH/CIH time. The occurrence of any of the following events shall be reported immediately by the Contractor's competent person to the VA Contracting Office or field representative using the most expeditious means (e.g., verbal or telephonic), followed up with written notification to the Contracting Officer as soon as practical. The Contractor shall immediately stop asbestos removal/disturbance activities and initiate fiber reduction activities:

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

#### 1.4 DEFINITIONS

##### 1.4.1 GENERAL

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

##### 1.4.2 GLOSSARY

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

**Aerosol** - Solid or liquid particulate suspended in air.

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

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

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

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

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

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

samples when required by this specification, or at the discretion of the VPIH/CIH as appropriate.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Contracting Officer's Representative (COR)** - The VA official responsible for on-going project work.

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

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

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

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

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

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

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

**Disturbance** - Activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM or PACM, no greater than the amount that can be contained in one standard sized glove bag or waste bag in order to access a building component. In no event shall the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or disposal bag which shall not exceed 60 inches in length or width.

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

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

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

**Encapsulation** - Treating ACM with an encapsulant.

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

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

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

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

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

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

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

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

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

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

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

**HVAC** - Heating, Ventilation and Air Conditioning

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

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

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

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

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

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

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

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

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

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

**Outside air** - The air outside buildings and structures, including the air under a bridge or in an open ferry dock.

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

#### 1.4.3 REFERENCED STANDARDS ORGANIZATIONS

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

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

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

## **1.5 APPLICABLE CODES AND REGULATIONS**

### **1.5.1 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS**

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

### **1.5.2 ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITY**

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

### **1.5.3 FEDERAL REQUIREMENTS**

Federal requirements which govern of asbestos abatement include the following regulations.

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

**1.5.4 STATE REQUIREMENTS**

- A. State requirements that apply to the abatement work include the following:
- 1. Construction Safety and Health Division's Asbestos Program
  - 2. Michigan Department of Environmental Quality Michigan Department of Environmental Quality - Air Quality Division
  - Michigan Department of Licensing and Regulatory Affairs, Michigan Occupational Safety and Health Administration.40 CFR 61, Subpart M by reference

**1.5.5 LOCAL REQUIREMENTS**

- A. There are no local requirements that apply to this abatement project.

**1.5.6 STANDARDS**

- A. Standards which govern asbestos abatement activities include the following:
1. American National Standards Institute (ANSI) Z9.2-79 - Fundamentals Governing the Design and Operation of Local Exhaust Systems and ANSI Z88.2 - Practices for Respiratory Protection.
  2. Underwriters Laboratories (UL) 586-90 - UL Standard for Safety of HEPA Filter Units, 7th Edition.
- B. Standards which govern encapsulation work include the following:
1. American Society for Testing and Materials (ASTM)
- C. Standards which govern the fire and safety concerns in abatement work include the following:
1. National Fire Protection Association (NFPA) 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.
  2. NFPA 701 - Standard Methods for Fire Tests for Flame Resistant Textiles and Film.
  3. NFPA 101 - Life Safety Code

**1.5.7 EPA GUIDANCE DOCUMENTS**

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

**1.5.8 NOTICES**

- A. State and Local agencies: Send written notification as required by state and local regulations including the local fire department prior to beginning any work on ACM as follows:

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

#### **1.5.9 PERMITS/LICENSES**

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

#### **1.5.10 POSTING AND FILING OF REGULATIONS**

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

#### **1.5.11 VA RESPONSIBILITIES**

Prior to commencement of work:

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

#### **1.5.12 EMERGENCY ACTION PLAN AND ARRANGEMENTS**

- A. An Emergency Action Plan shall be developed prior to commencing abatement activities and shall be agreed to by the Contractor and the VA. The Plan shall meet the requirements of 29 CFR 1910.38 (a); (b).
- B. Emergency procedures shall be in written form and prominently posted in the clean room and equipment room of the decontamination unit. Everyone, prior to entering the regulated area, shall read and sign these procedures to acknowledge understanding of the regulated area layout, location of emergency exits and emergency procedures.
- C. Emergency planning shall include written notification of police, fire, and emergency medical personnel of planned abatement activities; work schedule; layout of regulated area; and access to the regulated area, particularly barriers that shall affect response capabilities.
- D. Emergency planning shall include consideration of fire, explosion, hazardous atmospheres, electrical hazards, slips/trips and falls, confined spaces, and heat stress illness. Written procedures for response to emergency situations shall be developed and employee training in procedures shall be provided.
- E. Employees shall be trained in regulated area/site evacuation procedures in the event of workplace emergencies.
  - 1. For non life-threatening situations - employees injured or otherwise incapacitated shall decontaminate following normal procedures with

- assistance from fellow workers, if necessary, before exiting the regulated area to obtain proper medical treatment.
2. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, remove them from the regulated area, and secure proper medical treatment.
- F. Telephone numbers of any/all emergency response personnel shall be prominently posted in the clean room, along with the location of the nearest telephone.
  - G. The Contractor shall provide verification of first aid/CPR training for personnel responsible for providing first aid/CPR. OSHA requires medical assistance within 3-4 minutes of a life-threatening injury/illness. Bloodborne Pathogen training shall also be verified for those personnel required to provide first aid/CPR.
  - H. The Emergency Action Plan shall provide for a Contingency Plan in the event that an incident occurs that shall require the modification of the standard operating procedures during abatement. Such incidents include fire; accident; power failure; negative pressure failure; and supplied air system failure. The Contractor shall detail procedures to be followed in the event of an incident assuring that asbestos abatement work is stopped and wetting is continued until correction of the problem.

#### **1.5.13 PRE-CONSTRUCTION MEETING**

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

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

- H. At this meeting the Contractor shall provide all submittals as required.
- I. Procedures for handling, packaging and disposal of asbestos waste.
- J. Emergency Action Plan and Contingency Plan Procedures.

## 1.6 PROJECT COORDINATION

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

### 1.6.1 PERSONNEL

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

and has appropriate medical/respiratory protection records/documentation.

4. The Abatement Personnel shall have completed the EPA AHERA/OSHA abatement worker course; have training on the standard operating procedures of the Contractor; has one year of asbestos abatement experience within the past three (3) years of similar size and complexity; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

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

## **1.7 RESPIRATORY PROTECTION**

### **1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM**

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

### **1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR**

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

### **1.7.3 SELECTION AND USE OF RESPIRATORS**

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

### **1.7.4 MINIMUM RESPIRATORY PROTECTION**

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

### **1.7.5 MEDICAL WRITTEN OPINION**

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



**1.7.6 RESPIRATOR FIT TEST**

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

**1.7.7 RESPIRATOR FIT CHECK**

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

**1.7.8 MAINTENANCE AND CARE OF RESPIRATORS**

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

**1.7.9 SUPPLIED AIR SYSTEMS**

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

**1.8 WORKER PROTECTION****1.8.1 TRAINING OF ABATEMENT PERSONNEL**

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

**1.8.2 MEDICAL EXAMINATIONS**

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

### 1.8.3 REGULATED AREA ENTRY PROCEDURE

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

### 1.8.4 DECONTAMINATION PROCEDURE

The Competent Person shall require all personnel to adhere to following decontamination procedures whenever they leave the regulated area.

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

### 1.8.5 REGULATED AREA REQUIREMENTS

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

## 1.9 DECONTAMINATION FACILITIES

### 1.9.1 DESCRIPTION

Provide each regulated area with separate personnel decontamination facilities (PDF) and waste/equipment decontamination facilities (W/EDF). Ensure that the PDF are the only means of ingress and egress

to the regulated area and that all equipment, bagged waste, and other material exit the regulated area only through the W/EDF.

#### **1.9.2 GENERAL REQUIREMENTS**

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

#### **1.9.3 TEMPORARY FACILITIES TO THE PDF AND W/EDF**

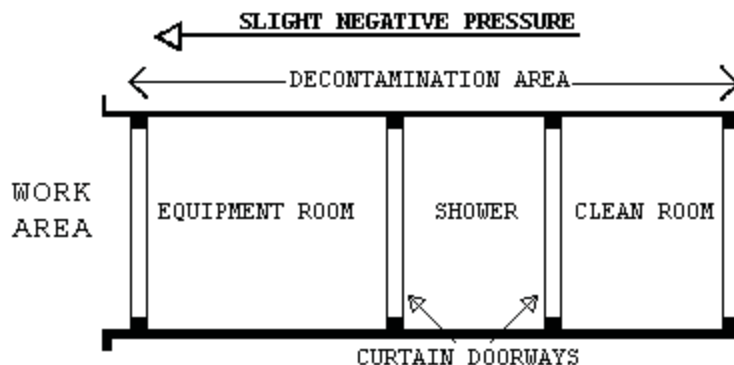
The Competent Person shall provide temporary water service connections to the PDF and W/EDF. Backflow prevention shall be provided at the point of connection to the VA system. Water supply shall be of adequate pressure and meet requirements of 29 CFR 1910.141(d)(3). Provide adequate temporary overhead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

#### **1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)**

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

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

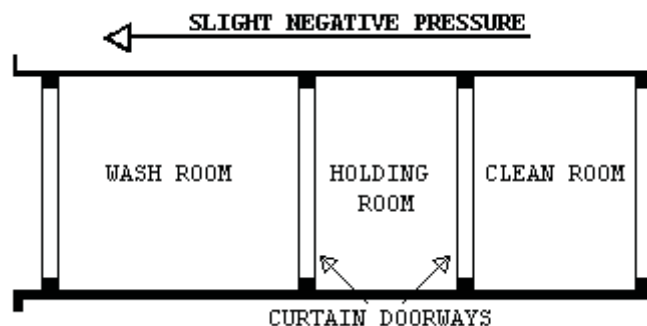
- entering the regulated area shall remove all street clothing in the clean room and dress in disposable protective clothing and respiratory protection. Any person entering the clean room does so either from the outside with street clothing on or is coming from the shower room completely naked and thoroughly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



#### 1.9.5 WASTE/EQUIPMENT DECONTAMINATION FACILITY (W/EDF)

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

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



#### 1.9.6 WASTE/EQUIPMENT DECONTAMINATION PROCEDURES

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

### PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT

#### 2.1 MATERIALS AND EQUIPMENT

##### 2.1.1 GENERAL REQUIREMENTS

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

- A. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable).
- B. Store all materials subject to damage off the ground, away from wet or damp surfaces and under cover sufficient enough to prevent damage or contamination. Flammable and combustible materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated area until abatement is completed.
- C. The Contractor shall not block or hinder use of buildings by patients, staff, and visitors to the VA in partially occupied buildings by placing materials/equipment in any unauthorized location.
- D. The Competent Person shall inspect for damaged, deteriorating or previously used materials. Such materials shall not be used and shall be removed from the worksite and disposed of properly.
- E. Polyethylene sheeting for walls in the regulated area shall be a minimum of 4-mils. For floors and all other uses, sheeting of at least 6-mil shall be used in widths selected to minimize the frequency of joints. Fire retardant poly shall be used throughout.

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

## **2.2 MONITORING, INSPECTION AND TESTING**

### **2.2.1 GENERAL**

- A. Perform throughout abatement work monitoring, inspection and testing inside and around the regulated area in accordance with the OSHA requirements and these specifications. OSHA requires that the employee exposure to asbestos shall not exceed 0.1 fiber per cubic centimeter (f/cc) of air, averaged over an 8-hour work shift. The CPIH/CIH is responsible for and shall inspect and oversee the performance of the Contractor IH Technician. The IH Technician shall continuously inspect and monitor conditions inside the regulated area to ensure compliance with these specifications. In addition, the CPIH/CIH shall personally manage air sample collection, analysis, and evaluation for personnel, regulated area, and adjacent area samples to satisfy OSHA requirements. Additional inspection and testing requirements are also indicated in other parts of this specification.



- B. The VA shall employ an independent industrial hygienist (VPIH/CIH) consultant and/or use its own IH to perform various services on behalf of the VA. The VPIH/CIH shall perform the necessary monitoring, inspection, testing, and other support services to ensure that VA patients, employees, and visitors shall not be adversely affected by the abatement work, and that the abatement work proceeds in accordance with these specifications, that the abated areas or abated buildings have been successfully decontaminated. The work of the VPIH/CIH consultant in no way relieves the Contractor from their responsibility to perform the work in accordance with contract/specification requirements, to perform continuous inspection, monitoring and testing for the safety of their employees, and to perform other such services as specified. The cost of the VPIH/CIH and their services shall be borne by the VA except for any repeat of final inspection and testing that shall be required due to unsatisfactory initial results. Any repeated final inspections and/or testing, if required, shall be paid for by the Contractor.
- C. If fibers counted by the VPIH/CIH during abatement work, either inside or outside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed the specified respective limits, the Contractor shall stop work. The Contractor shall request confirmation of the results by analysis of the samples by TEM. Request shall be in writing and submitted to the COR. Cost for the confirmation of results shall be borne by the Contractor for both the collection and analysis of samples and for the time delay that shall result for this confirmation. Confirmation sampling and analysis shall be the responsibility of the CPIH with review and approval of the VPIH/CIH. An agreement between the CPIH/CIH and the VPIH/CIH shall be reached on the exact details of the confirmation effort, in writing, including such things as the number of samples, location, collection, quality control on-site, analytical laboratory, interpretation of results and any follow-up actions. This written agreement shall be co-signed by the IH's and delivered to the COR.

#### **2.2.2 SCOPE OF SERVICES OF THE VPIH/CIH CONSULTANT**

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



5. Task 5: Perform, in the presence of the COR, final inspection and testing of a decontaminated regulated area at the conclusion of the abatement to certify compliance with all regulations and VA requirements/specifications.
  6. Task 6: Issue certificate of decontamination for each regulated area and project report.
- B. All documentation, inspection results and testing results generated by the VPIH/CIH shall be available to the Contractor for information and consideration. The Contractor shall cooperate with and support the VPIH/CIH for efficient and smooth performance of their work.
- C. The monitoring and inspection results of the VPIH/CIH shall be used by the VA to issue any Stop Removal orders to the Contractor during abatement work and to accept or reject a regulated area or building as decontaminated.

### **2.2.3 MONITORING, INSPECTION AND TESTING BY CONTRACTOR CPIH/CIH**

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

Additionally, the CPIH/CIH shall monitor and record pressure readings within the containment daily with a minimum of two readings at the beginning and at the end of a shift, and submit the data in the daily report.

### **2.3 ASBESTOS HAZARD ABATEMENT PLAN**

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

- A. Minimum Personnel Qualifications
- B. Emergency Action Plan/Contingency Plans and Arrangements
- C. Security and Safety Procedures
- D. Respiratory Protection/Personal Protective Equipment Program and Training
- E. Medical Surveillance Program and Recordkeeping
- F. Regulated Area Requirements - Containment Barriers/Isolation of Regulated Area
- G. Decontamination Facilities and Entry/Exit Procedures (PDF and W/EDF)
- H. Negative Pressure Systems Requirements
- I. Monitoring, Inspections, and Testing
- J. Removal Procedures for ACM
- K. Removal of Contaminated Soil (if applicable)
- L. Encapsulation Procedures for ACM
- M. Disposal of ACM waste/equipment
- N. Regulated Area Decontamination/Clean-up
- O. Regulated Area Visual and Air Clearance
- P. Project Completion/Closeout

### **2.4 SUBMITTALS**

#### **2.4.1 PRE-START MEETING SUBMITTALS**

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

- A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.
- B. Submit a staff organization chart showing all personnel who shall be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.
- C. Submit Asbestos Hazard Abatement Plan developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH/CIH.
- D. Submit the specifics of the materials and equipment to be used for this project with manufacturer names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:

1. Supplied air system, negative air machines, HEPA vacuums, air monitoring pumps, calibration devices, pressure differential monitoring device and emergency power generating system.
  2. Waste water filtration system, shower system, containment barriers.
  3. Encapsulants, surfactants, hand held sprayers, airless sprayers, glovebags, and fire extinguishers.
  4. Respirators, protective clothing, personal protective equipment.
  5. Fire safety equipment to be used in the regulated area.
- E. Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used for transportation; and name, address, and phone number of subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.
- F. Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
- G. Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Personal air monitoring shall be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A. Area or clearance air monitoring shall be conducted in accordance with EPA AHERA protocols.
- H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.
1. Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project: Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; Completion Date
  2. List of project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years: Project Name; Reason; Date; Reference Name/Number; Resolution
  3. List asbestos regulatory citations (e.g., OSHA), notices of violations (e.g., Federal and state EPA), penalties, and legal actions taken against the company including and of the company's officers (including damages paid) in the last 3 years. Provide copies and all information needed for verification.
- I. Submit information on personnel: Provide a resume; address each item completely; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH/CIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and written respiratory protection program, and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
1. CPIH/CIH and IH Technician: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of AHAPs developed; medical opinion; and current respirator fit test.
  2. Competent Person(s)/Supervisor(s): Number; names; social security numbers; years of abatement experience as Competent Person/Supervisor; list of similar projects in size/complexity as

- Competent Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training; maximum number of personnel supervised on a project; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.
3. Workers: Numbers; names; social security numbers; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.
- J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain language the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of AHAPs incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who performs and how is personal air monitoring of abatement workers conducted; a list of references of independent laboratories/IH's familiar with your air monitoring and standard operating procedures; and copies of monitoring results of the five referenced projects listed and analytical method(s) used.
- K. Rented equipment shall be decontaminated prior to returning to the rental agency.
- L. Submit, before the start of work, the manufacturer's technical data for all types of encapsulants, all SDS and application instructions.

#### **2.4.2 SUBMITTALS DURING ABATEMENT**

- A. The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as barrier breeching, equipment failures, emergencies, and any cause for stopping work; and representative air monitoring and results/TWA's/EL's. Submit this information daily to the VPIH/CIH.
- B. The CPIH/CIH shall document and maintain the inspection and approval of the regulated area preparation prior to start of work and daily during work.
1. Removal of any poly barriers.
  2. Visual inspection/testing by the CPIH/CIH or IH Technician prior to application of lockdown encapsulant.
  3. Packaging and removal of ACM waste from regulated area.
  4. Disposal of ACM waste materials; copies of Waste Shipment Records/landfill receipts to the COR on a weekly basis.

#### **2.4.3 SUBMITTALS AT COMPLETION OF ABATEMENT**

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

copies of the abatement report to VAMC Office of Engineer and the Safety Office.

## **2.5 ENCAPSULANTS**

### **2.5.1 TYPES OF ENCAPSULANTS**

- A. The following four types of encapsulants, if used, shall comply with comply with performance requirements as stated in paragraph 2.6.2:
1. Removal encapsulant - used as a wetting agent to remove ACM.
  2. Bridging encapsulant - provides a tough, durable coating on ACM.
  3. Penetrating encapsulant - penetrates/encapsulates ACM at least 13 mm (1/2").
  4. Lockdown encapsulant - seals microscopic fibers on surfaces after ACM removal.

### **2.5.2 PERFORMANCE REQUIREMENTS**

Encapsulants shall meet the latest requirements of EPA; shall not contain toxic or hazardous substances; or solvents; and shall comply with the following performance requirements:

- A. General Requirements for all Encapsulants:
1. ASTM E84: Flame spread of 25; smoke emission of 50.
  2. University of Pittsburgh Protocol: Combustion Toxicity; zero mortality.
  3. ASTM C732: Accelerated Aging Test; Life Expectancy - 20 years.
  4. ASTM E96: Permeability - minimum of 0.4 perms.
- B. Bridging/Penetrating Encapsulants:
1. ASTM E736: Cohesion/Adhesion Test - 24 kPa (50 lbs/ft<sup>2</sup>).
  2. ASTM E119: Fire Resistance - 3 hours (Classified by UL for use on fibrous/cementitious fireproofing).
  3. ASTM D2794: Gardner Impact Test; Impact Resistance - minimum 11.5 kg-mm (43 in/lb).
  4. ASTM D522: Mandrel Bend Test; Flexibility - no rupture or cracking.
- C. Lockdown Encapsulants:
1. ASTM E119: Fire resistance - 3 hours (tested with fireproofing over encapsulant applied directly to steel member).
  2. ASTM E736: Bond Strength - 48 kPa (100 lbs/ft<sup>2</sup>) (test compatibility with cementitious and fibrous fireproofing).
  3. In certain situations, encapsulants shall have to be applied to hot pipes/equipment. The encapsulant shall be able to withstand high temperatures without cracking or off-gassing any noxious vapors during application.

### **2.5.3 CERTIFICATES OF COMPLIANCE**

The Contractor shall submit to the COR certification from the manufacturer indicating compliance with performance requirements for encapsulants when applied according to manufacturer recommendations.

## **PART 3 - EXECUTION**

### **3.1 REGULATED AREA PREPARATIONS**

#### **3.1.1 SITE SECURITY**

- A. Regulated area access is to be restricted only to authorized, trained/accredited and protected personnel. These shall include the Contractor's employees, employees of Subcontractors, VA employees and representatives, State and local inspectors, and any other designated individuals. A list of authorized personnel

- shall be established prior to commencing the project and be posted in the clean room of the decontamination unit.
- B. Entry into the regulated area by unauthorized individuals shall be reported immediately to the Competent Person by anyone observing the entry. The Competent Person shall immediately require any unauthorized person to leave the regulated area and then notify the VA Contracting Officer or COR using the most expeditious means.
  - C. A log book shall be maintained in the clean room of the decontamination unit. Anyone who enters the regulated area shall record their name, affiliation, time in, and time out for each entry.
  - D. Access to the regulated area shall be through a single decontamination unit. All other access (doors, windows, hallways) shall be sealed or locked to prevent entry to or exit from the regulated area. The only exceptions for this requirement are the waste/equipment load-out area which shall be sealed except during the removal of containerized asbestos waste from the regulated area, and emergency exits. Emergency exits shall not be locked from the inside; however, they shall be sealed with poly sheeting and taped until needed. In any situation where exposure to high temperatures which shall result in a flame hazard, fire retardant poly sheeting shall be used.
  - E. The Contractor's Competent Person shall control site security during abatement operations in order to isolate work in progress and protect adjacent personnel. A 24 hour security system shall be provided at the entrance to the regulated area to assure that all entrants are logged in/out and that only authorized personnel are allowed entrance.
  - F. The Contractor shall have the VA's assistance in notifying adjacent personnel of the presence, location and quantity of ACM in the regulated area and enforcement of restricted access by the VA's employees.
  - G. The regulated area shall be locked during non-working hours and secured by COR or Competent Person. The VA Police shall be informed of asbestos abatement regulated areas to provide security checks during facility rounds and emergency response.

### **3.1.2 SIGNAGE AND POWER MANAGEMENT**

- A. Post OSHA DANGER signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to the regulated area where airborne concentrations of asbestos shall exceed the PEL. Signs shall be posted at a distance sufficiently far enough away from the regulated area to permit any personnel to read the sign and take the necessary measures to avoid exposure. Additional signs shall be posted following construction of the regulated area enclosure.
- B. Shut down and lock out/tag out electric power to the regulated area. Provide temporary power and lighting. Insure safe installation including GFCI of temporary power sources and equipment by compliance with all applicable electrical code and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.

- C. Shut down and lock out/tag out heating, cooling, and air conditioning system (HVAC) components that are in, supply or pass through the regulated area. Investigate the regulated area and agree on pre-abatement condition with the COR. Seal all intake and exhaust vents in the regulated area with duct tape and 2 layers of 6-mil poly. Also, seal any seams in system components that pass through the regulated area. Remove all contaminated HVAC system filters and place in labeled 6-mil polyethylene disposal bags for staging and eventual disposal as asbestos waste.

### **3.1.3 NEGATIVE PRESSURE FILTRATION SYSTEM**

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

#### **3.1.3.1 DESIGN AND LAYOUT**

- A. Before start of work submit the design and layout of the regulated area and the negative air machines. The submittal shall indicate the number of, location of and size of negative air machines. The point(s) of exhaust, air flow within the regulated area, anticipated negative pressure differential, and supporting calculations for sizing shall be provided. In addition, submit the following:
  - 1. Method of supplying power to the units and designation/location of the panels.
  - 2. Description of testing method(s) for correct air volume and pressure differential.
  - 3. If auxiliary power supply is to be provided for the negative air machines, provide a schematic diagram of the power supply and manufacturer's data on the generator and switch.

#### **3.1.3.2 NEGATIVE AIR MACHINES (HEPA UNITS)**

- A. Negative Air Machine Cabinet: The cabinet shall be constructed of steel or other durable material capable of withstanding potential damage from rough handling and transportation. The width of the cabinet shall be less than 30" in order to fit in standard doorways. The cabinet shall be factory sealed to prevent asbestos fibers from being released during use, transport, or maintenance. Any access to and replacement of filters shall be from the inlet end. The unit shall be on casters or wheels.
- B. Negative Air Machine Fan: The rating capacity of the fan shall indicate the CFM under actual operating conditions.



Manufacturer's typically use "free-air" (no resistance) conditions when rating fans. The fan shall be a centrifugal type fan.

- C. Negative Air Machine Final Filter: The final filter shall be a HEPA filter. The filter media shall be completely sealed on all edges within a structurally rigid frame. The filter shall align with a continuous flexible gasket material in the negative air machine housing to form an air tight seal. Each HEPA filter shall be certified by the manufacturer to have an efficiency of not less than 99.97%. Testing shall have been done in accordance with Military Standard MIL-STD-282 and Army Instruction Manual 136-300-175A. Each filter shall bear a UL586 label to indicate ability to perform under specified conditions. Each filter shall be marked with the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.
- D. Negative Air Machine Pre-filters: The pre-filters, which protect the final HEPA filter by removing larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. A first stage pre-filter shall be a low efficiency type for particles 10  $\mu$ m or larger. A second stage pre-filter shall have a medium efficiency effective for particles down to 5  $\mu$ m or larger. Pre-filters shall be installed either on or in the intake opening of the NAM and the second stage filter shall be held in place with a special housing or clamps.
- E. Negative Air Machine Instrumentation: Each unit shall be equipped with a gauge to measure the pressure drop across the filters and to indicate when filters have become loaded and need to be changed. A table indicating the cfm for various pressure readings on the gauge shall be affixed near the gauge for reference or the reading shall indicate at what point the filters shall be changed, noting cfm delivery. The unit shall have an elapsed time meter to show total hours of operation.
- F. Negative Air Machine Safety and Warning Devices: An electrical/mechanical lockout shall be provided to prevent the fan from being operated without a HEPA filter. Units shall be equipped with an automatic shutdown device to stop the fan in the event of a rupture in the HEPA filter or blockage in the discharge of the fan. Warning lights are required to indicate normal operation; too high a pressure drop across filters; or too low of a pressure drop across filters.
- G. Negative Air Machine Electrical: All electrical components shall be approved by the National Electrical Manufacturer's Association (NEMA) and Underwriters Laboratories (UL). Each unit shall be provided with overload protection and the motor, fan, fan housing, and cabinet shall be grounded.
- H. It is essential that replacement HEPA filters be tested using an "in-line" testing method, to ensure the seal around the periphery was not damaged during replacement. Damage to the outer HEPA filter seal could allow contaminated air to bypass the HEPA filter and be discharged to an inappropriate location. Contractor shall provide written documentation of test results for negative air machine units with HEPA filters changed by the contractor or documentation when changed and tested by the contractor filters



**3.1.3.3 PRESSURE DIFFERENTIAL**

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

**3.1.3.4 MONITORING**

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

**3.1.3.5 AUXILIARY GENERATOR**

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

**3.1.3.6 SUPPLEMENTAL MAKE-UP AIR INLETS**

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

**3.1.3.7 TESTING THE SYSTEM**

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

**3.1.3.8 DEMONSTRATION OF THE NEGATIVE PRESSURE FILTRATION SYSTEM**

The demonstration of the operation of the negative pressure system to the VA shall include the following:

- A. Plastic barriers and sheeting move lightly in toward the regulated area.

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

#### **3.1.3.9 USE OF THE NEGATIVE PRESSURE FILTRATION SYSTEM DURING ABATEMENT OPERATIONS**

- A. Start units before beginning any disturbance of ACM occurs. After work begins, the units shall run continuously, maintaining 4 actual air changes per hour at a negative pressure differential of -0.02" water column gauge, for the duration of the work until a final visual clearance and final air clearance has been successfully completed.  
No negative air units shall be shut down at any time unless authorized by the VA Contracting Officer, verbally and in writing.
- B. Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area. After items have been pre-cleaned and decontaminated, they shall be removed from the work area for storage until the completion of abatement in the work area.
- C. Abatement work shall begin at a location farthest from the units and proceed towards them. If an electric failure occurs, the Competent Person shall stop all abatement work and immediately begin wetting all exposed asbestos materials for the duration of the power outage. Abatement work shall not resume until power is restored and all units are operating properly again.
- D. The negative air machines shall continue to run after all work is completed and until a final visual clearance and a final air clearance has been successfully completed for that regulated area.

#### **3.1.3.10 DISMANTLING THE SYSTEM**

After completion of the final visual and final air clearance has been obtained by the VPIH/CIH, the units shall be shut down. The unit exterior surfaces shall have been completely decontaminated; pre-filters are not to be removed and the units inlet/outlet sealed with 2 layers of 6 mil poly immediately after shut down. No filter removal shall occur at the VA site following successful completion of site clearance. OSHA/EPA/DOT asbestos shall be attached to the units.

**3.1.4 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA****3.1.4.1 GENERAL**

Seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All surfaces in the regulated area shall be covered to prevent contamination and to facilitate clean-up. Should adjacent areas become contaminated as a result of the work, immediately stop work and clean up the contamination at no additional cost to the VA. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in Section 3.1.4.8; FIRESTOPPING.

**3.1.4.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA**

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

**3.1.4.3 CONTROLLING ACCESS TO THE REGULATED AREA**

Access to the regulated area is allowed only through the personnel decontamination facility (PDF). All other means of access shall be eliminated and OSHA DANGER demarcation signs posted as required by OSHA. If the regulated area is adjacent to, or within view of an occupied area, provide a visual barrier of 6 mil opaque fire retardant poly to prevent building occupant observation. If the adjacent area is accessible to the public, the barrier shall be solid and capable of withstanding the negative pressure.

**3.1.4.4 CRITICAL BARRIERS**

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

**3.1.4.5 PRIMARY BARRIERS**

A. Cover the regulated area with two layers of 6 mil fire retardant poly on the floors and two layers of 4 mil, fire retardant poly on the walls, unless otherwise directed in writing by the COR. Floor layers shall form a right angle with the wall and turn up the wall at least 300 mm (12"). Seams shall overlap at least 1800 mm (6') and shall be spray glued and taped. Install sheeting so that layers can be

removed independently from each other. Carpeting shall be covered with three layers of 6 mil poly. Corrugated cardboard sheets shall be placed between the bottom and middle layers of poly. Mechanically support and seal with duct tape and glue all wall layers.

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

#### **3.1.4.6 SECONDARY BARRIERS**

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

#### **3.1.4.7 EXTENSION OF THE REGULATED AREA**

If the enclosure of the regulated area is breached in any way that could allow contamination to occur, the affected area shall be included in the regulated area and constructed as per this section. Decontamination measures shall be started immediately and continue until air monitoring indicates background levels are met.

#### **3.1.4.8 FIRESTOPPING**

- A. Through penetrations caused by cables, cable trays, pipes, sleeves, conduits, shall be firestopped with a fire-rated firestop system providing an air tight seal.
- B. Firestop materials that are not equal to the wall or ceiling penetrated shall be brought to the attention of the COR. The contractor shall list all areas of penetration, the type of sealant used, and whether or not the location is fire rated. Any discovery of penetrations during abatement shall be brought to the attention of the COR immediately. All walls, floors and ceilings are considered fire rated unless otherwise determined by the COR or Fire Marshall.
- C. Any visible openings whether or not caused by a penetration shall be reported by the Contractor to the COR for a sealant system determination. Firestops shall meet ASTM E814 and UL 1479 requirements for the opening size, penetrant, and fire rating needed.

#### **3.1.5 SANITARY FACILITIES**

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

#### **3.1.6 PERSONAL PROTECTIVE EQUIPMENT**

Provide whole body clothing, head coverings, gloves and foot coverings and any other personal protective equipment as determined by conducting

the hazard assessment required by OSHA at 29 CFR 1910.132 (d). The Competent Person shall ensure the integrity of personal protective equipment worn for the duration of the project. Duct tape shall be used to secure all suit sleeves to wrists and to secure foot coverings at the ankle.

### **3.1.7 PRE-CLEANING**

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

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area. All workers performing pre-cleaning activities shall don appropriate personal protective equipment (PPE), as specified throughout this document and as approved in the Contractor's work plan. After items have been pre-cleaned and decontaminated, they shall be removed from the work area for storage until the completion of abatement in the work area.

Pre-clean all movable objects within the regulated area using a HEPA filtered vacuum and/or wet cleaning methods as appropriate. After cleaning, these objects shall be removed from the regulated area and carefully stored in an uncontaminated location. Drapes, clothing, upholstered furniture and other fabric items shall be disposed of as asbestos contaminated waste. Cleaning these asbestos contaminated items utilizing HEPA vacuum techniques and off-premises steam cleaning is very difficult and cannot guarantee decontamination. Carpeting shall be disposed of prior to abatement if in the regulated area. If ACM floor tile is attached to the carpet while the Contractor is removing the carpet that section of the carpet shall be disposed of as asbestos waste.

Pre-clean all fixed objects in the regulated area using HEPA filtered vacuums and/or wet cleaning techniques as appropriate. Careful attention shall be paid to machinery behind grills or gratings where access shall be difficult but contamination shall be significant. Also, pay particular attention to wall, floor and ceiling penetration behind fixed items. After pre-cleaning, enclose fixed objects with 2 layers of 6-mil poly and seal securely in place with duct tape. Objects (e.g., permanent fixtures, shelves, electronic equipment, laboratory tables, sprinklers, alarm systems, closed circuit TV equipment and computer cables) which shall remain in the regulated area and that require special ventilation or enclosure requirements shall be designated here along with specified means of protection. Contact the manufacturer for special protection requirements.

Pre-clean all surfaces in the regulated area using HEPA filtered vacuums and/or wet cleaning methods as appropriate. Do not use any methods that would raise dust such as dry sweeping or vacuuming with equipment not equipped with HEPA filters. Do not disturb asbestos-containing materials during this pre-cleaning phase.

**3.1.8 PRE-ABATEMENT ACTIVITIES****3.1.8.1 PRE-ABATEMENT MEETING**

The COR, upon receipt, review, and substantial approval of all pre-abatement submittals and verification by the CPIH/CIH that all materials and equipment required for the project are on the site, shall arrange for a pre-abatement meeting between the Contractor, the CPIH/CIH, Competent Person(s), the COR, and the VPIH/CIH. The purpose of the meeting is to discuss any aspect of the submittals needing clarification or amplification and to discuss any aspect of the project execution and the sequence of the operation. The Contractor shall be prepared to provide any supplemental information/documentation to the COR regarding any submittals, documentation, materials or equipment. Upon satisfactory resolution of any outstanding issues, the COR shall issue a written order to proceed to the Contractor. No abatement work of any kind described in the following provisions shall be initiated prior to the VA written order to proceed.

**3.1.8.2 PRE-ABATEMENT CONSTRUCTION AND OPERATIONS**

- A. Perform all preparatory work for the first regulated area in accordance with the approved work schedule and with this specification.
- B. Upon completion of all preparatory work, the CPIH/CIH shall inspect the work and systems and shall notify the COR when the work is completed in accordance with this specification. The COR shall inspect the regulated area and the systems with the VPIH/CIH and shall require that upon satisfactory inspection, the Contractor's employees perform all major aspects of the approved AHAP(s), especially worker protection, respiratory systems, contingency plans, decontamination procedures, and monitoring to demonstrate satisfactory operation. The operational systems for respiratory protection and the negative pressure system shall be demonstrated for proper performance.
- C. The CPIH/CIH shall document the pre-abatement activities described above and deliver a copy to the COR.
- D. Upon satisfactory inspection of the installation of and operation of systems the COR shall notify the Contractor in writing to proceed with the asbestos abatement work in accordance with this specification and all applicable regulations.

**3.1.8.3 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS**

Before any work begins on the construction of the regulated area, the Contractor shall:

- A. Conduct a space-by-space inspection with an authorized COR and prepare a written inventory of all existing damage in those spaces where asbestos abatement shall occur. Still or video photography shall be used to supplement the written damage inventory. Document shall be signed and certified as accurate by both parties.
- B. The COR, the Contractor, and the VPIH/CIH shall be aware of AEQA 10-95 indicating the failure to identify asbestos in the areas listed as well as common issues when preparing specifications and contract documents. This is especially

critical when demolition is planned, because AHERA surveys are non-destructive, and ACM shall remain undetected. A NESHAPS (destructive) ACM inspection shall be conducted on all building structures that shall be demolished. Ensure the following areas are inspected on the project: lay-in ceilings concealing ACM; ACM behind walls/windows from previous renovations; inside utility chases/walls; transite piping/ductwork/sheets; behind radiators; lab fume hoods; transite lab countertops; roofing materials; below window sills; water/sewer lines; electrical conduit coverings; crawlspaces (previous abatement contamination); flooring/mastic covered by carpeting/new flooring; exterior insulated wall panels; on underground fuel tanks; and steam line trench coverings.

- C. Ensure that all furniture, machinery, equipment, curtains, drapes, blinds, and other movable objects required to be removed from the regulated area have been cleaned and removed or properly protected from contamination.
- D. If present and required, remove and dispose of carpeting from floors in the regulated area.
- E. Inspect existing firestopping in the regulated area. Correct as needed.

### **3.2 REMOVAL OF ACM**

#### **3.2.1 WETTING ACM**

- A. Use amended water for the wetting of ACM prior to removal. The Competent Person shall assure the wetting of ACM meets the definition of "adequately wet" in the EPA NESHAP regulation and OSHA's "wet methods" for the duration of the project. A removal encapsulant shall be used instead of amended water with written approval of the COR.
- B. Amended Water: Provide water to which a surfactant has been added shall be used to wet the ACM and reduce the potential for fiber release during disturbance of ACM. The mixture shall be equal to or greater than the wetting provided by water amended by a surfactant consisting one ounce of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with 5 gallons (19L) of water.
- C. Removal Encapsulant: When authorized by VA, provide a penetrating encapsulant designed specifically for the removal of ACM. The material shall, when used, result in adequate wetting of the ACM and retard fiber release during removal.

#### **3.2.2 SECONDARY BARRIER AND WALKWAYS**

- A. Install as a drop cloth a 6 mil poly sheet at the beginning of each work shift where removal is to be done during that shift. Completely cover floors and any walls within 10 feet (3 meters) of the area where work is to be done. Secure the secondary barrier with duct tape to prevent it from moving or debris from getting behind it. Remove the secondary barrier at the end of the shift or as work in the area is completed. Keep residue on the secondary barrier wetted. When removing, fold inward to prevent spillage and place in a disposal bag.
- B. Install walkways using 6 mil black poly between the regulated area and the decontamination facilities (PDF and W/EDF) to protect the primary layers from contamination and damage. Install the walkways at the beginning of each shift and remove at the end of each shift.

### 3.2.3 WET REMOVAL OF ACM

- A. Adequately and thoroughly wet the ACM to be removed prior to removal with amended water or when authorized by VA, removal encapsulant to reduce/prevent fiber release to the air. Adequate time (at a minimum two hours) shall be allowed for the amended water or removal encapsulant to saturate the ACM. Abatement personnel shall not disturb dry ACM. Use a fine spray of amended water or removal encapsulant. Saturate the material sufficiently to wet to the substrate without causing excessive dripping. The material shall be sprayed repeatedly/continuously during the removal process in order to maintain adequately wet conditions. Removal encapsulants shall be applied in accordance with the manufacturer's written instructions. Perforate or carefully separate, using wet methods, an outer covering that is painted or jacketed in order to allow penetration and wetting of the material. Where necessary, carefully remove covering while wetting to minimize fiber release. **In no event shall dry removal occur except when authorized in writing by the VPIH/CIH and VA when a greater safety hazard (e.g., electricity) is present.**
- B. If ACM does not wet well with amended water due to composition, coating or jacketing, remove as follows:
1. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.
  2. Remove saturated ACM in small sections. Do not allow material to dry out. As material is removed, bag material, while still wet into disposal bags. Twist the bag neck tightly, bend over (gooseneck) and seal with a minimum of three tight wraps of duct tape. Clean /decontaminate the outside of the bag of any residue and move to washdown station adjacent to W/EDF.
  3. Fireproofing or Architectural Finish on Scratch Coat: Spray with a fine mist of amended water or removal encapsulant. Allow time for saturation to the substrate. Do not over saturate causing excess dripping. Scrape material from substrate. Remove material in manageable quantities and control falling to staging or floor. If the falling distance is over 20 feet (6M), use a drop chute to contain material through descent. Remove residue remaining on the scratch coat after scraping is done using a stiff bristle hand brush. If a removal encapsulant is used, remove residue completely before the encapsulant dries. Periodically re-wet the substrate with amended water as needed to prevent drying of the material before the residue is removed from the substrate.
  4. Fireproofing or Architectural Finish on Wire Lath: Spray with a fine mist of amended water or removal encapsulant. Allow time to completely saturate the material. Do not over saturate causing excess dripping. If the surface has been painted or otherwise coated, cut small holes as needed and apply amended water or removal encapsulant from above. Cut saturated wire lath into 2' x 6' (50mm x 150mm) sections and cut hanger wires. Roll up complete with ACM, cover in burlap and hand place in disposal bag. Do not drop to floor. After removal of lath/ACM, remove any overspray on decking and structure using stiff bristle nylon brushes. Depending on hardness of overspray, scrapers shall be needed for removal.
  5. Pipe/Tank/Vessel/Boiler Insulation: Remove the outer layer of wrap while spraying with amended water in order to saturate the ACM.



Spray ACM with a fine mist of amended water or removal encapsulant. Allow time to saturate the material to the substrate. Cut bands holding pre-formed pipe insulation sections. Slit jacketing at the seams, remove and hand place in a disposal bag. Do not allow dropping to the floor. Remove molded fitting insulation/mud in large pieces and hand place in a disposal bag. Remove any residue on pipe or fitting with a stiff bristle nylon brush. In locations where pipe fitting insulation is removed from fibrous glass or other non-asbestos insulated straight runs of pipe, remove fibrous material at least 6" from the point it contacts the ACM.

#### **3.2.4 WET REMOVAL OF AMOSITE**

Not Applicable.

### **3.3 LOCKDOWN ENCAPSULATION**

#### **3.3.1 GENERAL**

Lockdown encapsulation is an integral part of the ACM removal. At the conclusion of ACM removal and before removal of the primary barriers, the contractor shall encapsulate all surfaces with a bridging encapsulant.

#### **3.3.2 DELIVERY AND STORAGE**

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

#### **3.3.3 WORKER PROTECTION**

Before beginning work with any material for which an SDS has been submitted, provide workers with any required personal protective equipment. The required personal protective equipment shall be used whenever exposure to the material might occur. In addition to OSHA/specification requirements for respiratory protection, a paint pre-filter and an organic vapor cartridge, at a minimum, shall be used in addition to the HEPA filter when an organic solvent based encapsulant is used. The CPH/CIH shall be responsible for provision of adequate respiratory protection. Note: Flammable and combustible encapsulants shall not be used, unless authorized in writing by the VA.

#### **3.3.4 ENCAPSULATION OF SCRATCH COAT PLASTER OR PIPING**

- A. Apply two coats of lockdown encapsulant to the scratch coat plaster or piping after all ACM has been removed. Apply in strict accordance with the manufacturer's instructions. Any deviation from the instructions shall be approved by the COR in writing prior to commencing the work.
- B. Apply the lockdown encapsulant with an airless sprayer at a pressure and using a nozzle orifice as recommended by the manufacturer. Apply the first coat while the scratch coat is still damp from the asbestos removal process, after passing the visual inspection. If the surface has been allowed to dry, wet wipe or HEPA vacuum prior to spraying with encapsulant. Apply a second coat over the first coat in strict conformance with the manufacturer's instructions. Color the

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

### **3.3.5 SEALING EXPOSED EDGES**

Seal edges of ACM exposed by removal work which is inaccessible, such as a sleeve, wall penetration, with two coats of bridging encapsulant. Prior to sealing, permit the exposed edges to dry completely to permit penetration of the bridging encapsulant. Apply in accordance with 3.3.4 (B).

## **3.4 DISPOSAL OF ACM WASTE MATERIALS**

### **3.4.1 GENERAL**

Dispose of waste ACM and debris which is packaged in accordance with these specifications, OSHA, EPA and DOT. The landfill requirements for packaging shall also be met. Transport shall be in compliance with 49 CFR 100-185 regulations. Disposal shall be done at an approved landfill. Disposal of non-friable ACM shall be done in accordance with applicable regulations.

### **3.4.2 PROCEDURES**

- A. The VA shall be notified at least 24 hours in advance of any waste removed from the containment.
- B. Asbestos waste shall be packaged and moved through the W/EDF into a covered transport container in accordance with procedures in this specification. Waste shall be double-bagged and wetted with amended water prior to disposal. Wetted waste can be very heavy. Bags shall not be overfilled. Bags shall be securely sealed to prevent accidental opening and/or leakage. The top shall be tightly twisted and goose necked prior to tightly sealing with at least three wraps of duct tape. Ensure that unauthorized persons do not have access to the waste material once it is outside the regulated area. All transport containers shall be covered at all times when not in use. NESHAP signs shall be on containers during loading and unloading. Material shall not be transported in open vehicles. If drums are used for packaging, the drums shall be labeled properly and shall not be re-used.
- C. Waste Load Out: Waste load out shall be done in accordance with the procedures in W/EDF Decontamination Procedures. Sealed waste bags shall be decontaminated on exterior surfaces by wet cleaning and/or HEPA vacuuming before being placed in the second waste bag and sealed, which then shall also be wet wiped or HEPA vacuumed.
- D. Asbestos waste with sharp edged components, i.e., nails, screws, lath, strapping, tin sheeting, jacketing, metal mesh, which might tear poly bags shall be wrapped securely in burlap before packaging and, if needed, use a poly lined fiber drum as the second container, prior to disposal.

## **3.5 PROJECT DECONTAMINATION**

### **3.5.1 GENERAL**

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

- B. If the asbestos abatement work is in an area which was contaminated prior to the start of abatement, the decontamination shall be done by cleaning the primary barrier poly prior to its removal and cleanings of the surfaces of the regulated area after the primary barrier removal.
- C. If the asbestos abatement work is in an area which was uncontaminated prior to the start of abatement, the decontamination shall be done by cleaning the primary barrier poly prior to its removal, thus preventing contamination of the building when the regulated area critical barriers are removed.

### **3.5.2 REGULATED AREA CLEARANCE**

Clearance air testing and other requirements which shall be met before release of the Contractor and re-occupancy of the regulated area space are specified in Final Testing Procedures.

### **3.5.3 WORK DESCRIPTION**

Decontamination includes the clearance air testing in the regulated area and the decontamination and removal of the enclosures/facilities installed prior to the abatement work including primary/critical barriers, PDF and W/EDF facilities, and negative pressure systems.

### **3.5.4 PRE-DECONTAMINATION CONDITIONS**

- A. Before decontamination starts, all ACM waste from the regulated area shall be collected and removed, and the loose 6 mil layer of poly removed while being adequately wetted with amended water and disposed of along with any gross debris generated by the work.
- B. At the start of decontamination, the following shall be in place:
  - 1. Primary barriers consisting of 2 layers of 6 mil poly on the floor and 4 mil poly on the walls.
  - 2. Critical barriers consisting of 2 layers of 6 mil poly which is the sole barrier between the regulated area and openings to the rest of the building or outside.
  - 4. Decontamination facilities for personnel and equipment in operating condition and the negative pressure system in operation.

### **3.5.5 FIRST CLEANING**

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

### **3.5.6 PRE-CLEARANCE INSPECTION AND TESTING**

The CPIH/CIH and VPIH/CIH shall perform a thorough and detailed visual inspection at the end of the cleaning to determine whether there is any visible residue in the regulated area. If the visual inspection is acceptable, the CPIH/CIH shall perform pre-clearance sampling using aggressive clearance as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). If the sampling results show values below 0.01 f/cc,

then the Contractor shall notify the COR of the results with a brief report from the CPH/CIH documenting the inspection and sampling results and a statement verifying that the regulated area is ready for lockdown encapsulation. The VA reserves the right to utilize their own VPIH/CIH to perform a pre-clearance inspection and testing for verification.

### **3.5.7 LOCKDOWN ENCAPSULATION OF ABATED SURFACES**

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

## **3.6 FINAL VISUAL INSPECTION AND AIR CLEARANCE TESTING**

### **3.6.1 GENERAL**

Notify the COR 24 hours in advance for the performance of the final visual inspection and testing. The final visual inspection and testing shall be performed by the VPIH/CIH starting after the final cleaning.

### **3.6.2 FINAL VISUAL INSPECTION**

Final visual inspection shall include the entire regulated area, the PDF, all poly sheeting, seals over HVAC openings, doorways, windows, and any other openings. **If any debris, residue, dust or any other suspect material is detected, the final cleaning shall be repeated at no cost to the VA. Dust/material samples shall be collected and analyzed at no cost to the VA at the discretion of the VPIH/CIH to confirm visual findings. When the regulated area is visually clean the final testing can be done.**

### **3.6.3 FINAL AIR CLEARANCE TESTING**

- A. After an acceptable final visual inspection by the VPIH/CIH and COR, the VPIH/CIH shall perform the final clearance testing. Air samples shall be collected and analyzed in accordance with procedures for AHERA in this specification. If work is less than 260 lf/160 sf/35 cf, 5 PCM samples shall be collected for clearance and a minimum of one field blank. If work is equal to or more than 260 lf/160 sf/35 cf, AHERA TEM sampling shall be performed for clearance. TEM analysis shall be done in accordance with procedures for EPA AHERA in this specification. If the release criteria are not met, the Contractor shall repeat the final cleaning and continue decontamination procedures until clearance is achieved. **All Additional inspection and testing costs shall be borne by the Contractor.**
- B. If release criteria are met, proceed to perform the abatement closeout and to issue the certificate of completion in accordance with these specifications.

### **3.6.4 FINAL AIR CLEARANCE PROCEDURES**

- A. Contractor's Release Criteria: Work in a regulated area is complete when the regulated area is visually clean and airborne fiber levels have been reduced to or below 0.01 f/cc as measured by the AHERA PCM protocol, or 70 AHERA structures per square millimeter (s/mm<sup>2</sup>) by AHERA TEM.
- B. Air Monitoring and Final Clearance Sampling: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to the specified level, the VPIH/CIH shall secure samples and analyze them according to the following procedures:

1. Fibers Counted: "Fibers" referred to in this section shall be either all fibers regardless of composition as counted in the NIOSH 7400 PCM method or asbestos fibers counted using the AHERA TEM method.
2. Aggressive Sampling: All final air testing samples shall be collected using aggressive sampling techniques except where soil is not encapsulated or enclosed. Samples shall be collected on 0.8 $\mu$  MCE filters for PCM analysis and 0.45 $\mu$  Polycarbonate filters for TEM. A minimum of 1200 Liters of using calibrated pumps shall be collected for clearance samples. Before pumps are started, initiate aggressive air mixing sampling as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). Air samples shall be collected in areas subject to normal air circulation away from corners, obstructed locations, and locations near windows, doors, or vents. After air sampling pumps have been shut off, circulating fans shall be shut off. The negative pressure system shall continue to operate.
3. Final clearance for soil that is not encapsulated, samples shall be collected on 0.8 $\mu$  MCE filters for PCM analysis and 0.45 $\mu$  Polycarbonate filters for TEM. A minimum of 1200 Liters of using calibrated pumps shall be collected for clearance samples. Air clearance of work areas where contaminated soil has been removed is in addition to the requirement for clearance by bulk sample analysis discussed within these specifications. There shall be no aggressive air sampling for the clearance of soil due to the fact that aggressive air sampling shall overload the cassettes.
4. Random samples shall be collected from areas of soil which have been abated to ensure that the soil has been properly decontaminated. The total number of samples to be collected from the soil areas shall be; <1000 SF of soil - 3 samples; >1000 to <5000 SF of soil - 5 samples; and >5000 SF of soil - 7 samples. The soil samples shall be collected in a statistically random manner and shall be analyzed by PLM method. The clearance level to determine the soil clean is <1% asbestos by weight as analyzed by PLM method. If this level is achieved, the soil areas shall be considered clear. If the levels are >1% asbestos, the areas shall be re-cleaned until the sample results are <1%.

#### **3.6.5 CLEARANCE SAMPLING USING PCM - LESS THAN 260LF/160SF:**

- A. The VPIH/CIH shall perform clearance samples as indicated by the specification.
- B. The NIOSH 7400 PCM method shall be used for clearance sampling with a minimum collection volume of 1200 Liters of air. A minimum of 5 PCM clearance samples shall be collected. All samples shall be equal to or less than 0.01 f/cc to clear the regulated area.
- C. Random samples shall be collected from areas of soil which have been abated to ensure that the soil has been properly decontaminated. The total number of samples to be collected from the soil areas shall be; <1000 SF of soil - 3 samples; >1000 to <5000 SF of soil - 5 samples; and >5000 SF of soil - 7 samples. The soil samples shall be collected in a statistically random manner and shall be analyzed by PLM method. The clearance level to determine the soil clean is <1% asbestos by weight as analyzed by PLM method. If this level is achieved, the soil areas shall be considered clear. If the levels are >1% asbestos, the areas shall be re-cleaned until the sample results are <1%.

#### **3.6.6 CLEARANCE SAMPLING USING TEM - EQUAL TO OR MORE THAN 260LF/160SF: TEM**

- A. Clearance requires 13 samples be collected; 5 inside the regulated area; 5 outside the regulated area; and 3 field blanks.
- B. The TEM method shall be used for clearance sampling with a minimum collection volume of 1200 Liters of air. A minimum of 13 clearance samples shall be collected. All samples shall be equal to or less than 70 AHERA structures per square millimeter (s/mm<sup>2</sup>) AHERA TEM.

#### **3.6.7 LABORATORY TESTING OF PCM CLEARANCE SAMPLES**

The services of an AIHA accredited laboratory shall be employed by the VA to perform analysis for the PCM air samples. The accredited laboratory shall be successfully participating in the AIHA Proficiency Analytical Testing (PAT) program. Samples shall be sent daily by the VPIH/CIH so that verbal/faxed reports can be received within 24 hours. A complete record, certified by the laboratory, of all air monitoring tests and results shall be furnished to the COR and the Contractor.

#### **3.6.8 LABORATORY TESTING OF TEM SAMPLES**

Samples shall be sent by the VPIH/CIH to a NIST accredited laboratory for analysis by TEM. The laboratory shall be successfully participating in the NIST Airborne Asbestos Analysis (TEM) program. Verbal/faxed results from the laboratory shall be available within 24 hours after receipt of the samples. A complete record, certified by the laboratory, of all TEM results shall be furnished to the COR and the Contractor.

#### **3.6.9 LABORATORY TESTING OF BULK SAMPLES**

Samples shall be sent by the VPIH/CIH or CPIH/CIH to a NIST accredited laboratory for analysis by PLM. The laboratory shall be successfully participating in the NIST Bulk Asbestos Analysis (PLM) program. Verbal/faxed results from the laboratory shall be available within 24 hours after receipt of the samples. A complete record, certified by the laboratory, of all TEM results shall be furnished to the COR and the Contractor.

### **3.7 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE**

#### **3.7.1 COMPLETION OF ABATEMENT WORK**

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

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

#### **3.7.2 CERTIFICATE OF COMPLETION BY CONTRACTOR**

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

**3.7.3 WORK SHIFTS**

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

**3.7.4 RE-INSULATION**

If required as part of the contract, replace all asbestos containing insulation/fire-proofing with suitable non-asbestos material. Provide SDS's for all replacement materials in advance of installation for VA approval.

**ATTACHMENT #1****CERTIFICATE OF COMPLETION**

DATE: \_\_\_\_\_ VA Project #: \_\_\_\_\_

PROJECT NAME: \_\_\_\_\_ Abatement Contractor: \_\_\_\_\_

VAMC/ADDRESS: \_\_\_\_\_

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

CPIH/CIH Signature/Date: \_\_\_\_\_

CPIH/CIH Print Name: \_\_\_\_\_

Abatement Contractor Signature/Date: \_\_\_\_\_

Abatement Contractor Print Name: \_\_\_\_\_



**ATTACHMENT #2****CERTIFICATE OF WORKER'S ACKNOWLEDGMENT**

PROJECT NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

PROJECT ADDRESS: \_\_\_\_\_

ABATEMENT CONTRACTOR'S NAME: \_\_\_\_\_

**WORKING WITH ASBESTOS CAN BE HAZARDOUS TO YOUR HEALTH. INHALING ASBESTOS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCERS. IF YOU SMOKE AND INHALE ASBESTOS FIBERS, YOUR CHANCES OF DEVELOPING LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PUBLIC.**

Your employer's contract with the owner for the above project requires that: You shall be supplied with the proper personal protective equipment including an adequate respirator and be trained in its use. You shall be trained in safe and healthy work practices and in the use of the equipment found at an asbestos abatement project. You shall receive/have a current medical examination for working with asbestos. These things shall be provided at no cost to you. By signing this certificate you are indicating to the owner that your employer has met these obligations.

RESPIRATORY PROTECTION: I have been trained in the proper use of respirators and have been informed of the type of respirator to be used on the above indicated project. I have a copy of the written Respiratory Protection Program issued by my employer. I have been provided for my exclusive use, at no cost, with a respirator to be used on the above indicated project.

TRAINING COURSE: I have been trained by a third party, State/EPA accredited trainer in the requirements for an AHERA/OSHA Asbestos Abatement Worker training course, 32 hours minimum duration. I currently have a valid State accreditation certificate. The topics covered in the course include, as a minimum, the following:

- Physical Characteristics and Background Information on Asbestos
- Potential Health Effects Related to Exposure to Asbestos
- Employee Personal Protective Equipment
- Establishment of a Respiratory Protection Program
- State of the Art Work Practices
- Personal Hygiene
- Additional Safety Hazards
- Medical Monitoring
- Air Monitoring
- Relevant Federal, State and Local Regulatory Requirements, Procedures, and Standards
- Asbestos Waste Disposal

MEDICAL EXAMINATION: I have had a medical examination within the past 12 months which was paid for by my employer. This examination included: health history, occupational history, pulmonary function test, and shall have included a chest x-ray evaluation. The physician issued a positive written opinion after the examination.

Signature: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Social Security Number: \_\_\_\_\_

Witness: \_\_\_\_\_

**ATTACHMENT #3****AFFIDAVIT OF MEDICAL SURVEILLANCE, RESPIRATORY PROTECTION AND TRAINING/ACCREDITATION**

VA PROJECT NAME AND NUMBER: \_\_\_\_\_

VA MEDICAL FACILITY: \_\_\_\_\_

ABATEMENT CONTRACTOR'S NAME AND ADDRESS: \_\_\_\_\_

1. I verify that the following individual

Name: \_\_\_\_\_ Social Security Number: \_\_\_\_\_

who is proposed to be employed in asbestos abatement work associated with the above project by the named Abatement Contractor, is included in a medical surveillance program in accordance with 29 CFR 1926.1101(m), and that complete records of the medical surveillance program as required by 29 CFR 1926.1101(m)(n) and 29 CFR 1910.20 are kept at the offices of the Abatement Contractor at the following address.

Address: \_\_\_\_\_

2. I verify that this individual has been trained, fit-tested and instructed in the use of all appropriate respiratory protection systems and that the person is capable of working in safe and healthy manner as expected and required in the expected work environment of this project.

3. I verify that this individual has been trained as required by 29 CFR 1926.1101(k). This individual has also obtained a valid State accreditation certificate. Documentation shall be kept on-site.

4. I verify that I meet the minimum qualifications criteria of the VA specifications for a CPIH.

Signature of CPIH/CIH: \_\_\_\_\_ Date: \_\_\_\_\_

Printed Name of CPIH/CIH: \_\_\_\_\_

Signature of Contractor: \_\_\_\_\_ Date: \_\_\_\_\_

Printed Name of Contractor: \_\_\_\_\_

**ATTACHMENT #4****ABATEMENT CONTRACTOR/COMPETENT PERSON(S) REVIEW AND ACCEPTANCE OF THE VA'S ASBESTOS SPECIFICATIONS**

VA Project Location: \_\_\_\_\_

VA Project #: \_\_\_\_\_

VA Project Description: \_\_\_\_\_

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

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

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

Abatement Contractor Owner's Signature \_\_\_\_\_ Date \_\_\_\_\_

Abatement Contractor Competent Person(s) \_\_\_\_\_ Date \_\_\_\_\_

- - - END - - -

**SECTION 02 83 33.13**  
**LEAD-BASED PAINT REMOVAL AND DISPOSAL**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Removing and disposal of lead-based paint at interior and exterior locations

**1.2 RELATED REQUIREMENTS**

- A. Hazardous Material Abatement: Section 02 82 11, TRADITIONAL ASBESTOS ABATEMENT.
- B. Demolition Disturbing Lead-Based Paint: Section 02 41 00, DEMOLITION.
- C. Surface Preparation Disturbing Lead-Based Paint: Section 09 91 00, PAINTING.

**1.3 DEFINITIONS**

- A. Action Level: Employee exposure, without regard to use of respirator, to lead airborne concentration of 30 micrograms per cubic meter (0.03 parts per million) of air averaged over 8-hour period. As used in this section, "30 micrograms per cubic meter of air" refers to action level.
- B. Area Monitoring: Sampling of lead concentrations within lead control area and inside physical boundaries which are representative of airborne lead concentrations which may reach breathing zone of personnel potentially exposed to lead.
- C. Breathing Zone: Area within hemisphere, forward of shoulders, with 150 mm to 225 mm (6 to 9 inches) radius and center at nose or mouth of employee.
- D. Certified Industrial Hygienist (CIH): As used in this section, refers to an Industrial Hygienist employed by Contractor.
- E. Change Rooms and Shower Facilities: Rooms within designated physical boundary around lead control area equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross- contamination.
- F. Competent Person: Person capable of identifying lead hazards in work area and authorized by contractor to take corrective action.
- G. Decontamination Room: Room for removal of contaminated personal protective equipment (PPE).

- H. Eight-Hour Time Weighted Average (TWA): Airborne concentration of lead averaged over 8-hour workday to which an employee is exposed.
- I. High Efficiency Particulate Air (HEPA) Filter Equipment:  
HEPA filtered vacuuming equipment with UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. HEPA filter means 99.97 percent efficient against 0.3 micron (0.012 mil) size particles.
- J. Lead: Metallic lead, inorganic lead compounds, and organic lead soaps. Excluded from this definition are other organic lead compounds.
- K. Lead Control Area: Enclosed area or structure with full containment to prevent spreading lead dust, paint chips, and debris from lead-based paint removal operations. Lead control area is isolated by physical boundaries to prevent unauthorized entry of personnel.
- L. Lead Permissible Exposure Limit (PEL): Fifty micrograms per cubic meter (0.05 parts per million) of air as 8-hour time weighted average as determined by 29 CFR Part 1910.1025. When employee is exposed for more than 8 hours per work day, determine PEL by following formula.  $PEL \text{ micrograms/cubic meter (parts per million) of air} = 400 / \text{No. of hrs. worked per day.}$
- M. Personnel Monitoring: Sampling of lead concentrations within employee breathing zone to determine 8-hour time weighted average concentration according to 29 CFR Part 1910.1025. Take samples representative of employee's work tasks.
- N. Physical Boundary: Area physically roped or partitioned off around enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean same as "outside lead control area."

#### **1.4 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. American National Standards Institute (ANSI):
  - 1. Z9.2-12 - Fundamentals Governing the Design & Operation of Local Exhaust Ventilation Systems.
- C. Code of Federal Regulations (CFR):
  - 1. 29 CFR Part 1910 - Occupational Safety and Health Standards.
  - 2. 29 CFR Part 1926 - Safety and Health Regulations for Construction.
  - 3. 40 CFR Part 260 - Hazardous Waste Management System: General.
  - 4. 40 CFR Part 261 - Identification and Listing of Hazardous Waste.

5. 40 CFR Part 262 - Standards Applicable to Generators of Hazardous Waste.
  6. 40 CFR Part 263 - Standards Applicable to Transporters of Hazardous Waste.
  7. 40 CFR Part 268 - Land Disposal Restrictions.
  8. 49 CFR Part 172 - Hazardous Material Table, Special Provisions, Hazardous Material Communications, Emergency Response Information, and Training Requirements, and Security Plans.
  9. 49 CFR Part 178 - Specifications for Packagings.
- D. Underwriters Laboratories (UL):
1. 586-09 - High-Efficiency, Particulate, Air Filter Units.

#### **1.5 PRE-REMOVAL MEETINGS**

- A. Conduct pre-removal meeting at project site minimum 30 days before beginning Work of this section.
1. Required Participants:
    - a. Contracting Officer's Representative.
    - b. Certified Industrial Hygienist.
    - c. Architect/Engineer.
    - d. Inspection and Testing Agency.
    - e. Contractor.
    - f. Paint removal contractor.
    - g. Other installers responsible for finishing resulting surfaces.
  2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
    - a. Respiratory protection program.
    - b. Hazard communication program.
    - c. Hazardous waste management plan.
    - d. Safety and health regulation compliance.
    - e. Employee training.
    - f. Removal schedule.
    - g. Removal sequence.
    - h. Preparatory work.
    - i. Protection before, during, and after removal.
    - j. Removal.
    - k. Inspecting and testing.
    - l. Other items affecting successful completion.
  3. Document and distribute meeting minutes to participants to record decisions affecting installation.

**1.6 SUBMITTALS**

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Description of each product.
    - a. Paint removal products.
    - b. Vacuum filters.
    - c. Respirators.
  - 2. Safety data sheet for each paint removal product.
  - 3. Installation instructions.
    - a. Paint removal products.
- C. Test Reports: Submit testing laboratory reports.
  - 1. Submit air monitoring results within three working days, signed by testing laboratory employee performing air monitoring, employee analyzing sample, and CIH.
- D. Certificates: Certify completed training.
  - 1. Submit certificate for each employee signed and dated by CIH and employee stating employee was trained.
- E. Qualifications: Substantiate qualifications comply with specifications.
  - 1. Paint removal contractor.
  - 2. Testing laboratory.
    - a. Name, address, and telephone number.
    - b. Current evidence of participation in NIOSH PAT Program.
    - c. Copy of current AIHA accreditation certificate.
  - 3. Industrial hygienist.
    - a. Name, address, and telephone number.
    - b. Resume showing previous experience.
    - c. Copy of current ABIH CIH certification.
  - 4. Paint disposal facility.
    - a. Name, address, and telephone number.
    - b. Current license or authorization to receive and dispose lead contaminated waste.
- F. Record Documents:
  - 1. Completed and signed hazardous waste manifest from waste transporter.
  - 2. Paint disposal facility receipts and disposition reports.
  - 3. Certification of medical examinations.
  - 4. Employee training certification.

**1.7 QUALITY ASSURANCE**

- A. Safety and Health Regulation Compliance:
  - 1. Comply with laws, ordinances, rules, and regulations of federal, state, and local authorities having jurisdiction regarding removing, handling, storing, transporting, and disposing lead waste materials.
    - a. Comply with applicable requirements of 29 CFR Part 1910.1025.
    - b. Notify Contracting Officer's Representative and request resolution of conflicts between regulations and specified requirements before starting work.
  - 2. Comply with all local laws, ordinances, criteria, rules and regulations regarding removing, handling, storing, transporting, and disposing lead-contaminated materials.
- B. Paint Removal Contractor: Experienced contractor, registered or licensed by applicable state agency regulating lead-based paint removal.
- C. Testing Laboratory: Accredited independent testing laboratory experienced in airborne lead monitoring, testing, and reporting.
  - 1. Successful participant in NIOSH Proficiency Analytical Testing (PAT) Program within prior 12 months.
  - 2. Accredited by American Industrial Hygiene Association (AIHA).
- D. Certified Industrial Hygienist: Certified as CIH by American Board of Industrial Hygiene in comprehensive practice and responsible for:
  - 1. Certify Training.
  - 2. Review and approve lead-based paint removal plan for conformance to applicable referenced standards.
  - 3. Inspect lead-based paint removal work for conformance with approved plan.
  - 4. Direct monitoring.
  - 5. Ensure work is performed according to specifications.
  - 6. Ensure personnel and environment hazardous exposures are adequately controlled.
- E. Paint Disposal Facility: State certified disposal facility qualified to receive and dispose lead-based paint.
- F. Lead-based Paint Removal Plan:
  - 1. Submit detailed, site-specific plan describing lead-based paint removal procedures.



2. Include sketch showing location, size, and details of lead control areas, decontamination rooms, change rooms, shower facilities, and mechanical ventilation system.
  3. Include eating, drinking, and restroom procedures, interface of trades, work sequencing, collected wastewater and paint debris disposal plan, air sampling plan, respirators, protective equipment, and detailed description of containment methods ensuring airborne lead concentrations do not exceed action level outside lead control area.
    - a. Eating, drinking, and smoking are not acceptable within lead control area.
  4. Include air sampling, training and strategy, sampling methodology, frequency, duration, and qualifications of air monitoring personnel.
- G. Respiratory Protection Program: Establish and implement program required by 29 CFR Part 1910.134, 29 CFR Part 1910.1025, and 29 CFR Part 1926.62.
1. Provide each employee negative pressure or other appropriate respirator.
    - a. Test fit each employee's respirator at initial fitting and maximum 6 month intervals, as required by 29 CFR Part 1926.62.
- H. Hazard Communication Program: Establish and implement program required by 29 CFR Part 1910.1200.
- I. Hazardous Waste Management Plan: Establish and implement plan according to applicable requirements of Federal, State, and local hazardous waste regulations including the following:
1. Identification of hazardous wastes associated with work.
  2. Estimated quantities of generated and disposed waste.
  3. Names and qualifications of each contractor transporting, storing, treating, and disposing wastes. Include facility location and 24-hour point of contact. Provide two copies of state hazardous waste permits and EPA Identification numbers.
  4. Names and qualifications (experience and training) of personnel working on-site with hazardous wastes.
  5. List of required waste handling equipment including cleaning, volume reduction, and transport equipment.
  6. Spill prevention, containment, and cleanup contingency implementation measures.

7. Work plan and schedule for waste containment, removal, and disposal with daily waste cleaned up and containerization.
8. Hazardous waste disposal cost.

## **PART 2 - PRODUCTS**

### **2.1 PAINT REMOVAL PRODUCTS**

- A. Chemical Stripper: Biodegradable, non-toxic, capable of removing existing paint layers in one application, and acceptable to CIH.

### **2.2 ACCESSORIES**

- A. Waste Collection Drums: 49 CFR Part 178; Type 1A2, steel, removable head, 200 L (55 gal.) capacity, capable of containing waste without loss.
- B. Vacuum Cleaner: HEPA filtered type.
- C. Scrapers:
  1. Metal type for use on metal, concrete, and masonry surfaces.
  2. Plastic type for use on wood, plaster, gypsum board, and other surfaces.
- D. Rinse Water: Potable.
- E. Cleaning Cloths: Cotton.
- F. Labels

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Before exposure to lead-contaminated dust, provide workers with comprehensive medical examination required by 29 CFR Part 1926.62 (I) (1) (i) and (ii).
  1. Exemption: Examination is not required when employee medical records show last examination required by 29 CFR Part 1926.62(I) was completed within previous 12 months.
- B. Maintain complete and accurate employee medical records according to 29 CFR Part 1910.20.
- C. Train each employee performing paint removal, disposal, and air sampling operations according to 29 CFR Part 1926.62.
  1. Certify training is completed before employee is permitted to work on project and enter lead control area.

### **3.2 PREPARATION**

- A. Protect existing work indicated to remain.

1. Perform paint removal work without damaging and contaminating adjacent work.
  2. Restore damage and contamination to original condition.
- B. Notify Contracting Officer 20 days before starting paint removal work.
- C. Lead Control Area Requirements:
1. Establish lead control area by completely enclosing lead-based paint removal work area with containment screens.
  2. Contain removal operations using negative pressure full containment system with minimum one change room and HEPA filtered exhaust.
- D. Boundary Requirements: Provide physical boundaries around lead control area by roping off area or providing curtains, portable partitions or other enclosures to ensure that airborne lead concentrations do not meet or exceed action level outside of lead control area.
- E. Heating, Ventilating and Air Conditioning (HVAC) Systems: Shut down, lock out, and isolate HVAC systems supplying exhausting, and passing through lead control areas. Seal HVAC inlets and outlet within lead control area with 6-mil plastic sheet and tape. Tape seal seams in HVAC components passing through lead control area.
- F. Change Room and Shower Facilities: Provide clean change rooms and shower facilities within physical boundary around lead control area according to 29 CFR Part 1926.62.
- G. Mechanical Ventilation System:
1. Provide ventilation system to control personnel exposure to lead according to 29 CFR Part 1926.57.
  2. Design, construct, install, and maintain HEPA filtered fixed local exhaust ventilation system according to ANSI Z9.2 and approved by CIH.
  3. Exhaust ventilation air to exterior wherever possible.
  4. When exhaust ventilation air must be recirculated into work area, provide HEPA filter with reliable back-up filter and controls to monitor lead concentration in return air and to bypass recirculation system automatically when system fails.
- H. Personnel Protection: Provide and use required protective clothing and equipment within lead control area.
- I. Warning Signs: Provide warning signs complying with 29 CFR Part 1926.62 at lead control area approaches. Locate signs so personnel read signs and take necessary precautions before entering lead control area.

### 3.3 WORK PROCEDURES

- A. Remove lead-based paint according to approved lead-based paint removal plan.
  - 1. Perform work only in presence of CIH or Industrial Hygienist (IH) Technician under direction of CIH ensuring continuous inspection of work in progress and direction of air monitoring activities.
  - 2. Handle, store, transport, and dispose lead or and lead contaminated waste according to 40 CFR Part 260, 40 CFR Part 261, 40 CFR Part 262, and 40 CFR Part 263. Comply with land disposal restriction notification requirements as required by 40 CFR Part 268.
- B. Use procedures and equipment required to limit occupational and environmental lead exposure when lead-based paint is removed according to 29 CFR Part 1926.62.
- C. Dispose removed paint and waste according to Environmental Protection Agency (EPA), federal, state, and local requirements.
- D. Personnel Exiting Procedures:
  - 1. When personnel exit lead control area, comply with the following procedures:
    - a. Vacuum exposed clothing surfaces.
    - b. Remove protective clothing and equipment in decontamination room. Place clothing in approved impermeable disposal bag.
    - c. Shower.
    - d. Dress in clean clothes before leaving lead control area.
- E. Monitoring - General:
  - 1. Monitor airborne lead concentrations according to 29 CFR Part 1910.1025 by testing laboratory as directed by CIH.
  - 2. Take personal air monitoring samples on employees anticipated to have greatest exposure risk as determined by CIH. Additionally, take air monitoring samples on minimum 25 percent of work crew or minimum of two employees, whichever is greater, during each work shift.
  - 3. Submit results of air monitoring samples, signed by CIH, within 48 hours after taking air samples. Notify Contracting Officer's Representative immediately of lead exposure at or exceeding action level outside of lead control area.
- F. Monitoring During Paint Removal:
  - 1. Perform personal and area monitoring during entire paint removal operation.

2. Conduct area monitoring at physical boundary daily for each work shift to ensure unprotected personnel are not exposed above action level anytime.
3. For outdoor operations, take at least one sample on each shift leeward of lead control area. When adjacent areas are contaminated, clean area of contamination and have CIH visually inspect and certify lead contamination is cleaned.
4. Stop work when outside boundary lead levels meet or exceed action level. Notify Contracting Officer's Representative, immediately.
5. Correct conditions causing increased lead concentration as directed by CIH.
6. Review sampling data collected during work stoppage to determine if conditions require additional work method modifications as determined by CIH.
7. Resume paint removal when approved by CIH.

#### **3.4 LEAD-BASED PAINT REMOVAL**

- A. Remove paint within areas indicated on drawings completely exposing substrate. Minimize damage to substrate.
- B. Comply with paint removal processes described lead paint removal plan.
- C. Lead-Based Paint Removal: Select processes for each application to minimize work area lead contamination and waste.

#### **3.5 SUBSTRATE SURFACE PREPARATION**

- A. Protect substrates from deterioration and contamination until refinished.
  1. Protect metal substrates from flash rusting.
- B. Prepare and paint substrates according to Section 09 91 00, PAINTING.

#### **3.6 FIELD QUALITY CONTROL**

- A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Perform sampling and testing for:
  1. Air monitoring.
  2. Lead based paint.

#### **3.7 CLEANING AND DISPOSAL**

- A. Cleaning:
  1. Maintain lead control area surfaces free of accumulating paint chips and dust. Confine dust, debris, and waste to work area.

2. Vacuum clean work area daily, at end of each shift, and when paint removal operation is complete.
- B. CIH Certification: Certify in writing that inside and outside lead control area air monitoring samples are less than action level, employee respiratory protection was adequate, the work was performed according to 29 CFR Part 1926.62, and no visible accumulations of lead-based paint and dust remain on worksite.
1. Do not remove lead control area or roped-off boundary and warning signs before Contracting Officer's Representative's receipt of CIH's certification.
  2. Reclean areas showing dust or residual paint chips.
- C. Testing: Where indicated and when directed by Contracting Officer's Representative, test lead-based paint residue and used abrasive according to 40 CFR Part 261 for hazardous waste.
- D. Waste Collection:
1. Collect lead-contaminated materials including waste, scrap, debris, bags, containers, equipment, and clothing, which may produce airborne lead contamination.
  2. Place lead contaminated materials in waste disposal drums. Label each drum identifying waste type according to 49 CFR Part 172 and date waste materials were first put into drum. Obtain and complete the Uniform Hazardous Waste Manifest forms. Comply with land disposal restriction notification requirements required by 40 CFR Part 268:
  3. Coordinate temporary storage location on project site with Contracting Officer's Representative.
- E. Waste Disposal:
1. Do not store hazardous waste drums in temporary storage location longer than 90 calendar days from accumulation start date.
  2. Remove, transport, and deliver drums to paint disposal facility.
    - a. Obtain signed receipt including date, time, quantity, and description of materials received according to 40 CFR Part 262.
    - b. Obtain final report of materials disposition after disposal completion.

- - - E N D - - -

**SECTION 04 01 00  
MAINTENANCE OF MASONRY**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Repointing existing damaged masonry joints.

**1.2 APPLICABLE PUBLICATIONS**

A. Comply with references to extent specified in this section.

B. ASTM International (ASTM):

1. C67-14 - Sampling and Testing Brick and Structural Clay Tile.
2. C144-11 - Aggregate for Masonry Mortar.
3. C150/C150M-15 - Portland Cement.
4. C207-06(2011) - Hydrated Lime for Masonry Purposes.
5. C216-15 - Facing Brick (Solid Masonry Units Made from Clay or Shale).
6. C270-14a - Mortar for Unit Masonry.
7. C295/C295M-12 - Petrographic Examination of Aggregates for Concrete.

**1.3 SUBMITTALS**

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Description of each product.
2. Replacement units indicating manufacturer recommendation for each application.

C. Samples:

1. Pointing Mortar: Molded, 150 mm (6 inches) long for each type, texture, and color.

D. Test reports:

1. Preconstruction test results of existing masonry mortar and units.
2. Recommended mortar mix and mortar materials sources.

**1.4 QUALITY ASSURANCE**

A. Installer Qualifications:

1. Documented experience in completion of work, similar in design, material, and extent specified.

B. Preconstruction Testing:

1. Existing Mortar: according to ASTM C295/C295M.

- a. Recommend mortar mix compatible with existing and mortar material sources required to match existing color and texture.
- C. Mockups: Prepare full size mockup for each type and style of window, demonstrating quality and aesthetics of tuck pointing.

#### **1.5 DELIVERY**

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

#### **1.6 STORAGE AND HANDLING**

- A. Store materials covered, protected from weather, and elevated above grade.
  - 1. Prevent contamination of aggregates.
- B. Protect products from damage during handling and construction operations.

#### **1.7 FIELD CONDITIONS**

- A. Environment:
  - 1. Cold Weather Requirements: Maintain mortar ingredients and substrate within temperature range between 4 degrees C (40 degrees F) and 49 degrees C (120 degrees F) when outside temperature is less than 4 degrees C (40 degrees F).
  - 2. Hot Weather Requirements: Protect mortar-joint from evaporation of moisture from mortar material. When required, provide adequately shaded work area.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- A. Mortar Components:
  - 1. Hydrated Lime: ASTM C207, Type S.
  - 2. Aggregate: ASTM C144.
  - 3. Portland Cement: ASTM C150/C150M, Type I.
  - 4. Water: Potable, free of substances that are detrimental to grout, masonry, and metal.



**2.2 PRODUCTS - GENERAL**

- A. Basis of Design: Match existing mortar and tooling in area of repair in color and aggregate size.

**2.3 MIXES**

- A. Tuck Pointing Mortar: ASTM C270;
  - 1. Type N .

**2.4 ACCESSORIES**

- A. Cleaning Agent: Soapless, non-acidic, detergent, specially prepared for cleaning stone masonry.

**PART 3 - EXECUTION****3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
  - 1. Protect from mortar droppings and cleaning operations.
- C. Remove existing fixtures and fittings concealing masonry joints to permit repointing and repair.

**3.2 EXISTING MORTAR JOINTS**

- A. Cut out existing bed and head mortar joints, to uniform depth of 19 mm (3/4 inches), or to sound mortar without damaging edges and faces of existing masonry units to remain.
- B. Remove dust and debris from joints.
  - 1. Do not rinse when temperature is below freezing.

**3.3 TUCK POINTING**

- A. Dampen joints immediately before tuck pointing. Allow masonry units to absorb surface water.
- B. Tightly pack tuck pointing mortar into joints in thin layers, 6 mm (1/4 inch) thick, maximum.
- C. Allow layer to become slightly hardened before applying next layer.
- D. Pack final layer flush with surfaces of masonry units.

**3.4 JOINT TOOLING**

- A. Tool repointed joints when mortar becomes slightly hardened.
- B. Produce smooth, compacted, joint matching existing.

**3.5 CLEANING**

- A. Remove mortar splatter from exposed surfaces immediately.
- B. Clean exposed masonry surfaces on completion.

- C. Remove mortar droppings and other foreign substances from wall surfaces.
- D. Wet surfaces with clean water.
- E. Wash with cleaning agent.
- F. Brush masonry surfaces with stiff fiber brushes while washing.
- G. Immediately after washing, rinse with clean water.
  - 1. Remove traces of detergent, foreign streaks or stains.

- - E N D - -

**SECTION 04 05 13  
MASONRY MORTARING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Masonry mortar installed by other masonry sections.

**1.2 RELATED REQUIREMENTS**

A. Mortar used in Section:

1. Section 04 01 00, MAINTENANCE OF MASONRY.

B. Mortar Color: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 APPLICABLE PUBLICATIONS**

A. Comply with references to extent specified in this section.

B. ASTM International (ASTM):

1. C40/C40M-11 - Organic Impurities in Fine Aggregates for Concrete.
2. C91/C91M-12 - Masonry Cement.
3. C144-11 -Aggregate for Masonry Mortar.
4. C150/C150M-15 - Portland Cement.
5. C207-06(2011) - Hydrated Lime for Masonry Purposes.
6. C270-14a - Mortar of Unit Masonry.
7. C595/C595M-15e1 - Blended Hydraulic Cements.
8. C780-15 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
9. C979/C979M-10 - Pigments for Integrally Colored Concrete.
10. C1329/C1329M-15 - Mortar Cement.

**1.4 SUBMITTALS**

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Description of each product.

C. Test Reports: Certify each product complies with specifications.

1. Mortar.
2. Admixtures.

D. Certificates: Certify each product complies with specifications.

1. Portland cement.
2. Masonry cement.
3. Mortar cement.
4. Hydrated lime.

5. Fine aggregate.
6. Color admixture.
- E. Qualifications: Substantiate qualifications comply with specifications.
  1. Testing laboratory.

#### **1.5 QUALITY ASSURANCE**

- A. Preconstruction Testing:
  1. Engage independent testing laboratory to tests and submit reports.
    - a. Deliver samples to laboratory in number and quantity required for testing.
  2. Test mortar and materials specified.
  3. Mortar:
    - a. Test for compressive strength and water retention according to ASTM C270.
    - b. Minimum Mortar compressive strengths 28 days:
      - 1) Type S: 12.4 MPa (1,800 psi).
  4. Non Staining Cement: Test for water soluble alkali.
    - a. Water Soluble Alkali: Maximum 0.03 percent.
  5. Sand: Test for deleterious substances, organic impurities, soundness and grading.

#### **1.6 DELIVERY**

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

#### **1.7 STORAGE AND HANDLING**

- A. Store masonry materials under waterproof covers on planking clear of ground.
  1. Protect loose, bulk materials from contamination.
- B. Protect products from damage during handling and construction operations.

#### **1.8 WARRANTY**

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

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Hydrated Lime: ASTM C207, Type S.
- B. Aggregate for Masonry Mortar: ASTM C144 and as follows:
  - 1. Light colored sand for mortar for laying face brick.
  - 2. White plastering sand meeting sieve analysis for mortar joints for pointing and laying of structural facing tile units except that 100 percent passes No. 8 sieve, and maximum 5 percent retained on No. 16 sieve.
  - 3. Test sand for color value according to ASTM C40/C40M. Sand producing color darker than specified standard is unacceptable.
- C. Blended Hydraulic Cement: ASTM C595/C595M, Type IS, IP.
- D. Masonry Cement: ASTM C91/C91M. Type N, S, Or M.
  - 1. Use white masonry cement whenever white mortar is specified.
- E. Mortar Cement: ASTM C1329/C1329M, Type N, S or M.
- F. Portland Cement: ASTM C150/C150M, Type I.
  - 1. Use white Portland cement wherever white mortar is specified.
- G. Pigments: ASTM C979/C979M; inorganic, inert, mineral pigments only, unaffected by atmospheric conditions, nonfading, alkali resistant, and water insoluble.
- H. Water: Potable, free of substances that are detrimental to mortar, masonry, and metal.

**2.2 PRODUCTS - GENERAL**

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide each product from one manufacturer and from one production run.

**2.3 MIXES**

- A. Pointing Mortar for New Work:
  - 1. For Cast Stone or Precast Concrete: Proportion by volume; one part white Portland cement, two parts white sand, and 1/5 part hydrated lime.
  - 2. Pointing Mortar for Glazed Structural Facing Tile:
    - a. Proportion by volume: One part white Portland cement, two parts of graded white sand passing Number 50 sieve, and 1/8 part hydrated lime.
- B. Tuck Pointing Mortar for Repair Work: Tuck pointing mortar specified in Section 04 01 00, MAINTENANCE OF MASONRY.
- C. Masonry Mortar: ASTM C270.

1. Admixtures:
  - a. Do not use mortar admixtures, and color admixtures unless approved by Contracting Officer's Representative.
  - b. Do not use antifreeze compounds.
- D. Colored Mortar:
  1. Maintain uniform mortar color for exposed work, throughout.
  2. Match mortar color in approved sample.
  3. Alteration Work Mortar Color: Match existing mortar unless specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.
- E. Color Admixtures:
  1. Proportion as specified by manufacturer.
  2. For color, see Section 09 06 00, SCHEDULE FOR FINISHES.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.

#### **3.2 MIXING**

- A. Measure ingredients by volume using known capacity container.
- B. Mix for 3 to 5 minutes in a mechanically operated mortar mixer.
- C. Mix water with dry ingredients in sufficient amount to provide a workable mixture which will adhere to vertical surfaces of masonry units.
- D. Mortar Stiffened Because of Water Loss Through Evaporation:
  1. Re-temper by adding water to restore to proper consistency and workability.
  2. Discard mortar reaching initial set or unused within two hours of mixing.
- E. Pointing Mortar:
  1. Mix dry ingredients with enough water to produce damp mixture of workable consistency retaining shape when formed into ball.
  2. Allow mortar to stand in dampened condition for 60 to 90 minutes.
  3. Add water to bring mortar to a workable consistency before use.

#### **3.3 MORTARING**

- A. Type S Mortar: Use for setting cast stone and engineered reinforced unit masonry work.
- B. Type N Mortar: Use for other masonry work.

C. Type N Mortar: Use for pointing items and tuck pointing specified.

### **3.4 FIELD QUALITY CONTROL**

A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.

1. Take and test samples during progress of work according to ASTM C780.

- - E N D - -

**SECTION 06 10 00  
ROUGH CARPENTRY**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

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

**1.2 RELATED WORK:**

- A. Sustainable design requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

**1.3 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
  2. For composite wood products, submit documentation indicating that product contains no added urea formaldehyde.
- C. Shop Drawings showing framing connection details, fasteners, connections and dimensions.
- D. Manufacturer's Literature and Data:
1. Submit data for lumber, panels, hardware and adhesives.
  2. Submit data for wood-preservative treatment from chemical treatment manufacturer and certification from treating plants that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
  3. Submit data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
  4. For products receiving a waterborne treatment, submit statement that moisture content of treated materials was reduced to levels specified before shipment to project site.
- E. Manufacturer's certificate for unmarked lumber.



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

- A. Protect lumber and other products from dampness both during and after delivery at site.
- B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.
- C. Stack plywood and other board products so as to prevent warping.
- D. Locate stacks on well drained areas, supported at least 152 mm (6 inches) above grade and cover with well-ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

**1.5 QUALITY ASSURANCE:**

- A. Installer: A firm with a minimum of three (3) years' experience in the type of work required by this section.

**1.6 GRADING AND MARKINGS:**

- A. Any unmarked lumber or plywood panel for its grade and species shall not be allowed on VA Construction sites for lumber and material not normally grade marked, provide manufacturer's certificates (approved by an American Lumber Standards approved agency) attesting that lumber and material meet the specified the specified requirements.

**1.7 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.
- B. American Forest and Paper Association (AFPA):
  - NDS-15.....National Design Specification for Wood Construction
  - WCD1-01.....Details for Conventional Wood Frame Construction
- C. American Institute of Timber Construction (AITC):
  - A190.1-07.....Structural Glued Laminated Timber
- D. American Society of Mechanical Engineers (ASME):
  - B18.2.1-12(R2013).....Square and Hex Bolts and Screws
  - B18.2.2-10.....Square and Hex Nuts
  - B18.6.1-81(R2008).....Wood Screws
- E. American Plywood Association (APA):
  - E30-11.....Engineered Wood Construction Guide
- F. ASTM International (ASTM):

- A653/A653M-13.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process
- C954-11.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 inch (2.24 mm) to 0.112-inch (2.84 mm) in thickness
- C1002-14.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Metal Studs
- D198-14.....Test Methods of Static Tests of Lumber in Structural Sizes
- D2344/D2344M-13.....Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates
- D2559-12a.....Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions
- D3498-03 (R2011).....Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems
- D6108-13.....Test Method for Compressive Properties of Plastic Lumber and Shapes
- D6109-13.....Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber and Related Products
- D6111-13a.....Test Method for Bulk Density and Specific Gravity of Plastic Lumber and Shapes by Displacement
- D6112-13.....Test Methods for Compressive and Flexural Creep and Creep-Rupture of Plastic Lumber and Shapes
- F844-07a (R2013).....Washers, Steel, Plain (Flat) Unhardened for General Use
- F1667-13.....Nails, Spikes, and Staples
- G. American Wood Protection Association (AWPA):
- AWPA Book of Standards
- H. Commercial Item Description (CID):
- A-A-55615.....Shield, Expansion (Wood Screw and Lag Bolt Self Threading Anchors)
- I. Forest Stewardship Council (FSC):

FSC-STD-01-001 (Ver. 4-0) FSC Principles and Criteria for Forest  
Stewardship

J. Military Specification (Mil. Spec.):

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

K. Environmental Protection Agency (EPA):

40 CFR 59 (2014).....National Volatile Organic Compound Emission  
Standards for Consumer and Commercial Products

L. Truss Plate Institute (TPI):

TPI-85.....Metal Plate Connected Wood Trusses

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

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

PS 20-10.....American Softwood Lumber Standard

N. ICC Evaluation Service (ICC ES):

AC09.....Quality Control of Wood Shakes and Shingles

AC174.....Deck Board Span Ratings and Guardrail Systems  
(Guards and Handrails)

## **PART 2 - PRODUCTS**

### **2.1 LUMBER:**

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

1. Identifying marks are to be in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.

2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Structural Members: Species and grade as listed in the AFPA NDS having design stresses as shown.

C. Lumber Other Than Structural:

1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.

2. Framing lumber: Minimum extreme fiber stress in bending of 7584 kPa (1100 PSI).

3. Furring, blocking, nailers and similar items 101 mm (4 inches) and narrower Standard Grade; and, members 152 mm (6 inches) and wider, Number 2 Grade.
4. Board Sub-flooring: Shiplap edge, 25 mm (1 inch) thick, not less than 203 mm (8 inches) wide.

D. Sizes:

1. Conforming to PS 20.
2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.

E. Moisture Content:

1. Maximum moisture content of wood products is to be as follows at the time of delivery to site.
  - a. Boards and lumber 50 mm (2 inches) and less in thickness: 19 percent or less.
  - b. Lumber over 50 mm (2 inches) thick: 25 percent or less.

F. Fire Retardant Treatment:

1. Comply with Mil Spec. MIL-L-19140.
2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.

G. Preservative Treatment:

1. Do not treat Heart Redwood and Western Red Cedar.
2. Treat wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including framing of open roofed structures; sills, sole plates, furring, and sleepers that are less than 610 mm (24 inches) from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members provided in connection with roofing and flashing materials.
3. Treat other members specified as preservative treated (PT).
4. Preservative treat by the pressure method complying with AWPA Book use category system standards U1 and T1, except any process involving the use of Chromated Copper Arsenate (CCA) or other agents classified as carcinogenic for pressure treating wood is not permitted.

**2.3 PLYWOOD:**

- A. Comply with PS 1.

- B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.
- C. Sheathing:
  - 1. APA rated Exposure 1 or Exterior; panel grade CD or better.
  - 2. Wall sheathing:
    - a. Minimum 9 mm (11/32 inch) thick with supports 406 mm (16 inches) on center and 12 mm (15/32 inch) thick with supports 610 mm (24 inches) on center unless specified otherwise.
    - b. Minimum 1200 mm (48 inches) wide at corners without corner bracing of framing.

## **2.5 ROUGH HARDWARE AND ADHESIVES:**

- A. Anchor Bolts:
  - 1. ASME B18.2.1 and ASME B18.2.2 galvanized, 13 mm (1/2 inch) unless shown otherwise.
  - 2. Extend at least 203 mm (8 inches) into masonry or concrete with ends bent 50 mm (2 inches).
- B. Miscellaneous Bolts: Expansion Bolts: C1D A-A-55615; lag bolt, long enough to extend at least 65 mm (2-1/2 inches) into masonry or concrete. Provide 13 mm (1/2 inch) bolt unless shown otherwise.
- C. Washers
  - 1. ASTM F844.
  - 2. Provide zinc or cadmium coated steel or cast iron for washers exposed to weather.
- D. Screws:
  - 1. Wood to Wood: ASME B18.6.1 or ASTM C1002.
  - 2. Wood to Steel: ASTM C954, or ASTM C1002.
- E. Nails:
  - 1. Size and type best suited for purpose unless noted otherwise. Provide aluminum-alloy nails, plated nails, or zinc-coated nails, for nailing wood work exposed to weather and on roof blocking.
  - 2. ASTM F1667:
    - a. Common: Type I, Style 10.
    - b. Concrete: Type I, Style 11.
    - c. Barbed: Type I, Style 26.

- d. Underlayment: Type I, Style 25.
  - e. Masonry: Type I, Style 27.
  - f. Provide special nails designed for use with ties, strap anchors, framing connectors, joists hangers, and similar items. Nails not less than 32 mm (1-1/4 inches) long, 8d and deformed or annular ring shank.
- G. Adhesives:
- 1. For field-gluing plywood to lumber framing floor or roof systems: ASTM D3498.
  - 2. For structural laminated Wood: ASTM D2559.
  - 3. Adhesives to have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, (EPA Method 24).

### **PART 3 - EXECUTION**

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

- A. Conform to applicable requirements of the following:
  - 1. AFPA WCD1 for nailing and framing unless specified otherwise.
- B. Fasteners:
  - 1. Nails.
    - a. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA WCD1 where detailed nailing requirements are not specified in nailing schedule. Select nail size and nail spacing sufficient to develop adequate strength for the connection without splitting the members.
    - b. Use special nails with framing connectors.
  - 2. Bolts:
    - a. Fit bolt heads and nuts bearing on wood with washers.
    - b. Countersink bolt heads flush with the surface of nailers.
    - c. Embed in concrete and solid masonry or provide expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
    - d. Provide toggle bolts to hollow masonry or sheet metal.
    - e. Provide bolts to steel over 2.84 mm (0.112 inch, 11 gage) in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 610 mm (24 inch) intervals between end bolts. Provide clips to beam flanges.
  - 3. Drill Screws to steel less than 2.84 mm (0.112 inch) thick.

- a. ASTM C1002 for steel less than 0.84 mm (0.033 inch) thick.
- b. ASTM C954 for steel over 0.84 mm (0.033 inch) thick.
- 4. Power actuated drive pins may be provided where practical to anchor to solid masonry, concrete, or steel.
- 5. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Provide metal plugs, inserts or similar fastening.
- 6. Screws to Join Wood:
  - a. Where shown or option to nails.
  - b. ASTM C1002, sized to provide not less than 25 mm (1 inch) penetration into anchorage member.
  - c. Spaced same as nails.
- E. Blocking Nailers, and Furring:
  - 1. Install furring, blocking, nailers, and grounds where shown.
  - 2. Provide longest lengths practicable.
  - 3. Provide fire retardant treated wood blocking where shown at openings and where shown or specified.
  - 4. Layers of Blocking or Plates:
    - a. Stagger end joints between upper and lower pieces.
    - b. Nail at ends and not over 610 mm (24 inches) between ends.
    - c. Stagger nails from side to side of wood member over 127 mm (5 inches) in width.

- - - E N D - - -

**SECTION 07 21 13  
THERMAL INSULATION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Thermal insulation.
  - a. Batt or blanket insulation at exterior framed and furred walls.
  - b. Loose fill insulation at exterior hollow masonry walls.

**1.2 RELATED REQUIREMENTS**

A.

**1.3 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
1. C516-08(2013)e1 - Vermiculite Loose Fill Thermal Insulation.
  2. C549-06(2012) - Perlite Loose Fill Insulation.
  3. C552-15 - Cellular Glass Thermal Insulation.
  4. C553-13 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
  5. C578-15 - Rigid, Cellular Polystyrene Thermal Insulation.
  6. C591-15 - Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
  7. C612-14 - Mineral Fiber Block and Board Thermal Insulation.
  8. C665-12 - Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
  9. C728-15 - Perlite Thermal Insulation Board.
  10. C954-15 - Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Base to Steel Studs From 0.033 (0.84 mm) inch to 0.112 inch (2.84 mm) in thickness.
  11. C1002-14 - Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
  12. D312/D312M-15 - Asphalt Used in Roofing.
  13. E84-15a - Surface Burning Characteristics of Building Materials.
  14. F1667-15 - Driven Fasteners: Nails, Spikes, and Staples.



**1.4 SUBMITTALS**

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
  - 1. Show insulation type, thickness, and R-value for each location.
- C. Manufacturer's Literature and Data:
  - 1. Description of each product.
  - 2. Adhesive indicating manufacturer recommendation for each application.
- D. Sustainable Construction Submittals:
  - 1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
  - 2. Low Pollutant-Emitting Materials:
    - a. Show volatile organic compound types and quantities.

**1.5 DELIVERY**

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

**1.6 STORAGE AND HANDLING**

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.
- C. Protect foam plastic insulation from UV exposure.

**PART 2 - PRODUCTS****2.1 INSULATION - GENERAL**

- A. Insulation Thickness:
  - 1. Provide thickness required to fill full thickness of wall cavity.
- B. Insulation Types:
  - 1. Provide one insulation type for each application.
- C. Sustainable Construction Requirements:
  - 1. Insulation Recycled Content:
    - a. Polyisocyanurate/polyurethane foam-in-place: 5 percent recovered material.
    - b. Glass fiber reinforced: 6 percent recovered material.

- c. Rock wool material: 75 percent recovered material.
- 2. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
  - a. Non-Flooring Adhesives and Sealants.

## **2.2 THERMAL INSULATION**

- A. Exterior Framing or Furring Insulation:
  - 1. Mineral Fiber: ASTM C665, Type II, Class C, Category I where concealed by thermal barrier.
  - 2. Mineral Fiber: ASTM C665, Type III, Class A at other locations.
- B. Masonry Fill Insulation:
  - 1. Vermiculite Insulation: ASTM C516, Type II.

## **2.3 Perlite Insulation: ASTM C549, Type IV.ACCESSORIES**

- A. Fasteners:
  - 1. Staples or Nails: ASTM F1667, zinc-coated, size and type to suit application.
  - 2. Screws: ASTM C954 or ASTM C1002, size and length to suit application with washer minimum 50 mm (2 inches) diameter.
  - 3. Impaling Pins: Steel pins with head minimum 50 mm (2 inches) diameter.
    - a. Length: As required to extend beyond insulation and retain cap washer when washer is placed on pin.
    - b. Adhesive: Type recommended by manufacturer to suit application.
- B. Insulation Adhesive:
  - 1. Nonflammable type recommended by insulation manufacturer to suit application.
- C. Tape:
  - 1. Pressure sensitive adhesive on one face.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.

### **3.2 INSTALLATION - GENERAL**

- A. Install products according to manufacturer's instructions and approved submittal drawings.
  - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Install insulation with vapor barrier facing the heated side, unless indicated otherwise.
- C. Install batt and blanket insulation with joints tight. Fill framing voids completely. Seal penetrations, terminations, facing joints, facing cuts, tears, and unlapped joints with tape.
- D. Fit insulation tight against adjoining construction and penetrations, unless indicated otherwise.

### **3.3 THERMAL INSULATION**

- A. Exterior Framing or Furring Insulation:
  - 1. General:
    - a. Open voids are not acceptable.
    - b. Pack insulation around door frames and windows, in building expansion joints, door soffits, and other voids.
    - c. Pack behind outlets, around pipes, ducts, and services encased in walls.
    - d. Hold insulation in place with pressure sensitive tape.
    - e. Lap facing flanges together over framing for continuous surface. Seal penetrations through insulation and facings.
  - 2. Metal Studs:
    - a. Fasten insulation between metal studs, framing, and furring with pressure sensitive tape continuous along flanged edges.
  - 3. Wood Studs:
    - a. Fasten insulation between wood studs or framing with nails or staples through flanged edges on face of stud.
    - b. Space fastenings maximum 150 mm (six inches) apart.
- B. Masonry Fill Insulation:
  - 1. Pour fill insulation in masonry unit hollow cores from tops of walls, or from sill where windows or other openings occur. Pour in lifts of maximum 6 m (20 feet).

### **3.4 CLEANING**

- A. Remove excess adhesive before adhesive sets.

**3.5 PROTECTION**

- A. Protect insulation from construction operations.
- B. Repair damage.

- - E N D - -

**SECTION 07 24 00**  
**EXTERIOR INSULATION AND FINISH SYSTEMS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Direct exterior finish systems (DEFS), simulated synthetic stucco finish all of which are applied over existing exterior cement surfaces.

**1.2 RELATED REQUIREMENTS (Not Used)**

**1.3 APPLICABLE PUBLICATIONS**

A. Comply with references to extent specified in this section.

B. American National Standards Institute (ANSI):

1. A108/A118/A136-14 - Installation of Ceramic Tile.
2. A137.1-12 - Ceramic Tile - Version 1.

C. ASTM International (ASTM):

1. B117-11 - Operating Salt Spray (Fog) Apparatus.
2. C67-14 - Sampling and Testing Brick and Structural Clay Tile.
3. C177-13 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
4. C297/C297M-15 - Flatwise Tensile Strength of Sandwich Constructions.
5. C578-15 - Rigid, Cellular Polystyrene Thermal Insulation.
6. C666/C666M-15 - Resistance of Concrete to Rapid Freezing and Thawing.
7. C920-14a - Elastomeric Joint Sealants.
8. D968-15 - Abrasion Resistance of Organic Coatings by Falling Abrasive.
9. D2794-93(2010) - Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
10. E84-15a - Surface Burning Characteristics of Building Materials.
11. E96/E96M-15 - Water Vapor Transmission of Materials.
12. E119-15 - Fire Tests of Building Construction and Materials.
13. E330/E330M-14 - Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

14. E331-00(2009) - Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Wall by Uniform Static Air Pressure Differences.
15. E2486/E2486M-13 - Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS).
16. G90-10 - Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight.

#### **1.4 PREINSTALLATION MEETINGS**

- A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this section.
  1. Required Participants:
    - a. Contracting Officer's Representative.
    - b. Architect/Engineer.
    - c. Contractor.
    - d. Installer.
    - e. Other installers responsible for adjacent and intersecting work, including air barriers and sealants.
  2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
    - a. Installation schedule.
    - b. Installation sequence.
    - c. Preparatory work.
    - d. Protection before, during, and after installation.
    - e. Installation.
    - f. Terminations.
    - g. Transitions and connections to other work.
    - h. Inspecting and testing.
    - i. Other items affecting successful completion.
  3. Document and distribute meeting minutes to participants to record decisions affecting installation.

#### **1.5 SUBMITTALS**

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
  1. Show size, configuration, and fabrication and installation details.
  2. Show details for corner treatment, sills, soffits, dentils, quoins, lintels, openings, penetrations, flashing, and other special applications.

C. Manufacturer's Literature and Data:

1. Description of each product.
2. Installation instructions.
3. Warranty.

D. Samples:

1. Two 300 mm (1 foot) square samples of simulated synthetic stucco finishes over cement board identical to proposed installation in thickness, color, texture and workmanship.

E. Test reports: Certify each product and complete system complies with specifications.

F. Qualifications: Substantiate qualifications comply with specifications.

1. Installer with project experience list.

### **1.6 QUALITY ASSURANCE**

A. Installer Qualifications:

1. Regularly installs specified products.
2. Installed specified products with satisfactory service on five similar installations for minimum five years.
  - a. Project Experience List: Provide contact names and addresses for completed projects.

### **1.7 DELIVERY**

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

### **1.8 STORAGE AND HANDLING**

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.

### **1.9 FIELD CONDITIONS**

A. Environment:

1. Unless greater temperature is required by system manufacturer, install products only when ambient air temperature is minimum 7 degrees C (45 degrees F) and rising and predicted to persist for 24 hours after installation.

**1.10 WARRANTY**

- A. Manufacturer's Warranty: Warrant EIFS system materials against material and manufacturing defects.

1. Warranty Period: 10 years.

**PART 2 - PRODUCTS****2.1 PRODUCTS - GENERAL**

- A. Basis of Design: See construction drawings.
- B. Provide system components from one manufacturer and from one production run.

**2.2 DIRECT EXTERIOR FINISH SYSTEMS (DEFS)**

- A. Description: Reinforced cement board joints, synthetic stucco base coat and simulated stucco finish coat applied directly to gypsum board sheathing.
- B. Stucco Finish:
1. Base coat: Ready-to-mix, Portland cement mortar containing dry latex polymers.
  2. Finish coat: Pre-colored, ready-mixed, polymeric coating.
- C. Performance Requirements:
1. Surface Burning Characteristics: When tested according to ASTM E84.
    - a. Flame Spread Rating: 25 maximum.
    - b. Smoke Developed Rating: 450 maximum.
  2. Abrasion Resistance: ASTM D968; 500 liters of light smoothing sand with no loss of film integrity.
  3. Bond Strength (with gypsum board sheathing): ASTM C297/C297M, 345 kPa (50 psi).
  4. Salt Spray Resistance: ASTM B117; 300 hours exposure with no deleterious effects.
  5. Freeze/Thaw Resistance (with gypsum board sheathing): ASTM C666/C666M; 100 Cycles with no deterioration, no delamination.
  6. Accelerated Weathering: ASTM G90; 2000 hours with no deterioration.
  7. Rapid Deformation: ASTM D2794; No cracking or impact failure.
- D. Accessories:
1. Trim, control joints and corner beads as recommended by DEFS manufacturer.
  2. Joint Reinforcement:
    - a. Reinforcing tape: Minimum 100 mm (4 inch) wide, polymer coated, open mesh glass fiber tape.



- b. Tape embedding material: Ready-to-mix Portland cement mortar base coat containing dry latex polymers.
- 3. Sealant: ASTM C920, Class 50 with 100 percent recovery. Type, grade and use as recommended by the sealant manufacturer.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Notify Contracting Officer's Representative in writing of conditions detrimental to proper completion of work.
- D. Do not proceed with work until unsatisfactory conditions are corrected.

#### **3.2 INSTALLATION - GENERAL**

- A. Install products according to manufacturer's instructions and approved submittal drawings.
  - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

#### **3.3 CONTROL JOINT INSTALLATION**

- A. See drawings for location of building control joints and surface control joints.
- B. Install surface control joints as follows:
  - 1. Direct Exterior Finish: Install at 6 meters (20 feet) maximum on center, both directions, erecting continuous vertical joints first at building expansion joints, intersection of dissimilar substrates or finishing materials where concentrated stresses or movement is anticipated. Leave 13 mm (1/2inch) minimum continuous gap between board panels to receive control joint.

#### **3.4 SEALANT INSTALLATION**

- A. Direct Exterior Finish System: Apply sealant at intersections of gypsum board with windows, doors, control joints, other openings and locations as shown on drawings.
- B. Do not apply sealant in locations intended for water drainage.

**3.5 SYNTHETIC STUCCO FINISH INSTALLATION**

- A. Joint Reinforcement: Pre-fill gypsum board joints and trim with synthetic stucco base coat mixed according to manufacturer's directions.
  - 1. Immediately embed reinforcing tape into wet base coat and tightly trowel to board surface to avoid crowning joints.
  - 2. Cure for four hours minimum before applying base coat.
- B. Base Coat: Uniformly apply base coat minimum 1.6 mm (1/16 inch) thick, smooth and flat over entire surface including joints and trim. Dampen board surface as necessary under rapid drying conditions.
  - 1. Embed reinforcing fabric in basecoat while wet and cover with basecoat material so fabric pattern is not visible.
- C. Finish: Trowel apply exterior finish to base coat texturing surface as specified to uniform thickness of 1.5 mm to 5 mm (1/16 inch to 3/16 inch).
  - 1. Dampen base coat as necessary under rapid drying conditions.
  - 2. Extend finish so breaks between batches occur at surface breaks such as corners, control joints, windows, and other interruptions.

- - E N D - -

**SECTION 07 92 00  
JOINT SEALANTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section covers interior and exterior sealant and their application, wherever required for complete installation of building materials or systems.

**1.2 RELATED WORK (INCLUDING BUT NOT LIMITED TO THE FOLLOWING):**

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Glazing: Section 08 80 00, GLAZING.

**1.3 QUALITY ASSURANCE:**

- A. Installer Qualifications: An experienced installer with a minimum of three (3) years' experience and who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance. Submit qualification.
- B. Source Limitations: Obtain each type of joint sealant through one (1) source from a single manufacturer.
- C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.
  - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
  - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
  - 3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.
- D. Lab Tests: Submit samples of materials that shall be in contact or affect joint sealants to joint sealant manufacturers for tests as follows:
  - 1. Adhesion Testing: Before installing elastomeric sealants, test their adhesion to protect joint substrates according to the method in ASTM C794 to determine if primer or other specific joint preparation techniques are required.

2. Compatibility Testing: Before installing elastomeric sealants, determine compatibility when in contact with glazing and gasket materials.
3. Stain Testing: Perform testing per ASTM C1248 on interior and exterior sealants to determine if sealants or primers shall stain adjacent surfaces. No sealant work is to start until results of these tests have been submitted to the Contracting Officer Representative (COR) and the COR has given written approval to proceed with the work.

#### **1.4 CERTIFICATION:**

- A. Contractor is to submit to the COR written certification that joints are of the proper size and design, that the materials supplied are compatible with adjacent materials and backing, that the materials shall properly perform to provide permanent watertight, airtight or vapor tight seals (as applicable), and that materials supplied meet specified performance requirements.

#### **1.5 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
  1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Installer qualifications.
- D. Contractor certification.
- E. Manufacturer's installation instructions for each product used.
- F. Cured samples of exposed sealants for each color.
- G. Manufacturer's Literature and Data:
  1. Primers
  2. Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- H. Manufacturer warranty.

#### **1.6 PROJECT CONDITIONS:**

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

- b. When joint substrates are wet.
- B. Joint-Width Conditions:
  - 1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions:
  - 1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

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

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

#### **1.8 DEFINITIONS:**

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

#### **1.9 WARRANTY:**

- A. Manufacturer Warranty: Manufacturer shall warranty their sealant for a minimum of five (5) years from the date of installation and final acceptance by the Government. Submit manufacturer warranty.

#### **1.10 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. ASTM International (ASTM):
  - C509-06.....Elastomeric Cellular Preformed Gasket and Sealing Material
  - C612-14.....Mineral Fiber Block and Board Thermal Insulation
  - C717-14a.....Standard Terminology of Building Seals and Sealants
  - C734-06(R2012).....Test Method for Low-Temperature Flexibility of Latex Sealants after Artificial Weathering

- C794-10.....Test Method for Adhesion-in-Peel of Elastomeric  
Joint Sealants
- C919-12.....Use of Sealants in Acoustical Applications.
- C920-14a.....Elastomeric Joint Sealants.
- C1021-08 (R2014).....Laboratories Engaged in Testing of Building  
Sealants
- C1193-13.....Standard Guide for Use of Joint Sealants.
- C1248-08 (R2012).....Test Method for Staining of Porous Substrate by  
Joint Sealants
- C1330-02 (R2013).....Cylindrical Sealant Backing for Use with Cold  
Liquid Applied Sealants
- C1521-13.....Standard Practice for Evaluating Adhesion of  
Installed Weatherproofing Sealant Joints
- D217-10.....Test Methods for Cone Penetration of  
Lubricating Grease
- D1056-14.....Specification for Flexible Cellular Materials—  
Sponge or Expanded Rubber
- E84-09.....Surface Burning Characteristics of Building  
Materials
- C. Sealant, Waterproofing and Restoration Institute (SWRI).  
The Professionals' Guide
- D. Environmental Protection Agency (EPA):  
40 CFR 59 (2014).....National Volatile Organic Compound Emission  
Standards for Consumer and Commercial Products

## **PART 2 - PRODUCTS**

### **2.1 SEALANTS:**

- A. S-1:
1. ASTM C920, polyurethane or polysulfide.
  2. Type M.
  3. Class 25.
  4. Grade NS.
  5. Shore A hardness of 20-40
- B. S-2:
1. ASTM C920, polyurethane or polysulfide.
  2. Type M.
  3. Class 25.
  4. Grade P.

5. Shore A hardness of 25-40.

C. S-6:

1. ASTM C920, silicone, neutral cure.
2. Type S.
3. Class: Joint movement range of plus 100 percent to minus 50 percent.
4. Grade NS.
5. Shore A hardness of 15-20.
6. Minimum elongation of 1200 percent.

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.

E. Provide the specified exterior sealants at the following location(s),

Horizontal and Vertical:

1. Metal to metal: Type S-1, S-2
2. Metal to Masonry or Stone: Type S-1.
3. Masonry to Masonry or Stone: Type S-1
4. Masonry expansion and control joints.
5. Wood to Masonry: Type S-1
6. Voids where items penetrate exterior walls.
7. Metal Reglets and Flashings:
  - a. Flashings to Wall: Type S-6
  - b. Metal to Metal: Type S-6
8. Sanitary Joints:
  - a. Pipe Penetrations: Type S-9

F. Interior Sealants:

1. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system are to comply with the following limits for VOC content when calculated according to 40 CFR 59, (EPA Method 24):
  - a. Architectural Sealants: 250 g/L.
  - b. Sealant Primers for Nonporous Substrates: 250 g/L.
  - c. Sealant Primers for Porous Substrates: 775 g/L.
2. S-4 Vertical and Horizontal Surfaces: ASTM C920, Type S or M, Grade NS, Class 25, Use NT.

3. Provide location(s) of interior sealant as follows:
  - a. Typical narrow joint 6 mm, (1/4 inch) or less at walls and adjacent components.
  - b. Perimeter of doors, windows, access panels which adjoin concrete or masonry surfaces.
  - c. Interior surfaces of exterior wall penetrations.
  - d. Joints at masonry walls and columns, piers, concrete walls or exterior walls.
  - e. Perimeter of lead faced control windows and plaster or gypsum wallboard walls.
  - f. Exposed isolation joints at top of full height walls.
  - g. Joints formed where nonplanar tile surfaces meet.
  - h. Joints between tile and dissimilar materials; joints occurring where substrates change.

## **2.2 COLOR:**

- A. Sealants used with exposed masonry are to match color of mortar joints.
- B. Sealants used with unpainted concrete are to match color of adjacent concrete.
- C. Color of sealants for other locations to be white, unless specified otherwise to match adjacent surfaces.

## **2.3 JOINT SEALANT BACKING:**

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
  1. Type C: Closed-cell material with a surface skin.
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056 or synthetic rubber (ASTM C509), nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32 degrees C (minus 26 degrees F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid,



inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

**2.4 FILLER:**

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

**2.5 PRIMER:**

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

**2.6 CLEANERS-NON POROUS SURFACES:**

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

**PART 3 - EXECUTION****3.1 INSPECTION:**

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

**3.2 PREPARATIONS:**

- A. Prepare joints in accordance with manufacturer's instructions and SWRI (The Professionals' Guide).
- B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
  - 1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
  - 2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include but are not limited to the following:
    - a. Concrete.

- b. Masonry.
  - c. Unglazed surfaces of ceramic tile.
- 3. Remove laitance and form-release agents from concrete.
- 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous surfaces include but are not limited to the following:
  - a. Metal.
  - b. Glass.
  - c. Porcelain enamel.
  - d. Glazed surfaces of ceramic tile.
- C. Do not cut or damage joint edges.
- D. Apply non-staining masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions or as indicated by pre-construction joint sealant substrate test.
  - 1. Apply primer prior to installation of back-up rod or bond breaker tape.
  - 2. Use brush or other approved means that shall reach all parts of joints. Avoid application to or spillage onto adjacent substrate surfaces.

### **3.3 BACKING INSTALLATION:**

- A. Install backing material, to form joints enclosed on three sides as required for specified depth of sealant.
- B. Where deep joints occur, install filler to fill space behind the backing rod and position the rod at proper depth.
- C. Cut fillers installed by others to proper depth for installation of backing rod and sealants.
- D. Install backing rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.

- E. Where space for backing rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

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

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

### **3.5 INSTALLATION:**

#### **A. General:**

1. Apply sealants and caulking only when ambient temperature is between 5 degrees C and 38 degrees C (40 degrees and 100 degrees F).
2. Do not install polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
3. Do not install sealant type listed by manufacture as not suitable for use in locations specified.
4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
5. Avoid dropping or smearing compound on adjacent surfaces.
6. Fill joints solidly with compound and finish compound smooth.
7. Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in ASTM C1193 unless shown or specified otherwise in construction documents. Remove masking tape immediately after tooling of sealant and before sealant face starts to "skin" over. Remove any excess sealant from adjacent surfaces of joint, leaving the working in a clean finished condition.
8. Finish paving or floor joints flush unless joint is otherwise detailed.
9. Apply compounds with nozzle size to fit joint width.
10. Test sealants for compatibility with each other and substrate. Use only compatible sealant. Submit test reports.
11. Replace sealant which is damaged during construction process.

- C. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise. Take all necessary steps to prevent three-sided adhesion of sealants.

- D. Interior Sealants: Where gypsum board partitions are of sound rated, fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.
1. Apply a 6 mm (1/4 inch) minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
  2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.
  3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
  4. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cutouts to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.
  5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

### **3.6 FIELD QUALITY CONTROL:**

- A. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
1. Extent of Testing: Test completed elastomeric sealant joints as follows:
    - a. Perform 3 tests for first 1 foot of joint length for each type of elastomeric sealant and joint substrate.
    - b. Perform one test for each 1 foot of joint length thereafter or one test per each floor per elevation.
  - B. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.
  - C. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.
  - D. Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated

requirements, shall be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

**3.7 CLEANING:**

- A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by manufacturer of the adjacent material or if not otherwise indicated by the caulking or sealant manufacturer.
- B. Leave adjacent surfaces in a clean and unstained condition.

- - - E N D - - -

**SECTION 08 11 13  
HOLLOW METAL DOORS AND FRAMES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Hollow metal doors hung in hollow metal frames at exterior locations.

**1.2 RELATED REQUIREMENTS**

- A. Aluminum frames entrance work: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
- B. Door Hardware: Section 08 71 00, DOOR HARDWARE.
- C. Glazing: Section 08 80 00, GLAZING.

**1.3 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. American National Standard Institute (ANSI):
  1. A250.8-2014 - Standard Steel Doors and Frames.
- C. ASTM International (ASTM):
  1. A240/A240M-15b - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  2. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip.
  3. A1008/A1008M-15 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
  4. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
  5. B209M-14 - Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
  6. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  7. B221M-13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
  8. D3656/D3656M-13 - Insect Screening and Louver Cloth Woven from Vinyl Coated Glass Yarns.
  9. E90-09 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- D. Master Painters Institute (MPI):

**1.4 SUBMITTALS**

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
  - 1. Show size, configuration, and fabrication and installation details.
- C. Manufacturer's Literature and Data:
  - 1. Description of each product.
  - 2. Include schedule showing each door and frame requirements for openings.
  - 3. Installation instructions.
- D. Qualifications: Substantiate qualifications comply with specifications.
  - 1. Manufacturer with project experience list.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:
  - 1. Regularly manufactures specified products.
  - 2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
    - a. Project Experience List: Provide contact names and addresses for completed projects.

**1.6 DELIVERY**

- A. Fasten temporary steel spreaders across the bottom of each door frame before shipment.
- B. Deliver products in manufacturer's original sealed packaging.
- C. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.
- D. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

**1.7 STORAGE AND HANDLING**

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.

**PART 2 - PRODUCTS****2.1 SYSTEM PERFORMANCE**

- A. Design hollow metal doors and frames complying with specified performance:

1. Thermal Transmittance: 0.700 U-value (0.700 U-value), maximum at exterior doors.
2. Thermal Resistance: 1.4 R-value (1.4 R-value), minimum at exterior doors.

## **2.2 MATERIALS**

- A. Stainless Steel: ASTM A240/A240M; Type 304.
- B. Sheet Steel: ASTM A1008/A1008M, cold-rolled.

## **2.3 PRODUCTS - GENERAL**

- A. Provide hollow metal doors and frames from one manufacturer.

## **2.4 HOLLOW METAL DOORS**

- A. Hollow Metal Doors: ANSI A250.8; 44 mm (1-3/4 inches) thick. See drawings for sizes and designs.
  1. Exterior Doors: Level 3 and Physical Performance Level A.
- B. Door Faces:
  1. Exterior Doors: Stainless steel Z120 or ZF120 (G40 or A40).
- C. Door Cores:
  1. Exterior Doors: Polystyrene or polyurethane.

## **2.5 HOLLOW METAL FRAMES**

- A. Hollow Metal Frames: ANSI A250.8; face welded. See drawings for sizes and designs.
  - a. Exterior Frames:
    - 1) Level 3 Hollow Metal Doors: 1.3 mm (0.053 inch) thick.
- B. Frame Materials:
  1. Exterior Frames: Galvanized sheet steel minimum Z120 or ZF120 (G40 or A40).

## **2.6 FABRICATION**

- A. Hardware Preparation: ANSI A250.8; for hardware specified in Section 08 71 00, DOOR HARDWARE.
- B. Hollow Metal Door Fabrication:
  1. Close top edge of exterior doors flush and seal to prevent water intrusion.
  2. Fill spaces between vertical steel stiffeners with insulation.
- C. Custom Metal Hollow Doors:
  1. Provide custom hollow metal doors where nonstandard steel doors are shown on drawings.



- a. Provide door sizes, design, materials, construction, gages, and finish as specified for standard steel doors.
2. Two Piece Frames:
  - a. One piece unequal leg finished rough buck sub-frames as shown, drilled for anchor bolts.
  - b. Unequal leg finished frames formed to fit subframes and secured to subframe legs with countersunk, flat head screws, spaced 300 mm (12 inches) on center at head and jambs on both sides.
  - c. Preassemble at factory for alignment.
3. Frame Anchors:
  - a. Floor anchors:
    - 1) Provide extension type floor anchors to compensate for depth of floor fills.
    - 2) Provide 1.3 mm (0.053 inch) thick steel clip angles welded to jamb and drilled to receive floor fasteners.
    - 3) Provide 50 mm by 50 mm by 9 mm (2 inch by 2 inch by 3/8 inch) clip angle for lead lined frames, drilled for floor fasteners.
    - 4) Provide mullion 2.3 mm (0.093 inch) thick steel channel anchors, drilled for two floor fasteners and frame anchor screws.
    - 5) Provide continuous 1 mm (0.042 inch) thick steel rough bucks drilled for floor fasteners and frame anchor screws for sill sections.
      - a) Space floor bolts 50 mm (24 inches) on center.
  - b. Jamb anchors:
    - 1) Place anchors on jambs:
      - a) Near top and bottom of each frame.
      - b) At intermediate points at maximum 600 mm (24 inches) spacing.
    - 2) Form jamb anchors from steel minimum 1 mm (0.042 inch) thick.
    - 3) Anchors set in masonry: Provide adjustable anchors designed for friction fit against frame and extended into masonry minimum 250 mm (10 inches). Provide one of following types:
      - a) Wire Loop Type: 5 mm (3/16 inch) diameter wire.
      - b) T-Shape type.
      - c) Strap and stirrup type: Corrugated or perforated sheet steel.

- 4) Anchors for frames set in prepared openings:
  - a) Steel pipe spacers 6 mm (1/4 inch) inside diameter, welded to plate reinforcing at jamb stops, or hat shaped formed strap spacers 50 mm (2 inches) wide, welded to jamb near stop.
  - b) Drill jamb stop and strap spacers for 6 mm (1/4 inch) flat head bolts to pass through frame and spacers.
  - c) Two piece frames: Subframe or rough buck drilled for 6 mm (1/4 inch) bolts.

## **2.7 FINISHES**

- A. Steel and Galvanized Steel: ANSI A250.8; shop primed.
  - 1. Color Anodized Finish: (WHITE) AA-C22A32 or AA-C22A34; Class II Architectural, 0.01 mm (0.4 mil) thick.

## **2.8 ACCESSORIES**

- A. Primers: ANSI A250.8.
- B. Barrier Coating: ASTM D1187/D1187M.
- C. Welding Materials: AWS D1.1/D1.1M, type to suit application.
- D. Clips Connecting Members and Sleeves: Match door faces.
- E. Fasteners: Galvanized steel.
  - 1. Metal Framing: Steel drill screws.
  - 2. Masonry and Concrete: Expansion bolts and power actuated drive pins.
- F. Anchors: Galvanized steel.
- G. Galvanizing Repair Paint: MPI No. 18.
- H. Insulation: Unfaced mineral wool.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Apply barrier coating to metal surfaces in contact with cementitious materials to minimum 0.7 mm (30 mils) dry film thickness.

### **3.2 INSTALLATION - GENERAL**

- A. Install products according to manufacturer's instructions and approved submittal drawings.
  - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

### 3.3 FRAME INSTALLATION

- A. Apply barrier coating to concealed surfaces of frames built into masonry.
- B. Plumb, align, and brace frames until permanent anchors are set.
  - 1. Use triangular bracing near each corner on both sides of frames with temporary wood spreaders at midpoint.
  - 2. Use wood spreaders at bottom of frame when shipping spreader is removed.
  - 3. Where construction permits concealment, leave shipping spreaders in place after installation, otherwise remove spreaders when frames are set and anchored.
  - 4. Remove wood spreaders and braces when walls are built and jamb anchors are secured.
- C. Floor Anchors:
  - 1. Anchor frame jambs to floor with two expansion bolts.
    - a. Lead Lined Frames: Use 9 mm (3/8 inch) diameter bolts.
    - b. Other Frames: Use 6 mm (1/4 inch) diameter bolts.
  - 2. Power actuated drive pins are acceptable to secure frame anchors to concrete floors.
- D. Jamb Anchors:
  - 1. Masonry Walls:
    - a. Embed anchors in mortar.
    - b. Fill space between frame and masonry with grout or mortar as walls are built.
  - 2. Prepared Masonry and Concrete Openings:
    - a. Direct Securement: 6 mm (1/4 inch) diameter expansion bolts through spacers.
    - b. Subframe or Rough Buck Securement:
      - 1) 6 mm (1/4 inch) diameter expansion bolts on 600 mm (24 inch) centers.
    - c. Secure two-piece frames to subframe or rough buck with machine screws on both faces.
- E. Frames for Sound Rated Doors: Fill frames with insulation.
- F. Touch up damaged factory finishes.
  - 1. Repair galvanized surfaces with galvanized repair paint.
  - 2. Repair painted surfaces with touch up primer.

### 3.4 DOOR INSTALLATION

- A. Install doors plumb and level.

- B. Adjust doors for smooth operation.
- C. Touch up damaged factory finishes.
  - 1. Repair galvanized surfaces with galvanized repair paint.
  - 2. Repair painted surfaces with touch up primer.

**3.5 CLEANING**

- A. Clean exposed door and frame surfaces. Remove contaminants and stains.

**3.6 PROTECTION**

- A. Protect doors and frames from construction operations.
- B. Remove protective materials immediately before acceptance.
- C. Repair damage.

- - - E N D - - -

**SECTION 08 41 13**  
**ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Aluminum-framed storefronts.

**1.2 RELATED REQUIREMENTS**

- A. Glass and Glazing: Section 08 80 00, GLAZING.
- B. Hardware: Section 08 71 00, DOOR HARDWARE.
- C. Aluminum Finish and Color: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. American Architectural Manufacturers Associations (AAMA):
1. 2603-15 - Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
  2. 2604-13 - Performance Requirements and Test Procedures for High Performance Organic Coatings on Architectural Extrusions and Panels.
  3. 2605-13 - Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- C. American Welding Society (AWS):
1. D1.2/D1.2M-14 - Structural Welding Code - Aluminum.
- D. ASTM International (ASTM):
1. A240/A240M-15b - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  2. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
  3. B209M-14 - Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
  4. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  5. B221M 13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
  6. D1187/D1187M-97(2011)e1 - Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
  7. E283-04(2012) - Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

8. E330/E330M-14 -Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
9. E331-00(2009) - Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
10. E1886-13a - Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missiles and Exposures to Cyclic Pressure Differentials.
11. E1996-14a - Performance of Exterior Windows, Curtain Walls, Doors, and impact Protective Systems Impacted by Windborne Debris in Hurricanes.
12. F468-15 - Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
13. F593-13a - Stainless Steel Bolts, Hex Cap Screws, and Studs.
- E. National Association of Architectural Metal Manufacturers (NAAMM):
  1. AMP 500-06 - Metal Finishes Manual.
- F. National Fenestration Rating Council (NFRC):
  1. 500-14(E1A0) - Determining Fenestration Product Condensation Resistance Values.
- G. United States Veterans Administration (VA):
  1. PSDSDD - Physical Security Design Standards Data Definitions.

#### **1.4 PREINSTALLATION MEETINGS**

- A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this section.
  1. Required Participants:
    - a. Contracting Officer's Representative.
    - b. Architect/Engineer
    - c. Contractor.
    - d. Installer.
  2. Manufacturer's field representative. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
    - a. Installation schedule.
    - b. Installation sequence.
    - c. Preparatory work.
    - d. Protection before, during, and after installation.
    - e. Installation.
    - f. Terminations.
    - g. Transitions and connections to other work.

- h. Other items affecting successful completion.
- 3. Document and distribute meeting minutes to participants to record decisions affecting installation.

#### **1.5 SUBMITTALS**

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings: Minimum 1 to 2 (half size) scale.
  - 1. Show size, configuration, and fabrication and installation details.
  - 2. Show anchorage and reinforcement.
  - 3. Show interface and relationship to adjacent work, including thermal, air, and water barrier continuity.
- C. Manufacturer's Literature and Data:
  - 1. Description of each product.
  - 2. Storefront construction.
  - 3. Installation instructions.
  - 4. Warranty.
- D. Samples:
  - 1. Aluminum Anodized Finish: Two (2) sample extrusions minimum 150 mm (6 inches) long for each specified color in sets of three showing maximum color range.

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:
  - 1. Regularly manufactures specified products.
  - 2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
    - a. Project Experience List: Provide contact names and addresses for completed projects.
- B. Installer Qualifications: Product manufacturer. Manufacturer authorized representative.
  - 1. Regularly installs specified products.
  - 2. Installed specified products with satisfactory service on five similar installations for minimum five years.
    - a. Project Experience List: Provide contact names and addresses for completed projects.

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

- A. Deliver products in manufacturer's original sealed packaging.

- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.
- D. Protect products from damage during handling and construction operations.

#### **1.8 WARRANTY**

- A. Furnish manufacturer's warranty for windows against malfunctions due to defects in thermal breaks, hardware, materials and workmanship. Warranty shall run directly to Government and cover a period of not less than 10 years from the date Government accepted the work.

### **PART 2 - PRODUCTS**

#### **2.1 SYSTEM PERFORMANCE**

- A. Delegated Design: Prepare submittal documents including design calculations and drawings signed and sealed by registered design professional, licensed in state where work is located.
  - 1. Minor deviations to details shown on drawings to accommodate manufacturer's standard products may be accepted by Contracting Officer's Representative when deviations do not affect design concept and specified performance.
- B. Design aluminum framed storefronts complying with specified performance:
  - 1. Wind and Seismic Load Resistance: ASCE/SEI 7; Design criteria as indicated on Drawings when tested according to ASTM E330/E330M.
    - a. Wind Load: 1.4 kPa ( 30 psf) positive and negative, minimum.
    - b. Maximum Deflection: 1/175 of span, maximum with minimum 1.65 safety factor.
  - 2. Thermal Movement: Accommodate ambient temperature range of 67 degrees C (120 degrees F).
  - 3. Condensation Resistance: NFRC 500.
    - a. Fixed Framing: 45 CRF, minimum.
  - 4. Water Resistance: ASTM E331; No uncontrolled penetration at 380 Pa (8 psf), minimum, pressure differential.
  - 5. Fixed Framing Air Infiltration Resistance: ASTM E283; 0.30 L/s/sq. m (0.06 cfm/sf), maximum at 300 Pa (6.24 psf), minimum, pressure differential.



## MATERIALS

### C. Aluminum:

1. Sheet Metal: ASTM B209M (ASTM B209), minimum 1.6 mm (0.063 inch) thick.
2. Extrusions: ASTM B221M (ASTM B221).
  - a. Framing: Minimum 3 mm (0.125 inch) wall thickness.
  - b. Glazing Beads, Moldings, and Trim: Minimum 1.25 mm (0.050 inch) thick.
3. Alloy 6063 temper T5 for fixed glass storefronts and transoms.
4. Alloy 6061 temper T6 for guide tracks for sliding doors and other extruded structural members.
5. Color Anodized Aluminum: Provide aluminum alloy required to produce specified color.

### D. Stainless Steel: ASTM A240/A240M; Type 302 or Type 304.

### E. Thermal Break: Manufacturer standard low conductive material retarding heat flow in the framework, where insulating glass is scheduled.

## 2.2 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide aluminum framed storefronts from one manufacturer.
- C. Provide aluminum storefront, windows systems from same manufacturer.
- D. Sustainable Construction Requirements:
  1. Aluminum Recycled Content: 50 percent total recycled content, minimum.

## 2.3 FRAMES

- A. Framing Members: Extruded aluminum, thermally broken.
- B. Provide concealed screws, bolts and other fasteners.

## 2.4 COLUMN COVERS AND TRIM

- A. Column Covers and Trim: Sheet aluminum fabrications shown from sheet aluminum of longest available lengths.
- B. Provide concealed fasteners.
- C. Provide aluminum stiffeners and supporting members shown on drawings and as required to maintain component integrity and shape.

## 2.5 FABRICATION

- A. Form metal parts and fit and assemble joints, except joints designed to accommodate movement. Seal joints to resist air infiltration and water penetration.

**B. Welding:**

1. Make welds without distorting and discoloring exposed surfaces.
2. Clean and dress welds. Remove welding flux and weld spatter.

**2.6 FINISHES****A. Aluminum Anodized Finish: NAAMM AMP 500.**

1. Clear Anodized Finish: AA-C22A31; Class II Architectural, 0.01 mm (0.4 mil) thick.

**2.7 ACCESSORIES**

- A. Dielectric Tape: Plastic, non-absorptive, with pressure sensitive adhesive; 0.18 to 0.25 mm (7 to 10 mils) thick.
- B. Barrier Coating: ASTM D1187/D1187M.
- C. Welding Materials: AWS D1.2/D1.2M, type to suit application.
- D. Fasteners:
  1. Aluminum: ASTM F468, Alloy 2024.
  2. Stainless Steel: ASTM F593, Alloy Groups 1, 2 and 3.
- E. Anchors: Aluminum or stainless steel; type to suit application.
- F. Galvanizing Repair Paint: MPI No. 18.
- G. Touch-Up Paint: Match shop finish.

**PART 3 - EXECUTION****3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
  1. Coordinate floor closer installation recessed into concrete slabs.
  2. Coordinate anchor installation built into masonry and concrete.
- B. Protect existing construction and completed work from damage.
- C. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.
- D. Apply dielectric tape or barrier coating to aluminum surfaces in contact with dissimilar metals and cementitious materials to minimum 0.7 mm (30 mils) dry film thickness.

**3.2 INSTALLATION - GENERAL**

- A. Install products according to manufacturer's instructions and approved submittal drawings.
  1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

- B. Install aluminum framed entrances and storefronts plumb and true, in alignment and to lines shown on drawings.
- C. Anchor frames to adjoining construction at heads, jambs and sills.
- D. Provide concealed aluminum clips to connect adjoining frame sections.
- E. Touch up damaged factory finishes.
  - 1. Repair galvanized surfaces with galvanized repair paint.
- F. Tolerances:
  - 1. Variation from Plumb, Level, Warp, and Bow: Maximum 3 mm in 3 m (1/8 inch in 10 feet).
  - 2. Variation from Plane: Maximum 3 mm in 3.65 m (1/8 inch in 12 feet); 6 mm (1/4 inch) over total length.
  - 3. Variation from Alignment: Maximum 1.5 mm (1/16 inch) in-line offset and maximum 3 mm (1/8 inch) corner offset.
  - 4. Variation from Square: Maximum 3 mm (1/8 inch) diagonal measurement differential.

### **3.3 PROTECTION, CLEANING AND REPAIRING**

- A. Clean exposed aluminum and glass surfaces. Remove contaminants and stains.
- B. Protect aluminum-framed storefronts from construction operations.
- C. Remove protective materials immediately before acceptance.
- D. Repair damage.

- - - E N D - - -

**SECTION 08 51 13  
ALUMINUM WINDOWS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Aluminum windows of type and size shown, complete with hardware, related components and accessories for renovation work .
2. Types:
  - a. Operable single hung.
  - b. Projected, hopper style.
  - c. Projected, awning style.
  - d. Fixed.
3. Insect Screens.
4. Security Screens.
5. Rodent Screens.

**1.2 RELATED REQUIREMENTS**

- A. Sealing Joints: Section 07 92 00, JOINT SEALANTS.
- B. Glazing: Section 08 80 00, GLAZING.
- C. Color of finish: as specified in Construction Drawings.

**1.3 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. American Architectural Manufacturers Associations (AAMA):
  1. AAMA/WDMA/CSA 101/I.S.2/A440-11 - Windows, Doors, and Skylights.
  2. AAMA 505-09 - Dry Shrinkage and Composite Performance Thermal Cycle Test Procedures.
  3. AAMA 2605-13 - Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
  4. AAMA TIR A8-08 - Structural Performance of Composite Thermal Barrier Framing System.
- C. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI):
  1. 7-10 - Minimum Design Loads for Buildings and Other Structures.
- D. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
  1. 90.1-13 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

E. ASTM International (ASTM):

1. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
2. B209M-14 - Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
3. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
4. B221M-13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
5. E283-04(2012) - Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
6. E331-00(2009) - Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

**1.4 PREINSTALLATION MEETINGS**

- A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this section. Provide full-size mockup at or before pre-installation meeting.
1. Required Participants:
    - a. Contracting Officer's Representative.
    - b. Architect
    - c. Contractor.
    - d. Installer.
    - e. Manufacturer's field representative.
  2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
    - a. Installation schedule.
    - b. Installation sequence.
    - c. Preparatory work.
    - d. Protection before, during, and after installation.
    - e. Installation.
    - f. Transitions and connections to other work.
    - g. Other items affecting successful completion.
  3. Document and distribute meeting minutes to participants to record decisions affecting installation.

**1.5 SUBMITTAL**

- A. Submit according to Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:

1. Indicate window types required for project.
  2. Identify window unit components by name and type of metal or material, show construction, locking systems, mechanical operators, trim, installation and anchorages.
  3. Include glazing details and standards for factory glazed units.
- C. Manufacturer's Literature and Data:
1. Description of each product.
  2. Installation instructions.
  3. Warranty.
- D. Sustainable Construction Submittals:
1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
- E. Samples:
1. Window Frame: 150 mm (6 inch) long samples showing finishes, specified.
- F. Test reports: Indicate each product complies with specifications.
1. Windows.
  2. Operating hardware.
- G. Certificates: Indicate each product complies with requirements (window characteristics may be on window schedule or other drawings).

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:
1. Regularly manufactures specified products.
  2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
    - a. Provide contact names and addresses for completed projects when requested by Contracting Officer's Representative.
- B. Quality Certified Labels or Certificates:
1. AAMA Label affixed to each window indicating compliance with specification.
  2. Certificates in lieu of label with copy of test report maximum 4 years old from independent testing laboratory and certificate signed by window manufacturer stating that windows provided comply with specified requirements and AAMA/WDMA/CSA 101/I.S.2/A440 for type of window specified.

**1.7 STORAGE AND HANDLING**

- A. Protect windows from damage during handling and construction operations before, during and after installation.
- B. Store windows under cover, setting upright.
- C. Do not stack windows flat.
- D. Do not lay building materials or equipment on windows.

**1.8 WARRANTY**

- A. Furnish manufacturer's warranty for windows against malfunctions due to defects in thermal breaks, hardware, materials and workmanship.  
Warranty shall run directly to Government and cover a period of not less than 10 years from the date Government accepted the work.

**PART 2 - PRODUCTS****2.1 SYSTEM PERFORMANCE**

- A. Condensation Resistance Factor (CRF): Minimum CRF of C 50.
- B. Thermal Transmittance:
  - 1. Maximum U value class for insulating glass windows: 50 (U=0.50).
  - 2. Maximum U value class for dual glazed windows: 70 (U=0.70), or as required by ASHRAE 90.1.
- C. Solar Heat Gain Coefficient (SHGC): SHGC shall comply with State or local energy code requirement.
- D. Design windows complying with specified performance:
  - 1. Water Resistance: ASTM E331; No uncontrolled penetration at 390 Pa (8.00 psf), minimum, pressure differential.
  - 2. Air Infiltration Resistance: ASTM E283; 0.1 cfm/sq. ft., maximum at 300 Pa (6.24 psf), minimum, pressure differential.

**2.2 MATERIALS**

- A. Aluminum Extrusions; Sheet and Plate: AAMA 101/I.S.2/A440.
- B. Sheet Steel, Galvanized: ASTM A653; G90 galvanized coating.
- C. Weather-strips: AAMA 101/I.S.2/A440; except leaf type weather-stripping is not permitted.
- D. Fasteners: AAMA 101/I.S.2/A440. Screws, bolts, nuts, rivets and other fastening devices to be non-magnetic stainless steel.
  - 1. Fasteners to be concealed when window is closed. Where wall thickness is less than 3 mm (0.125 inch) thick, provide backup plates or similar reinforcements for fasteners.

2. Stainless steel self tapping screws shall be used to secure Venetian blind hanger clips, vent guide blocks, friction adjuster, and limit opening device.
3. Attach locking and hold-open devices to windows with concealed fasteners. Provide reinforcing plates where wall thickness is less than 3 mm (0.125 inch) thick.

E. Weather-strips: AAMA 101/I.S.2/A440.

F. Hardware:

1. Locks: Two position locking bolts or cam type tamperproof custodial locks with a single point control located not higher than five feet from floor level. Locate locking devices in the vent side rail. Fastenings for locks and keepers shall be concealed or nonremovable.
2. Locking Device Strikes: Locate strikes in frame jamb. Strikes shall be adjustable for locking tension. Fabricate strikes from Type 304 stainless steel or white bronze.
3. Fabricate hinges of noncorrosive metal. Hinges shall be either fully concealed when window is closed or semi-concealed with exposed knuckles. All exposed knuckle hinges shall have hospital tips, at both ends. Surface mounted hinges will not be accepted.
4. Guide Blocks: Fabricate guide blocks of injection molded nylon. Install guide block fully concealed in vent/frame sill.
5. Hardware for Emergency Ventilation of Windows:
  - a. Provide windows with a hold open linkage for emergency ventilation.
  - b. Hold open hardware shall provide for maximum six inches of window opening and shall include an adjustable friction shoe to provide resistance when closing the window.
  - c. Handles shall be removable.

## **2.3 PRODUCTS - GENERAL**

- A. Basis of Design: Provide windows from one manufacturer.
- B. Sustainable Construction Requirements:
  1. Aluminum Recycled Content: 80 total recycled content, minimum.

## **2.4 ALUMINUM WINDOWS**

- A. Frames and Sashes: Aluminum extrusions, AAMA/WDMA/CSA 101/I.S.2/A440.
- B. Thermal-Break Window Construction:
  1. Manufacturer's Standard.
  2. Low conductance thermal barrier.



3. Capable of structurally holding sash in position and together.
  4. Thermal Break Assemblies: Tested according to AAMA TIR A8 and AAMA 505.
  5. Design location of thermal break so that, in closed position, outside air does not come in direct contact with interior frame of window.
- C. Mullions: Match window units.
- D. Provide anchors and other related accessories required for installation.

## **2.5 GLAZING**

- A. Glass and Glazing: As specified in Section 08 80 00, GLAZING.
1. Factory glaze windows.
  2. Weep holes through glazed areas are not acceptable.

## **2.6 INSECT SCREENING**

- A. Screen Mesh: 18 by 18, AAMA/WDMA/CSA 101/I.S.2/A440.
1. Screen Cloth: Aluminum.
- B. Frame: Aluminum, match window unit finish type and color, unless otherwise indicated.

## **2.7 HARDWARE**

- A. Locks: Two position locking bolts or cam type tamperproof custodial locks with a single point control located not higher than 1500 mm (60 inches) from floor level. Locate locking devices in vent side rail. Provide concealed or nonremovable fastenings for locks and keepers.
- B. Locking Device Strikes: Locate adjustable strikes in frame jamb. Fabricate strikes from Type 304 stainless steel or white bronze.
- C. Fabricate hinges of noncorrosive metal. Hinges may be either fully concealed when window is closed or semi-concealed with exposed knuckles and hospital tips. Surface mounted hinges are not acceptable.
- D. Guide Blocks: Fabricate guide blocks of injection molded nylon. Install guide block fully concealed in vent/frame sill.
- E. Hardware for Emergency Ventilation of Windows:
1. Provide windows with hold open linkage.
  2. Provide hold open hardware for maximum 150 mm (6 inches) of window opening with adjustable friction shoe to provide resistance when closing window.
  3. Handles: Removable type.

F. Hardware for Maintenance Opening of Windows: Opening beyond limit stop position accomplished by maintenance key captured by release device when window is in open position.

1. Design operating device to prevent opening with standard tools, coins or bent wire devices.

G. Weather Stripping: AAMA/WDMA/CSA 101/I.S.2/A440; leaf type weather-stripping is not acceptable.

H. Provide wrenches, keys, or removable locking operating handles, as specified to operate windows.

1. Provide one emergency ventilating operating handle for every four windows.
2. Provide maintenance or window washer operating handles as required.

## **2.8 FABRICATION**

A. Fabrication to exceed or meet requirements of Physical Load Tests, Air Infiltration Test, and Water Resistance Test of AAMA 101/I.S.2/A440.

B. Glazing:

1. Factory or field glazing optional.
2. Glaze in accordance with Section 08 80 00, GLAZING.
3. Windows reglazable without dismantling sash framing.
4. Design rabbet to suit glass thickness and glazing method specified.
5. Glaze from interior except where not accessible.
6. Provide removable fin type glazing beads.

C. Trim:

1. Trim includes casings, closures, and panning.
2. Fabricate to shapes shown of aluminum not less than 1.6 mm (0.062 inch) thick
3. Extruded or formed sections, straight, true, and smooth on exposed surfaces.
4. Exposed external corners mitered and internal corners coped; fitted with hairline joints.
5. Reinforce 1.6 mm (0.062 inch) thick members with not less than 3 mm (1/8-inch) thick aluminum.
6. Except for strap anchors, provide reinforcing for fastening near ends and at intervals not more than 305 mm (12 inches) between ends.
7. Design to allow unrestricted expansion and contraction of members and window frames.

8. Secure to window frames with machine screws or expansion rivets.
  9. Exposed screws, fasteners or pop rivets are not acceptable on exterior of the casing or trim cover system.
- D. Thermal-Break Construction:
1. Manufacturer's Standard.
  2. Low conductance thermal barrier.
  3. Capable of structurally holding sash in position and together.
  4. All Thermal Break Assemblies (Pour & Debridge, Insulbar or others) shall be tested as per AAMA TIR A8 and AAMA 505 for Dry Shrinkage and Composite Performance.
  5. Location of thermal barrier and design of window shall be such that, in closed position, outside air shall not come in direct contact with interior frame of the window.
- E. Mullions: AAMA 101/I.S.2/A440.
- F. Muntins / Grills:
1. Dimensions: 3/4" - 7/8".
  2. Locations: apply to each face of window unit with spacer between panes of glass as detailed on drawings
- G. Subsills and Stools:
1. Fabricate to shapes shown of not less than 2 mm (0.080 inch) thick extruded aluminum.
  2. One piece full length of opening with concealed anchors.
  3. Sills turned up back edge not less than 6 mm (1/4 inch). Front edge provide with drip.
  4. Sill back edge behind face of window frame. Do not extend to interior surface or bridge thermal breaks.
  5. Do not perforate for anchorage, clip screws, or other requirements.

## **2.9 FINISHES**

- A. Finish window units according to NAAMM AMP 500 series.
- B. Anodized Aluminum:
1. Color (White) Anodized Finish: AA-C22A42 or AA-C22A44; Class I Architectural, 0.018 mm (0.7 mil) thick.

## **2.10 ACCESSORIES**

- A. Fasteners: AAMA/WDMA/CSA 101/I.S.2/A440; non-magnetic stainless steel.
- B. Window Mounting Kit: Commercial Grade; steel hardware; Masonite wingboard. See Drawings for additional information.

**PART 3 - EXECUTION****3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
  - 1. Verify openings are within acceptable tolerances.
- B. Protect existing construction and completed work from damage.
- C. Remove existing windows to permit new installation when replacement window is available, and ready for immediate installation.
  - 1. Contractor is responsible for all testing and abatement of hazardous materials during demolition work.
  - 2. Remove existing work carefully; avoid damage to existing work indicated to remain.
  - 3. Perform other operations as necessary to prepare openings for proper installation and operation of new windows.
  - 4. Do not leave openings uncovered at end of working day, during precipitation or temperatures below 16 degrees C (60 degrees F).

**3.2 INSTALLATION, GENERAL**

- A. Install products according to manufacturer's instructions and approved submittal drawings .
  - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Where type, size or spacing of fastenings for securing window accessories or equipment to building construction is not shown or specified, provide expansion or toggle bolts or screws, as best suited to construction material.
  - 1. Provide bolts or screws minimum 6 mm (1/4 inch) in diameter.
  - 2. Sized and spaced to resist tensile and shear loads imposed.
  - 3. Do not install exposed fasteners on exterior, except when unavoidable for application of hardware.
  - 4. Provide non-magnetic stainless steel Phillips flat-head machine screws for exposed fasteners, where required, or special tamper-proof fasteners.
  - 5. Locate fasteners to avoid disturbing window thermal break.
- C. Set windows plumb, level, true, and in alignment; without warp or rack of frames or sash.
- D. Anchor windows on four sides with anchor clips or fin trim.
  - 1. Do not allow anchor clips to bridge thermal breaks.

2. Use separate clips for both sides of thermal breaks.
3. Make connections to allow for thermal and other movements.
4. Do not allow building load to bear on windows.
5. Use manufacturer's standard clips at corners and maximum 600 mm (24 inches) on center.
6. Where fin trim anchorage is indicated build into adjacent construction, anchoring at corners and maximum 600 mm (24 inches) on center.

E. Sills and Stools:

1. Set in bed of mortar or other compound to fully support, true to line shown.
2. Do not extend sill to inside window surface or past thermal break.
3. Leave space for sealants at ends and to window frame unless indicated otherwise.

**3.3 MULLIONS CLOSURES, TRIM, AND PANNING**

- A. Cut mullion full height of opening and anchor directly to window frame on both sides and spacer between glass.
- B. Closures, Trim, and Panning: External corners mitered and internal corners coped, fitted with hairline, tightly closed joints.
  1. Secure to concrete and solid masonry with expansion bolts, expansion rivets, split shank drive bolts, or powder actuated drive pins.
  2. Toggle bolt to hollow masonry units.
  3. Screw to wood and metal.
- C. Fasten except for strap anchors, near ends and corners and maximum 300 mm (12 inches) on center.
- D. Seal units following installation to provide weathertight system.

**3.4 ADJUSTING**

- A. Adjust ventilating sash and hardware to provide tight fit at contact points, and at weather-stripping for smooth operation and weathertight closure.

**3.5 CLEANING**

- A. Lubricate hardware and moving parts.
- B. Remove excess glazing and sealant compounds.
- C. Clean exposed aluminum and glass surfaces. Remove contaminants and stains.
- D. Keep windows locked except while adjusting and testing.

- - E N D - -

**SECTION 08 56 66**  
**DETENTION WINDOW SCREENS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Detention screens for interior installations at exterior windows in existing buildings.
2. Security screens for exterior windows.

**1.2 RELATED REQUIREMENTS**

- A. Finish Color: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. American Welding Society (AWS):
1. D1.1/D1.1M-15 - Structural Welding Code - Steel.
- C. ASTM International (ASTM):
1. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  2. A780/A780M-15 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- D. Master Painters Institute (MPI):
1. No. 18 - Primer, Zinc Rich, Organic.

**1.4 SUBMITTALS**

- A. Submittal Procedures: Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
1. Show size, configuration, and fabrication and installation details.
  2. Indicate anchorage details and door operator clearance requirements.
  3. Details: Drawn 1/2 full scale.
- C. Manufacturer's Literature and Data:
1. Description of each product.
- D. Certificates: Indicate products comply with specifications.
1. Wire cloth.
- E. Qualifications: Substantiate qualifications comply with specifications.
1. Manufacturer.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:

1. Experienced and specializing in manufacturing detention and security screens.
  2. Minimum three years documented experience manufacturing products specified in this section.
- B. Welders and Welding Procedures Qualifications: AWS D1.1/D1.1M.
- C. Mockups:
1. Prepare full sized mockup of each screen assembly including wire cloth, perimeter frame, and hardware.
  2. Approved mockups may be incorporated into project.
- D. Construction."

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Wire Cloth: Woven wire, double crimped.
1. Wire: 0.7 mm (0.028 inch) diameter Type 304 stainless steel with 15 kg/mm (800 pounds per lineal inch) tensile strength.
  2. Mesh: 12 x 12 per 25 mm (in.).
- B. Screen Framing: ASTM A653/A653M; A90 galvanized sheet steel.

### **2.2 PRODUCTS - GENERAL**

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide each product from one manufacturer.

### **2.3 HARDWARE**

- A. Operating Hardware: Extra heavy-duty type.
- B. Locks: Concealed locking system consisting of one, bit-key operated locking mechanism with minimum of two operable bolts.
- C. Lock Bolts: Concealed 13 mm (1/2 inch) diameter case-hardened steel.
1. Locate bolts near top and bottom of screen.
  2. Design bolts to engage adjustable strike or keepers in sub-frame.
- D. Cylinder: Steel construction bit key including three brass tumblers having beryllium copper springs.
- E. Lock Case: Two piece, steel construction having three brass pedestal bearing supports attached to lower half of case to support slide bar, tumblers, case and cover. Fabricate slide bar from steel with hardened steel guide tumbler block.
- F. Bit Key: Forged steel or solid bronze with chromium or cadmium plated finish; non-removable, except when lock bolts are extended.



1. Key locks alike. Design locks allowing operation by existing attendant's key established for the VA Medical Center.

#### **2.4 FABRICATION - GENERAL**

- A. Fabricate screens without the use of muntins, allowing units to be mounted flush with surrounding construction.
- B. Fabricate scribe members from 1.5 mm (0.06) thick sheet steel and install at head and jambs of openings.
- C. Frames: Continuously weld corners of fixed and hinged frames, without outside reinforcements or projections. Finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.
- D. Drill and tap fixed frames for adjustment against scribe members. Drill head rail of hinged frames on room side for installation of shade brackets. Locate holes on center line of rail, 38 mm (1-1/2 inches) outside edges of stiles.
- E. Reinforce frames lighter than 2.5 mm (0.10 inch) thick steel at locks and hinges with steel plates minimum 5 mm (3/16 inch) thick.
- F. Provide rubber cushion plugs (bumpers) on lock between fixed and hinged frames. Locate bumpers 150 mm (6 inches) from top and bottom on side of frame where lock bolts or slides occur.

#### **2.5 FABRICATION - SECURITY SCREENS**

- A. Reinforce hinged frames greater than 1200 mm (4 feet) in height horizontally or vertically, or both if width exceeds 1500 mm (5 feet).
- B. Screen Unit - Type "D": Fixed sub-frame of minimum 2.5 (0.1 inch) thick "Z" (zee) shaped members and hinged main frame.
  1. Fabricate hinged frames of minimum 2.5 mm (0.1 inch) thick channel shaped members having an extended inner flange. Form flange edge with a right angle return forming a channel to receive wire cloth retaining strip.
  2. Wire Cloth Attachment: Bend screening to fit over the screen frame and attach using a 1.5 mm (0.06 inch) thick retaining angle, continuous for entire perimeter. Clamp screening between retaining angle and return edge of hinged frame with hardened steel machine screws spaced approximately 125 mm (5 inches) on center.

#### **2.6 FINISHES**

- A. Finish exposed surfaces after fabrication.
  1. Do not paint wire cloth.

- B. Apply two coats baked-on enamel to entire surface of screen framing before installing wire cloth.
- C. Stainless Steel: NAAMM AMP 500; No. 4 polished finish.
- D. Finish exposed surfaces after fabrication.

## **2.7 ACCESSORIES**

- A. Welding Materials: AWS D1.1/D1.1M, type to suit application.
- B. Fasteners: Stainless steel, type and size as recommended by screen unit manufacturer.
- C. Galvanizing Repair Paint: MPI No. 18.
- D. Touch-Up Paint: Match shop finish.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
  - 1. Verify openings are correctly sized, plumb, and square.
- B. Protect existing construction and completed work from damage.

### **3.2 INSTALLATION - GENERAL**

- A. Install products according to manufacturer's instructions and approved submittal drawings.
  - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

### **3.3 INSTALLATION**

- A. Drill, tap or cut metal window trim and other materials as required for proper installation of screen units.
- B. Install screen units allowing easy removal without damage to new or existing work and to effectively exclude insects.
- C. Secure screen units to metal windows with fasteners, spaced at approximately 375 mm (15 inches) on centers.
- D. Adjust screens for proper operation and locking.
- E. Touch up damaged factory finishes.

### **3.4 PROTECTION**

- A. Protect screens from construction operations.
- B. Repair damage.

- - E N D - -

**SECTION 08 71 00  
DOOR HARDWARE**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Door hardware and related items necessary for complete installation and operation of doors.

**1.2 RELATED WORK**

- A. Caulking: Section 07 92 00 JOINT SEALANTS.
- B. Application of Hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
- C. Finishes: Section 09 06 00, SCHEDULE FOR FINISHES.
- D. Painting: Section 09 91 00, PAINTING.

**1.3 GENERAL**

- A. All hardware shall comply with UFAS, (Uniform Federal Accessible Standards) unless specified otherwise.
- B. Hardware for application on metal and wood doors and frames shall be made to standard templates. Furnish templates to the fabricator of these items in sufficient time so as not to delay the construction.
- C. The following items shall be of the same manufacturer, except as otherwise specified:
  - 1. Mortise locksets.
  - 2. Hinges for hollow metal and wood doors.
  - 3. Surface applied overhead door closers.
  - 4. Exit devices.
  - 5. Floor closers.

**1.4 WARRANTY**

- A. Automatic door operators Warranty period of one year to include:
  - 1. Locks, latchsets, and panic hardware.
  - 2. Door closers and continuous hinges.

**1.5 MAINTENANCE MANUALS**

- A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on all door hardware. Provide installation instructions with the submittal documentation.

**1.6 SUBMITTALS**

- A. Submittals shall be in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Submit 6 copies of the schedule per Section 01 33 23. Submit 2 final copies of the final approved schedules to COR

as record copies (VISN Locksmith if the VAMC does not have a locksmith).

- B. Hardware Schedule: Prepare and submit hardware schedule in the following form:

| Hardware Item | Quantity | Size | Reference Publication Type No. | Finish | Mfr. Name and Catalog No. | Key Control Symbols | UL Mark (if fire rated and listed) | ANSI/BHMA Finish Designation |
|---------------|----------|------|--------------------------------|--------|---------------------------|---------------------|------------------------------------|------------------------------|
|               |          |      |                                |        |                           |                     |                                    |                              |
|               |          |      |                                |        |                           |                     |                                    |                              |
|               |          |      |                                |        |                           |                     |                                    |                              |

- C. Samples and Manufacturers' Literature:

1. Samples: All hardware items (proposed for the project) that have not been previously approved by Builders Hardware Manufacturers Association shall be submitted for approval. Tag and mark all items with manufacturer's name, catalog number and project number.
2. Samples are not required for hardware listed in the specifications by manufacturer's catalog number, if the contractor proposes to use the manufacturer's product specified.

- D. Certificate of Compliance and Test Reports: Submit certificates that hardware conforms to the requirements specified herein. Certificates shall be accompanied by copies of reports as referenced. The testing shall have been conducted either in the manufacturer's plant and certified by an independent testing laboratory or conducted in an independent laboratory, within four years of submittal of reports for approval.

#### 1.7 DELIVERY AND MARKING

- A. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. Tag one of each different item of hardware and deliver to COR for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in COR's office until all other similar items have been installed in project, at which time the COR will deliver items on

file to Contractor for installation in predetermined locations on the project.

#### **1.8 PREINSTALLATION MEETING**

A. Convene a preinstallation meeting not less than 30 days before start of installation of door hardware. Require attendance of parties directly affecting work of this section, including Contractor and Installer, Architect, Project Engineer and VA Locksmith, Hardware Consultant, and Hardware Manufacturer's Representative. Review the following:

1. Inspection of door hardware.
2. Job and surface readiness.
3. Coordination with other work.
4. Protection of hardware surfaces.
5. Substrate surface protection.
6. Installation.
7. Adjusting.
8. Repair.
9. Field quality control.
10. Cleaning.

#### **1.9 INSTRUCTIONS**

- A. Hardware Set Symbols on Drawings: Except for protective plates, door stops, mates, thresholds and the like specified herein, hardware requirements for each door are indicated on drawings by symbols. Symbols for hardware sets consist of letters (e.g., "HW") followed by a number. Each number designates a set of hardware items applicable to a door type.
- B. Keying: All cylinders shall be keyed by the VA Locksmith into existing Station Wide KABA Removable Core System. . Provide removable core cylinders that are removable only with a special key or tool without disassembly of knob or lockset. Cylinders shall be (6 pin with seventh anti-pick pin.) type. Keying information shall be furnished at a later date by the COR.

#### **1.10 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. In text, hardware items are referred to by series and types, listed in such specifications and standards, except as otherwise specified.

## B. American Society for Testing and Materials (ASTM):

F883-04.....Padlocks

E2180-07.....Standard Test Method for Determining the  
Activity of Incorporated Antimicrobial Agent(s)  
In Polymeric or Hydrophobic Materials

## C. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):

A156.1-06.....Butts and Hinges

A156.2-03.....Bored and Pre-assembled Locks and Latches

A156.3-08.....Exit Devices, Coordinators, and Auto Flush  
Bolts

A156.4-08.....Door Controls (Closers)

A156.5-14.....Cylinders and Input Devices for Locks.

A156.6-05.....Architectural Door Trim

A156.8-05.....Door Controls-Overhead Stops and Holders

A156.12-05 .....Interconnected Locks and Latches

A156.13-05.....Mortise Locks and Latches Series 1000

A156.16-08.....Auxiliary Hardware

A156.17-04 .....Self-Closing Hinges and Pivots

A156.18-06.....Materials and Finishes

A156.20-06 .....Strap and Tee Hinges, and Hasps

A156.21-09.....Thresholds

A156.22-05.....Door Gasketing and Edge Seal Systems

A156.26-06.....Continuous Hinges

A156.28-07 .....Master Keying Systems

A156.29-07 .....Exit Locks and Alarms

A156.30-03 .....High Security Cylinders

A156.36-10.....Auxiliary Locks

A250.8-03.....Standard Steel Doors and Frames

## E. Underwriters Laboratories, Inc. (UL):

Building Materials Directory (2008)

**PART 2 - PRODUCTS****2.1 CONTINUOUS HINGES**

## A. ANSI/BHMA A156.26, Grade 1-600.

1. Listed under Category N in BHMA's "Certified Product Directory."

## B. General: Minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with minimum overall width of 4 inches (102 mm); fabricated to full height

of door and frame and to template screw locations; with components finished after milling and drilling are complete

- C. Continuous, Barrel-Type Hinges: Hinge with knuckles formed around a Teflon-coated 6.35mm (0.25-inch) minimum diameter pin that extends entire length of hinge.

1. Base Metal for Exterior Hinges: Stainless steel.
2. Provide with non-removable pin (hospital tip option) at lockable outswing doors.
3. Where required to clear adjacent casing, trim, and wall conditions and allow full door swing, provide wide throw hinges of minimum width required.
4. Provide with manufacturer's cut-outs for separate mortised power transfers and/or mortised automatic door bottoms where they occur.
5. Where thru-wire power transfers are integral to the hinge, provide hinge with easily removable portion to allow easy access to wiring connections.
6. Where models are specified that provide an integral wrap-around edge guard for the hinge edge of the door, provide manufacturer's adjustable threaded stud and machine screw mechanism to allow the door to be adjusted within the wrap-around edge guard.

### **2.3 DOOR CLOSING DEVICES**

- A. Closing devices shall be LCN, model number 1461 Super Stock, part number 21818-01 0005, aluminum finish, TBSRT screws, Rw/PA arm.

### **2.4 OVERHEAD CLOSERS**

- A. Conform to ANSI A156.4, Grade 1.
- B. Closers shall conform to the following:
1. The closer shall have minimum 50 percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.
  2. Where specified, closer shall have hold-open feature.
  3. Size Requirements: Provide multi-size closers, sizes 1 through 6, except where multi-size closer is not available for the required application.
  4. Material of closer body shall be forged or cast.
  5. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.

6. Where closers are exposed to the exterior or are mounted in rooms that experience high humidity, provide closer body and arm assembly of stainless steel material.
7. Closers shall have full size metal cover; plastic covers will not be accepted.
8. Closers shall have adjustable hydraulic back-check, separate valves for closing and latching speed, adjustable back-check positioning valve, and adjustable delayed action valve.
9. Provide closers with any accessories required for the mounting application, including (but not limited to) drop plates, special soffit plates, spacers for heavy-duty parallel arm fifth screws, bull-nose or other regular arm brackets, longer or shorter arm assemblies, and special factory templating. Provide special arms, drop plates, and templating as needed to allow mounting at doors with overhead stops and/or holders.
10. Closer arms or backcheck valve shall not be used to stop the door from overswing, except in applications where a separate wall, floor, or overhead stop cannot be used.
11. Provide parallel arm closers with heavy duty rigid arm.
12. Where closers shall be installed on the push side of the door, provide parallel arm type except where conditions require use of top jamb arm.
13. Provide all surface closers with the same body attachment screw pattern for ease of replacement and maintenance.
14. All closers shall have a 1 ½" (38mm) minimum piston diameter.

## **2.5 OVERHEAD DOOR STOPS AND HOLDERS**

- A. Conform to ANSI Standard A156.8. Overhead holders shall be of sizes recommended by holder manufacturer for each width of door. Set overhead holders for 110 degree opening, unless limited by building construction or equipment. Provide Grade 1 overhead concealed slide type: stop-only at rated doors and security doors, hold-open type with exposed hold-open on/off control at all other doors requiring overhead door stops.

## **2.6 LOCKS AND LATCHES**

- A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts. Lock cylinders shall have not less than six pins with anti-pick pin. Cylinders for all locksets shall be removable core type. Cylinders shall be furnished with construction removable cores and construction master keys. Cylinder shall be



removable by special key or tool. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, cylindrical locks, and any other type lock included in the Great Grand Master Key System. Disassembly of lever or lockset shall not be required to remove core from lockset. All locksets or latches on double doors with fire label shall have latch bolt with 19 mm (3/4 inch) throw, unless shorter throw allowed by the door manufacturer's fire label. Provide temporary keying device or construction core to allow opening and closing during construction and prior to the installation of final cores. Final cores shall be KABA Cores or approved equal purchased by the contractor from the local distributor, IDN Industrial, Phone 734-466-4096 (Chris Vasquez). The distributor shall send the cores directly to the BCVAMC Locksmith. The contractor shall install the cylinders.

The manufacturer product identified above meets the salient characteristics of this specification. Such information is only provided to show an example of products which meet the specifications and do not, in any way, limit the offeror from providing products from other manufacturers which meet the salient characteristics as identified in the specification.

- B. In addition to above requirements, locks and latches shall comply with following requirements:
1. Mortise Lock and Latch Sets: Conform to ANSI/BHMA A156.13. Provide Corbin Russwin Locksets with 612 finish. All locks and latchsets shall be furnished with 122.55 mm (4-7/8-inch) curved lip strike and wrought box. At outswing pairs with overlapping astragals, provide flat lip strip with 21mm (7/8-inch) lip-to-center dimension. Lock function F02 shall be furnished with emergency tools/keys for emergency entrance. All lock cases installed on lead lined doors shall be lead lined before applying final hardware finish. Furnish armored fronts for all mortise locks. Where mortise locks are installed in high-humidity locations or where exposed to the exterior on both sides of the opening, provide non-ferrous mortise lock case.

**2.7 KEYS**

- A. Stamp all keys with change number and key set symbol. Furnish keys in quantities as follows:

| Locks/Keys    | Quantity    |
|---------------|-------------|
| Mortise locks | 2 keys each |
|               |             |

**2.8 EXIT DEVICES**

- A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have cast satin stainless steel lever handles of design similar to locksets, unless otherwise specified. Provide key cylinders for keyed operating trim and, where specified, cylinder dogging.
- B. Surface vertical rod panics shall only be provided less bottom rod; provide fire pins as required by exit device and door fire labels. Do not provide surface vertical rod panics at exterior doors.
- C. Concealed vertical rod panics shall be provided less bottom rod at interior doors, unless lockable or otherwise specified; provide fire pins as required by exit device and door fire labels. Where concealed vertical rod panics are specified at exterior doors, provide with both top and bottom rods.
- D. Where removable mullions are specified at pairs with rim panic devices, provide mullion with key-removable feature.
- E. At non-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.
- F. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

**2.9 FLUSH BOLTS (LEVER EXTENSION)**

- A. Conform to ANSI A156.16. Flush bolts shall be Type L24081 unless otherwise specified. Furnish proper dustproof strikes conforming to ANSI A156.16, for flush bolts required on lower part of doors.
- B. Lever extension manual flush bolts shall only be used at non-fire-rated pairs for rooms only accessed by maintenance personnel.
- C. Face plates for cylindrical strikes shall be rectangular and not less than 25 mm by 63 mm (1 inch by 2-1/2 inches).

- D. Friction-fit cylindrical dustproof strikes with circular face plate may be used only where metal thresholds occur.
- E. Provide extension rods for top bolt where door height exceeds 2184 mm (7 feet 2 inches).

## **2.10 THRESHOLDS**

- A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. In existing construction, thresholds shall be installed in a bed of sealant with ¼-20 stainless steel machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.
- B. For thresholds at elevators entrances see other sections of specifications.
- C. At exterior doors and any interior doors exposed to moisture, provide threshold with non-slip abrasive finish.
- D. Provide with miter returns where threshold extends more than 12 mm (0.5 inch) beyond face of frame.

## **2.11 WEATHERSTRIPS (FOR EXTERIOR DOORS)**

- A. Conform to ANSI A156.22. Air leakage shall not to exceed 0.50 CFM per foot of crack length ( $0.000774\text{m}^3/\text{s/m}$ ).

## **2.12 FINISHES**

- A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below. Finishes on all hinges, pivots, closers, and thresholds shall be as specified below under "Miscellaneous Finishes." For field painting (final coat) of ferrous hardware, see Section 09 91 00, PAINTING.
- B. 612: All surfaces on exterior and interior of buildings, except where other finishes are specified.
- C. Miscellaneous Finishes:
  - 1. Hinges --exterior doors: 612.
  - 2. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color.
  - 3. Thresholds: Mill finish aluminum.
  - 4. Other primed steel hardware: 612.
- D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces except where otherwise specified. Finish shall be 612.

E. Anti-microbial Coating: All hand-operated hardware (levers, pulls, push bars, push plates, paddles, and panic bars) shall be provided with an anti-microbial/anti-fungal coating that has passed ASTM E2180 tests. Coating to consist of ionic silver (Ag<sup>+</sup>). Silver ions surround bacterial cells, inhibiting growth of bacteria, mold, and mildew by blockading food and respiration supplies.

## 2.12 BASE METALS

A. Apply specified U.S. Standard finishes on different base metals as following:

| Finish | Base Metal      |
|--------|-----------------|
| 612    | Steel           |
| 612    | Brass or bronze |
| 612    | Stainless steel |

## PART 3 - EXECUTION

### 3.1 HARDWARE HEIGHTS

- A. For existing buildings locate hardware on doors at heights to match existing hardware. The Contractor shall visit the site, verify location of existing hardware and submit locations to VA Resident Engineer for approval.
- B. Hardware Heights from Finished Floor:
- Exit devices centerline of strike (where applicable) 1024 mm (40-5/16 inches).
  - Locksets and latch sets centerline of strike 1024 mm (40-5/16 inches).
  - Deadlocks centerline of strike 1219 mm (48 inches).
  - Hospital arm pull 1168 mm (46 inches) to centerline of bottom supporting bracket.
  - Centerline of door pulls to be 1016 mm (40 inches).
  - Push plates and push-pull shall be 1270 mm (50 inches) to top of plate.
  - Push-pull latch to be 1024 mm (40-5/16 inches) to centerline of strike.
  - Locate other hardware at standard commercial heights. Locate push and pull plates to prevent conflict with other hardware.

### 3.2 INSTALLATION

- A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by

building construction or equipment. Closers shall be mounted on side of door inside rooms, inside stairs, and away from corridors. At exterior doors, closers shall be mounted on interior side. Where closers are mounted on doors they shall be mounted with sex nuts and bolts; foot shall be fastened to frame with machine screws.

**B. Hinge Size Requirements:**

| Door Thickness                              | Door Width  | Hinge Height          |
|---|---|-----------------------|
| 45 mm (1-3/4 inch)                          | 900 mm (3 feet) and less                                | 113 mm (4-1/2 inches) |
| 45 mm (1-3/4 inch)                          | Over 900 mm (3 feet) but not more than 1200 mm (4 feet) | 125 mm (5 inches)     |
| 35 mm (1-3/8 inch) (hollow core wood doors) | Not over 1200 mm (4 feet)                               | 113 mm (4-1/2 inches) |

C. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim and surrounding conditions.

**D. Hinges Required Per Door:**

|  |         |
|--|---------|
| Doors 1500 mm (5 ft) or less in height                               | 2 butts |
| Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high | 3 butts |
| Doors over 2280 mm (7 feet 6 inches) high                            | 4 butts |
| Dutch type doors   | 4 butts |
| Doors with spring hinges 1370 mm (4 feet 6 inches) high or less      | 2 butts |
| Doors with spring hinges over 1370 mm (4 feet 6 inches)              | 3 butts |

E. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile, or solid masonry. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.

F. After locks have been installed; show in presence of COR that keys operate their respective locks in accordance with keying requirements. (All keys, Master Key level and above shall be sent Registered Mail to the Medical Center Director along with the bitting list. Also a copy of the invoice shall be sent to the COR for his records.) Installation of locks which do not meet specified keying requirements shall be

considered sufficient justification for rejection and replacement of all locks installed on project.

### 3.3 FINAL INSPECTION

- A. Installer to provide letter to COR that upon completion, installer has visited the Project and has accomplished the following:
1. Re-adjust hardware.
  2. Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
  3. Identify items that have deteriorated or failed.
  4. Submit written report identifying problems.

### 3.4 DEMONSTRATION

- A. Demonstrate efficacy of mechanical hardware and electrical, and electronic hardware systems, including adjustment and maintenance procedures, to satisfaction of COR.

### 3.5 HARDWARE SETS

- A. Following sets of hardware correspond to hardware symbols shown on drawings. Only those hardware sets that are shown on drawings will be required. Disregard hardware sets listed in specifications but not shown on drawings.
- B. Hardware Consultant working on a project will be responsible for providing additional information regarding these hardware sets. The numbers shown in the following sets come from BHMA standards.

#### ELECTRIC HARDWARE ABBREVIATIONS LEGEND:

ADO = Automatic Door Operator

EMCH = Electro-Mechanical Closer-Holder

MHO = Magnetic Hold-Open (wall- or floor-mounted)

#### EXTERIOR PAIRS OF DOORS

##### SET #XX1 (Standard exterior door with mortise lock)

|   |                |                          |     |      |
|---|----------------|--------------------------|-----|------|
| 3 | Hinges         | TA2314 4 1/2 X 4 1/2 NRP | 10  | MC   |
| 1 | Classroom Lock | ML2055 LWA CT6B          | 612 | CR   |
| 1 | I/C Core       | 6140-25-1006 x F2        | 612 | KABA |
| 1 | Closer         | 1461 S CUSH TBSRT        | AL  | LC   |
| 1 | Threshold      | 171 A                    |     | PE   |
| 1 | Door Sweep     | 18062 CNB                |     | PE   |
| 1 | Weatherstrip   | 2891 APK                 |     | PE   |

- - - E N D - - -

**SECTION 08 80 00  
GLAZING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies the following:
  - 1. Glass.
  - 2. Glazing materials and accessories for both factory and field glazed assemblies.

**1.2 RELATED WORK:**

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Factory glazed by manufacturer in following units:
  - 1. Aluminum Windows: Section 08 51 13, ALUMINUM WINDOWS.

**1.3 LABELS:**

- A. Temporary labels:
  - 1. Provide temporary label on each light of glass identifying manufacturer or brand and glass type, quality and nominal thickness.
  - 2. Label in accordance with NFRC label requirements.
  - 3. Temporary labels are to remain intact until glass is approved by Contracting Officer Representative (COR).
- B. Permanent labels:
  - 1. Locate in corner for each pane.
  - 2. Label in accordance with ANSI Z97.1 and SGCC label requirements.
    - a. Tempered glass.
    - b. Laminated glass or have certificate for panes without permanent label.
    - c. Organic coated glass.
  - 3. Blast Resistant Film.

**1.4 PERFORMANCE REQUIREMENTS:**

- A. General: Design glazing system consistent with guidance and practices presented in the GANA Glazing Manual, GANA Laminated Glazing Manual, and GANA Sealant Manual, as applicable to project. Installed glazing is to withstand applied loads, thermal stresses, thermal movements, building movements, permitted tolerances, and combinations of these conditions without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight;



deterioration of glazing materials; unsafe engagement of the framing system; deflections beyond specified limits; or other defects in construction.

- B. Glazing Unit Design: Design glass, including engineering analysis meeting requirements of authorities having jurisdiction. Thicknesses listed are minimum. Coordinate thicknesses with framing system manufacturers.
  - 1. Design glass in accordance with ASTM E1300, and for conditions beyond the scope of ASTM E1300, by a properly substantiated structural analysis.
  - 2. Design Wind Pressures: In accordance with ASCE 7.
  - 3. Wind Design Data In accordance with ASCE 7
- C. Ballistic- and Blast- resistant glass or plastic glazing assemblies:
  - 1. Basis of Design: 3M Ultra 800 or equivalent approved by VA.
  - 2. For blast-resistant and ballistic-resistant units comply with requirements in UFC 4-010-01, Physical Security Design Manual for VA Facilities, and project-specific criteria provided by VA.
  - 3. Spall Resistance: Laminated glazing is not permitted to produce spall to interior (protected side) when impacted with scheduled ballistics.
  - 4. Tolerances:
    - a. Outside dimensions: Overall outside dimensions (height and width) of laminated security glazing is to maintain tolerance of  $\pm 3$  mm ( $\pm 0.12$  inch).
    - b. Warpage: Out-of-flat (warpage or bowing) condition of laminates is not to exceed 2.5 mm per lineal meter (0.10 inch per 3.3 lineal foot). The condition, if present, is to be localized to extent not greater than 0.75 mm (0.03 inch) for any 0.3 meter (0.98 feet) section.
- D. Building Enclosure Vapor Retarder and Air Barrier:
  - 1. Utilize the inner pane of multiple pane sealed units for the continuity of the air barrier and vapor retarder seal.
  - 2. Maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.
- E. Glass Thickness:
  - 1. Select thickness of exterior glass to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with ASCE 7.

2. Test in accordance with ASTM E 1300.
3. Thicknesses listed are minimums. Coordinate thicknesses with framing system manufacturers.

**1.5 SUBMITTALS:**

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Certificates:
  1. Certificate stating that fire-protection and fire-resistive glazing units meet code requirements for fire-resistance-rated assembly and applicable safety glazing requirements.
  2. Certificate on solar heat gain coefficient when value is specified.
  3. Certificate on "R" value when value is specified.
  4. Certificate test reports confirming compliance with specified bullet resistive rating.
  5. Certificate that blast resistant glass meets the specified requirements.
- D. Manufacturer Warranty.
- E. Manufacturer's Literature and Data:
  1. Glass, each kind required.
  2. Insulating glass units.
  3. Elastic compound for metal sash glazing.
  4. Putty, for wood sash glazing.
  5. Glazing cushion.
  6. Sealing compound.
  7. Plastic glazing material, each type required.
- F. Samples:
  1. Size: 305 mm by 305 mm (12 inches by 12 inches).
  2. Tinted glass.
- G. Preconstruction Adhesion and Compatibility Test Report: Submit glazing sealant manufacturer's test report indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

**1.6 DELIVERY, STORAGE AND HANDLING:**

- A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of crates is required. Do not open crates except as required for inspection for shipping damage.

- B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.
- C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.
- D. Protect laminated security glazing units against face and edge damage during entire sequence of fabrication, handling, and delivery to installation location. Provide protective covering on exposed faces of glazing plastics, and mark inside as "INTERIOR FACE" or "PROTECTED FACE":
  - 1. Treat security glazing as fragile merchandise, and packaged and shipped in export wood cases with width end in upright position and blocked together in a mass. Storage and handling to comply with manufacturer's directions and as required to prevent edge damage or other damage to glazing resulting from effects of moisture, condensation, temperature changes, direct exposure to sun, other environmental conditions, and contact with chemical solvents.
  - 2. Protect sealed-air-space insulating glazing units from exposure to abnormal pressure changes, as could result from substantial changes in altitude during delivery by air freight. Provide temporary breather tubes which do not nullify applicable warranties on hermetic seals.
  - 3. Temporary protections: The glass front and polycarbonate back of glazing are to be temporarily protected with compatible, peelable, heat-resistant film which will be peeled for inspections and re-applied and finally removed after doors and windows are installed at destination. Since many adhesives will attack polycarbonate, the film used on exposed polycarbonate surfaces is to be approved and applied by manufacturer.
  - 4. Edge protection: To cushion and protect glass clad, and polycarbonate edges from contamination or foreign matter, the four (4) edges are to be sealed the depth of glazing with continuous standard-thickness thermoplastic rubber tape. Alternatively, continuous channel shaped extrusion of thermoplastic rubber are to be used, with flanges extending into face sides of glazing.
  - 5. Protect "Constant Temperature" units including every unit where glass sheet is directly laminated to or directly sealed with

metal-tube type spacer bar to polycarbonate sheet, from exposures to ambient temperatures outside the range of 16 to 24 degrees C (60 to 75 degrees F), during the fabricating, handling, shipping, storing, installation, and subsequent protection of glazing.

#### **1.7 PROJECT CONDITIONS:**

Field Measurements: Field measure openings before ordering tempered glass products to assure for proper fit of field measured products.

#### **1.8 WARRANTY:**

- A. Manufacturer Warranty: Manufacturer shall warranty their glazing from the date of installation and final acceptance by the Government as follows. Submit manufacturer warranty.
1. Bullet resistive plastic material to remain visibly clear without discoloration for 10 years.
  2. Insulating glass units to remain sealed for ten (10) years.
  3. Laminated glass units to remain laminated for five (5) years.
  4. Polycarbonate to remain clear and ultraviolet light stabilized for five (5) years.
  5. Insulating plastic to not have more than 6 percent decrease in light transmission and be ultraviolet light stabilized for ten (10) years.

#### **1.9 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Architectural Manufacturers Association (AAMA):
- 800.....Test Methods for Sealants
  - 810.1-77.....Expanded Cellular Glazing Tape
- C. American National Standards Institute (ANSI):
- Z97.1-14.....Safety Glazing Material Used in  
Building - Safety Performance Specifications  
and Methods of Test
- D. American Society of Civil Engineers (ASCE):
- 7-10.....Wind Load Provisions
- E. ASTM International (ASTM):
- C542-05(R2011).....Lock-Strip Gaskets
  - C716-06.....Installing Lock-Strip Gaskets and Infill  
Glazing Materials
  - C794-10.....Adhesion-in-Peel of Elastomeric Joint Sealants

C864-05(R2011).....Dense Elastomeric Compression Seal Gaskets,  
Setting Blocks, and Spacers

C920-14a.....Elastomeric Joint Sealants

C964-07(R2012).....Standard Guide for Lock-Strip Gasket Glazing

C1036-11(R2012).....Flat Glass

C1048-12.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated  
and Uncoated Glass.

C1172-14.....Laminated Architectural Flat Glass

C1349-10.....Standard Specification for Architectural Flat  
Glass Clad Polycarbonate

C1376-10.....Pyrolytic and Vacuum Deposition Coatings on  
Flat Glass

D635-10.....Rate of Burning and/or Extent and Time of  
Burning of Self-Supporting Plastic in a  
Horizontal Position

D4802-10.....Poly (Methyl Methacrylate) Acrylic Plastic  
Sheet

E84-14.....Surface Burning Characteristics of Building  
Materials

E119-14.....Standard Test Methods for Fire Test of Building  
Construction and Material

E1300-12a.....Load Resistance of Glass in Buildings

E1886-13a.....Standard Test Method for Performance of  
Exterior Windows, Curtain Walls, Doors, and  
Impact Protective Systems Impacted by  
Missile(s) and Exposed to Cyclic Pressure  
Differentials

E1996-14a.....Standard Specification for Performance of  
Exterior Windows, Curtain Walls, Doors, and  
Impact Protective Systems Impacted by Windborne  
Debris in Hurricanes

E2141-12.....Test Methods for Assessing the Durability of  
Absorptive Electrochromic Coatings on Sealed  
Insulating Glass Units

E2190-10.....Insulating Glass Unit

E2240-06.....Test Method for Assessing the Current-Voltage  
Cycling Stability at 90 Degree C (194 Degree F)

- of Absorptive Electrochromic Coatings on Sealed  
Insulating Glass Units
- E2241-06.....Test Method for Assessing the Current-Voltage  
Cycling Stability at Room Temperature of  
Absorptive Electrochromic Coatings on Sealed  
Insulating Glass Units
- E2354-10.....Assessing the Durability of Absorptive  
Electrochromic Coatings within Sealed  
Insulating Glass Units
- E2355-10.....Test Method for Measuring the Visible Light  
Transmission Uniformity of an Absorptive  
Electrochromic Coating on a Glazing Surface
- F1233-08.....Standard Test Method for Security Glazing  
Materials and Systems
- F1642-12.....Test Method for Glazing and Glazing Systems  
Subject to Airblast Loadings
- F. Code of Federal Regulations (CFR):
- 16 CFR 1201-10.....Safety Standard for Architectural Glazing  
Materials
- G. Glass Association of North America (GANA):
- 2010 Edition.....GANA Glazing Manual
- 2008 Edition.....GANA Sealant Manual
- 2009 Edition.....GANA Laminated Glazing Reference Manual
- 2010 Edition.....GANA Protective Glazing Reference Manual
- H. International Code Council (ICC):
- IBC.....International Building Code
- I. Insulating Glass Certification Council (IGCC)
- J. Insulating Glass Manufacturer Alliance (IGMA):
- TB-3001-13.....Guidelines for Sloped Glazing
- TM-3000.....North American Glazing Guidelines for Sealed  
Insulating Glass Units for Commercial and  
Residential Use
- K. Intertek Testing Services - Warnock Hersey (ITS-WHI)
- L. National Fire Protection Association (NFPA):
- 80-16.....Fire Doors and Windows
- 252-12.....Fire Tests of Door Assemblies
- 257-12.....Standard on Fire Test for Window and Glass  
Block Assemblies

- M. National Fenestration Rating Council (NFRC)
- N. Safety Glazing Certification Council (SGCC) 2012:  
Certified Products Directory (Issued Semi-Annually).
- O. Underwriters Laboratories, Inc. (UL):  
9-08(R2009).....Fire Tests of Window Assemblies  
263-14.....Fire Tests of Building Construction and  
Materials  
752-11.....Bullet-Resisting Equipment.
- P. Unified Facilities Criteria (UFC):  
4-010-01-03(R2007).....DOD Minimum Antiterrorism Standards for  
Buildings
- Q. U.S. Veterans Administration:  
Physical Security Design Manual for VA Facilities (VAPSDG); Life Safety  
Protected  
Physical Security Design Manual for VA Facilities (VAPSDG); Mission  
Critical Facilities  
Architectural Design Manual for VA Facilities (VASDM)
- R. Environmental Protection Agency (EPA):  
40 CFR 59(2014).....National Volatile Organic Compound Emission  
Standards for Consumer and Commercial Products

## **PART 2 - PRODUCT**

### **2.1 GLASS:**

- A. Use thickness stated.
- B. Clear Glass:
  - 1. ASTM C1036, Type I, Class 1, Quality q3.
  - 2. Thickness, 6 mm (1/4 inch).
- C. Tinted Heat reflective and low emissivity coated glass:
  - 1. ASTM C1036, Type I, Class 2, Quality q3.
  - 2. Color: Crystal (light) Gray
  - 3. Thickness, 6 mm (1/4 inch).
- D. Patterned Glass:
  - 1. ASTM C1036, Type II, Class 1, Pattern P1 is P62.

### **2.2 HEAT-TREATED GLASS:**

- A. Clear Heat Strengthened Glass:
  - 1. ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3.
  - 2. Thickness, 6 mm (1/4 inch).
- B. Tinted Heat Strengthened Glass:
  - 1. ASTM C1048, Kind HS, Condition A, Type I, Class 2, Quality q3.

2. Color: crystal (light) gray

3. Thickness, 6 mm (1/4 inch).

C. Clear Tempered Glass:

1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.

2. Thickness, 6 mm (1/4 inch).

D. Tinted Tempered Glass.

1. ASTM C1048, Kind FT, Condition A, Type I, Class 2, Quality q3.

2. Color: crystal (light) gray.

3. Thickness, 6 mm (1/4 inch).

**2.3 COATED GLASS:**

A. Low-E Tempered Glass:

1. ASTM C1048, Kind FT, Condition C, Type I, Class 1, Quality q3 with low emissivity pyrolytic coating having an E of 0.15.

2. Apply coating to second surface of insulating glass units.

3. Thickness, 4.8 mm (3/16 inch).

**2.4 GLASS FOR ALUMINUM WINDOWS:**

A. Provide factory fabricated glass consisting of two panes of glass installed in aluminum window sash.

B. Glass types specified:

1. Glass for aluminum window sash.

a. Basis of Design - SuperNeutral 68 by Guardian Sunguard.

1) Light Transmittance - 49%

2) Reflectance Out - 8

3) Reflectance In - 11

4) Aluminum Window U-value - See Section 08 5113, Aluminum Windows

5) Shading Coefficient - 0.34

6) Solar Heat Gain Coefficient - 0.30

7) Color - Light Gray

8) Outboard Light - Crystal Gray

9) Inboard Light - Clear

10) Low-E Coating

2. Glass shall be annealed, heat strengthened or tempered as required by codes, or as required to meet thermal stress and wind loads.

3. Glass heat-treated by horizontal (roller hearth) process with inherent roller wave distortion parallel to the bottom edge of the glass as installed when specified.



**2.5 INSULATING GLASS UNITS:**

- A. Provide factory fabricated, hermetically sealed glass unit consisting of two panes of glass separated by a dehydrated air space and comply with ASTM E2190.
- B. Assemble units using glass types specified.

**2.6 GLAZING ACCESSORIES:**

- A. As required to supplement the accessories provided with the items to be glazed and to provide a complete installation. Ferrous metal accessories exposed in the finished work are to have a finish that will not corrode or stain while in service. Fire rated glazing to be installed with glazing accessories in accordance with the manufacturer's installation instructions.
- B. Setting Blocks: ASTM C864:
  - 1. Silicone type.
  - 2. Channel shape; having 6 mm (1/4 inch) internal depth.
  - 3. Shore A hardness of 80 to 90 Durometer.
  - 4. Block lengths: 50 mm (2 inches) except 100 to 150 mm (4 to 6 inches) for insulating glass.
  - 5. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
  - 6. Block thickness: Minimum 4.8 mm (3/16 inch). Thickness sized for rabbet depth as required.
- C. Spacers: ASTM C864:
  - 1. Channel shape having a 6 mm (1/4 inch) internal depth.
  - 2. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
  - 3. Lengths: 25 to 76 mm (1 to 3 inches).
  - 4. Shore A hardness of 40 to 50 Durometer.
- D. Glazing Tapes:
  - 1. Semi-solid polymeric based closed cell material exhibiting pressure-sensitive adhesion and withstanding exposure to sunlight, moisture, heat, cold, and aging.
  - 2. Shape, size and degree of softness and strength suitable for use in glazing application to prevent water infiltration.
  - 3. Complying with AAMA 800 for the following types:
    - a. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.

- b. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.
- E. Spring Steel Spacer: Galvanized steel wire or strip designed to position glazing in channel or rabbeted sash with stops.
- F. Glazing Gaskets: ASTM C864:
  - 1. Firm dense wedge shape for locking in sash.
  - 2. Soft, closed cell with locking key for sash key.
  - 3. Flanges may terminate above the glazing-beads or terminate flush with top of beads.
- G. Neoprene, EPDM, or Vinyl Glazing Gasket: ASTM C864.
  - 1. Channel shape; flanges may terminate above the glazing channel or flush with the top of the channel.
  - 2. Designed for dry glazing.
- H. Color: White
  - 1. Color of glazing compounds, gaskets, and sealants used for aluminum color frames to match color of the finished aluminum and be nonstaining.
  - 2. Color of other glazing compounds, gaskets, and sealants which will be exposed in the finished work and unpainted are to bewhite.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION:**

- A. Verification of Conditions:
  - 1. Examine openings for glass and glazing units; determine they are proper size; plumb; square; and level before installation is started.
  - 2. Verify that glazing openings conform with details, dimensions and tolerances indicated on manufacturer is approved shop drawings.
- B. Review for conditions which may adversely affect glass and glazing unit installation, prior to commencement of installation. Do not proceed with installation until unsatisfactory conditions have been corrected.
- C. Verify that wash down of adjacent masonry is completed prior to erection of glass and glazing units.

#### **3.2 PREPARATION:**

- A. For sealant glazing, prepare glazing surfaces in accordance with GANA Sealant Manual.
- B. Determine glazing unit size and edge clearances by measuring the actual unit to receive the glazing.

- C. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.
- D. Verify that components used are compatible.
- E. Clean and dry glazing surfaces.
- F. Prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.

### **3.3 INSTALLATION - GENERAL:**

- A. Install in accordance with GANA Glazing Manual, GANA Sealant Manual, IGMA TB-3001, and IGMA TM-3000 unless specified otherwise.
- B. Glaze in accordance with recommendations of glazing and framing manufacturers, and as required to meet the Performance Test Requirements specified in other applicable sections of specifications.
- C. Set glazing without bending, twisting, or forcing of units.
- D. Do not allow glass to rest on or contact any framing member.
- E. Glaze doors and operable sash, in a securely fixed or closed and locked position, until sealant, glazing compound, or putty has thoroughly set.
- F. Patterned Glass:
  - 1. Install units with one patterned surface with smooth surface on the weather side.
  - 2. Install units in interior partitions with pattern in same direction in all openings.
- G. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed.
- H. Insulating Glass Units:
  - 1. Glaze in compliance with glass manufacturer's written instructions.
  - 2. When glazing gaskets are used, they are to be of sufficient size and depth to cover glass seal or metal channel frame completely.
  - 3. Do not use putty or glazing compounds.
  - 4. Do not grind, nip, cut, or otherwise alter edges and corners of fused glass units after shipping from factory.
  - 5. Install with tape or gunnable sealant in wood sash.
- I. Bullet Resisting Material:
  - 1. Glaze as recommended by manufacturer, using glazing material which will permit expansion and contraction of the bullet resistive material in the frame.
  - 2. The polycarbonate surface is not to be cleaned by scraping, razor blade, squeegee, or use of highly alkaline cleaner.

3. At no time is polycarbonate material be exposed to chemical solvents (benzene, gasoline, acetone, paint thinners) or aromatic hydrocarbons (toluene or xylene), nor should any of these solvents or fumes be used or present in confined area such as a security guard booth.
4. Due care is to be exercised (paint formula, ventilation, protection of polycarbonate) when painting becomes necessary to interiors of rooms of hardline glazed units; exposure to chemical solvents could result in irreparable damage to security glazings (delaminations, distortions, cracks, severe stress crazing, air bubbles, etc.).

#### **3.4 REPLACEMENT AND CLEANING:**

- A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by COR.
- B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.
- C. Leave glass, putty, and other setting material in clean, whole, and acceptable condition.

#### **3.5 PROTECTION:**

- A. Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

- - - E N D - - -

**SECTION 08 80 00.1**  
**METAL WINDOW PANELS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. The Panels required are as manufactured by Mapes Architectural Panels, LLC, Lincoln, NE. Panels consist of metal skins laminated to stabilizer substrates with an insulating core material. Panels are designed to be glazed into a window system or curtain wall system.
- B. Related Work:
  - 1. Section 06100 - Back Up Walls
  - 2. Section 07200 - Insulation
  - 3. Section 07920 - Caulking

**1.2 QUALITY ASSURANCE:**

- A. Panel manufacturer shall have a minimum of 25 years experience.
- B. Field measurements shall be taken prior to completion of manufacturing and cutting.
- C. Maximum deviation from vertical and horizontal alignment of installed panels is 1/8" (3mm) in 20' (6m) non-commutative.

**1.3 REFERENCES:**

- A. American Society of Testing Materials (ASTM)
  - 1. E330-84: Structural Performance of Exterior Windows, Curtain Walls and Doors under the influence of wind loads.
  - 2. D1781-76: Climbing Drum Peel Test for Adhesives.
  - 3. D3363-74: Method for Film Hardness by Pencil Test.
  - 4. D2794-90: Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
  - 5. D3359-90: Method for Measuring Adhesion by the tape test.

**1.4 SUBSTITUTIONS:**

- A. The materials and products specified in this section establish a minimum standard of required function, design, appearance quality and warranty to be met by any proposed substitution.
- B. No substitutions will be considered unless a written request for approval has been submitted by the bidder and received by the architect 10 days prior to the bid date.

**1.5 SUBMITTALS:**

- A. Submittals shall be in conformance with section 088000.1. Included section number of Division and refer to CSI Division I, Section 1340 - Shop Drawings, Product Data and Samples.
- B. Samples:
  - 1. Panel makeup - 2 samples - 10"x10"
  - 2. Two samples of each color and finish texture - 3"x5"
- C. Submission Drawings: Indicate thickness, dimension and components of parts. Detail glazing methods, framing and tolerances to accommodate thermal movement.
- D. Affidavit certifying materials meet all requirements as specified.
- E. 2 copies of manufacturers standard literature for specified material.

**1.6 DELIVERY, STORAGE AND HANDLING:**

- A. Protect finish and edge in accordance with panel manufacturer's recommendations.
- B. Store materials in accordance with panel manufacturer's recommendations.

**PART 2 - PRODUCTS**

**2.1 PANELS - LAMINATED:**

- A. Basis of Design: Laminated metal faced Mapes-R panels as manufactured by Mapes Industries, Inc.
- B. Acceptable alternatives: Panels having similar composite construction and finish providing manufacturer has a minimum of 25 years panel laminating experience and comparable published warranties. Must be approved by the A/E and VA COR.

**2.2 FINISH:**

- A. Finishes
- B. Exterior: Custom Kynar
- C. Interior: Custom Kynar
- D. Color as selected by COR.

**2.3 PANEL FABRICATION:**

- A. Exterior Substrate: Cement Board
- B. Core: Isocyanurate
- C. Interior Substrate: Cement Board
- D. Tolerances - .8% of panels dimension length and width - (+/-) 1/16" thickness
- E. Panel Thickness - 1"
- F. R-Value - 5.88
- G. U-Value - 0.17

**2.4 ACCESSORIES:**

- A. Recommended for use as an infill panel component in window and curtain wall systems. Related material to complete installation as recommended by the manufacturer.
- B. Seals against moisture intrusion as recommended by the manufacturer. Polyurethane and silicone based sealant with a 20 year life are recommended.

**PART 3 - EXECUTION**

**3.1 INSTALLATION:**

- A. Panel surfaces shall be free from defects prior to installation.
- B. All panels to be factory installed.
- C. Alterations to panels on site to follow manufacturer's instructions.

**3.2 EXECUTION:**

- A. Erect panels plumb, level and true.
- B. Glaze panels securely and in accordance with approved shop drawings and manufacturer's instructions to allow for necessary thermal movement and structural support.
- C. Do not install panels that are observed to be defective including warped, bowed, dented, scratched and delaminating components.
- D. Weatherseal all joints as required using methods and materials as previously specified.
- E. Separate dissimilar metals using gasketed fasteners and blocking to eliminate the possibility of electrolytic reaction.
- F. All penetrations to the panel made on site to be cut using a carbide-tip blade. Follow all manufacturer's instructions in execution.

**3.3 ADJUSTING AND CLEANING:**

- A. Remove masking film as soon as possible after installation. Masking intentionally left in place after panel installation will be the responsibility of the contractor.
- B. Weep holes and drainage channels must be unobstructed and free from dirt and sealant.

- - - E N D - - -

**SECTION 09 06 00**  
**SCHEDULE FOR FINISHES**

**SECTION 09 06 00-SCHEDULE FOR FINISHES**

VAMC: Battle Creek VA Medical Center

Location: Battle Creek, MI

Project no. and Name: 515-14-103 Replace Windows in Various Locations

Submission CD Phase

Date: 11-27-2017



**SECTION 09 06 00  
SCHEDULE FOR FINISHES**

**PART I - GENERAL**

**1.1 DESCRIPTION**

This section contains a coordinated system in which requirements for materials specified in other sections shown are identified by abbreviated material names and finish codes in the room finish schedule or shown for other locations.

**1.2 MANUFACTURERS**

Manufacturer's trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Products of other manufacturer's equivalent to colors, finishes, textures and patterns of manufacturers listed that meet requirements of technical specifications will be acceptable upon approval in writing by contracting officer for finish requirements.

**1.3 SUBMITTALS**

Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES—provide quadruplicate samples for color approval of materials and finishes specified in this section.

**1.4 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.
- B. MASTER PAINTING INSTITUTE: (MPI)
  - 2001.....Architectural Painting Specification Manual

**PART 2- PRODUCTS****2.1 DIVISION 08 - OPENINGS**

## A. SECTION 08 51 13, ALUMINUM WINDOWS

| Type                      | Finish | Glazing | Manufacturer | Mfg. Color Name/No. |
|---------------------------|--------|---------|--------------|---------------------|
| As specified in drawings. | -      | -       | -            | -                   |

## B. WINDOW SILLS

| Room No. and Name                 | Material                  | Finish |
|-----------------------------------|---------------------------|--------|
| All areas called out in drawings. | As specified in drawings. | -      |

## C. WINDOW STOOLS

| Room No. and Name                 | Material                         | Finish   |
|-----------------------------------|----------------------------------|--|
| All areas called out in drawings. | Solid Surface (SS-1), 1/2" Thick | Selected by VA from the Manufacturer's full range of colors and patterns, including premium products |

**2.2 DIVISION 09 - FINISHES**

## A. SECTION 09 30 13, CERAMIC TILING

## 1. SECTION 09 30 13, CERAMIC / PORCELAIN TILING

| Finish Code | Manufacturer   | Mfg. Color Name/No |
|-------------|----------------|--------------------|
| WT-1        | Match Existing | Match Existing     |

## B. SECTION 09 51 00, ACOUSTICAL CEILINGS

| Finish Code | Component                        | Color Pattern  | Manufacturer   | Mfg Name/No.   |
|-------------|----------------------------------|----------------|----------------|----------------|
| ACT-1       | Acoustical Ceiling Tile and Grid | Match Existing | Match Existing | Match Existing |

## C. SECTION 09 91 00, PAINT AND COATINGS

## 1. MPI Gloss and Sheen Standards

|               |   | Gloss @60          | Sheen @85     |
|---------------|---|--------------------|---------------|
| Gloss Level 1 | a traditional matte finish-flat               | max 5 units, and   | max 10 units  |
| Gloss Level 2 | a high side sheen flat-"a velvet-like" finish | max 10 units, and  | 10-35 units   |
| Gloss Level 3 | a traditional "egg-shell like" finish         | 10-25 units, and   | 10-35 units   |
| Gloss Level 4 | a "satin-like" finish                         | 20-35 units, and   | min. 35 units |
| Gloss Level 5 | a traditional semi-gloss                      | 35-70 units        |               |
| Gloss Level 6 | a traditional gloss                           | 70-85 units        |               |
| Gloss level 7 | a high gloss                                  | more than 85 units |               |

| 2. Paint code | Gloss          | Manufacturer   | Mfg. Color Name/No. |
|---------------|----------------|----------------|---------------------|
| PT-1          | Match Existing | Match Existing | Match Existing      |
| PT-2          | Match Existing | Match Existing | Match Existing      |
| PT-3          | Match Existing | Match Existing | Match Existing      |

## D. SECTION 09 72 16, VINYL COATED FABRIC WALLCOVERING (WC)

| Finish Code | Manufacturer   | Mfg. Color Name/No. |
|-------------|----------------|---------------------|
| WC-1        | Match Existing | Match Existing      |

## 2.3 DIVISION II - EQUIPMENT

## E. SECTION 08 11 61 / 08 56 66, DETENTION AND PROTECTION SCREENS

| Type   | Material            | Finish Color        |
|--------|---------------------|---------------------|
| Type A | Coordinate with COR | Coordinate with COR |

**2.4 DIVISION 12- FURNISHINGS****A. SECTION 12 24 00, WINDOW SHADES**

| Component       | Material    | Manufacturer | Mfg. Color Name/No.   |
|-----------------|-------------|--------------|---|
| Venetian Blinds | 1" Aluminum | -            | Color to be selected by VA from manufacturer's range of standard color options. |

**PART III EXECUTION****3.1 FINISH SCHEDULES & MISCELLANEOUS ABBREVIATIONS**

| FINISH SCHEDULE & MISCELLANEOUS ABBREVIATIONS |              |
|---|--------------|
| Term  | Abbreviation |
| Access Flooring                               | AF           |
| Accordion Folding Partition                   | AFP          |
| Acoustical Ceiling                            | ACT          |
| Acoustical Ceiling, Special Faced             | AT (SP)      |
| Acoustical Metal Pan Ceiling                  | AMP          |
| Acoustical Wall Panel                         | AWP          |
| Acoustical Wall Treatment                     | AWT          |
| Acoustical Wallcovering                       | AWF          |
| Anodized Aluminum Colored                     | AAC          |
| Anodized Aluminum Natural Finish              | AA           |
| Baked On Enamel                               | BE           |
| Brick Face                                    | BR           |
| Brick Flooring                                | BF           |
| Brick Paving                                  | BP           |

|                             |        |
|-----------------------------|--------|
| Carpet                      | CP     |
| Carpet Athletic Flooring    | CAF    |
| Carpet Module Tile          | CPT    |
| Ceramic Glazed Facing Brick | CGFB   |
| Ceramic Mosaic Tile         | FTCT   |
| Concrete                    | C      |
| Concrete Masonry Unit       | CMU    |
| Divider Strips Marble       | DS MB  |
| Epoxy Coating               | EC     |
| Epoxy Resin Flooring        | ERF    |
| Existing                    | E      |
| Exposed Divider Strips      | EXP    |
| Exterior                    | EXT    |
| Exterior Finish System      | EFS    |
| Exterior Paint              | EXT-P  |
| Exterior Stain              | EXT-ST |
| Fabric Wallcovering         | WF     |
| Facing Tile                 | SCT    |
| Feature Strips              | FS     |
| Floor Mats & Frames         | FM     |
| Floor Tile, Mosaic          | FT     |
| Fluorocarbon                | FC     |
| Folding Panel Partition     | FP     |
| Foot Grille                 | FG     |

|  |      |
|--|------|
| Glass Masonry Unit                       | GUMU |
| Glazed Face CMU                          | GCMU |
| Glazed Structural Facing Tile            | SFTU |
| Granite                                  | GT   |
| Gypsum Wallboard                         | GWB  |
| High Glazed Coating                      | SC   |
| Latex Mastic Flooring                    | LM   |
| Linear Metal Ceiling                     | LMC  |
| Linear Wood Ceiling                      | LWC  |
| Marble                                   | MB   |
| Material                                 | MAT  |
| Mortar                                   | M    |
| Multi-Color Coating                      | MC   |
| Natural Finish                           | NF   |
| Paint                                    | PT   |
| Paver Tile                               | PVT  |
| Perforated Metal Facing (Tile or Panels) | PMF  |
| Plaster                                  | PL   |
| Plaster High Strength                    | HSPL |
| Plaster Keene Cement                     | KC   |
| Plastic Laminate                         | HPDL |
| Polypropylene Fabric Wallcovering        | PFW  |
| Porcelain Paver Tile                     | PPT  |
| Quarry Tile                              | QT   |
| Radiant Ceiling Panel System             | RCP  |
| Resilient Stair Tread                    | RST  |

|                                     |     |
|-------------------------------------|-----|
| Rubber Base                         | RB  |
| Rubber Tile Flooring                | RT  |
| Spandrel Glass                      | SLG |
| Stain                               | ST  |
| Stone Flooring                      | SF  |
| Structural Clay                     | SC  |
| Suspension Decorative Grids         | SDG |
| Terrazzo Portland Cement            | PCT |
| Terrazzo Tile                       | TT  |
| Terrazzo, Thin Set                  |     |
| Textured Gypsum Ceiling Panel       | TGC |
| Textured Metal Ceiling Panel        | TMC |
| Thin set Terrazzo                   | TST |
| Veneer Plaster                      | VP  |
| Vinyl Base                          | VB  |
| Vinyl Coated Fabric Wallcovering    | WC  |
| Vinyl Composition Tile              | VCT |
| Vinyl Sheet Flooring                | VSF |
| Vinyl Sheet Flooring (Welded Seams) | WSF |
| Wall Border                         | WB  |
| Wood                                | WD  |

### 3.2 FINISH SCHEDULE SYMBOLS

#### Symbol Definition

\*\* Same finish as adjoining walls  
 - No color required  
 E Existing  
 XX To match existing  
 EFTR Existing finish to remain

RM      Remove

**3.3 ROOM FINISH SCHEDULE (SEE CONSTRUCTION DOCUMENTS)**

A. Match adjoining or existing similar surfaces colors, textures or patterns where disturbed or damaged by alterations or new work when not scheduled.

**--- E N D---**

**SECTION 09 22 16**  
**NON-STRUCTURAL METAL FRAMING**

**PART 1 - GENERAL****1.1 DESCRIPTION**

This section specifies steel studs wall systems, shaft wall systems, ceiling or soffit suspended or furred framing, wall furring, fasteners, and accessories for the screw attachment of gypsum board, plaster bases or other building boards.

**1.2 RELATED WORK**

- A. Ceiling suspension systems for acoustical tile or panels and lay in gypsum board panels: Section 09 51 00, ACOUSTICAL CEILINGS Section 09 29 00, GYPSUM BOARD.

**1.3 TERMINOLOGY**

- A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.
- B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, or bar joists. In interstitial spaces with walk-on floors the underside of the walk-on floor is the underside of structure overhead.
- C. Thickness of steel specified is the minimum bare (uncoated) steel thickness.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
1. Studs, runners and accessories.
  2. Hanger inserts.
  3. Channels (Rolled steel).
  4. Furring channels.
  5. Screws, clips and other fasteners.
- C. Shop Drawings:
1. Typical ceiling suspension system.
  2. Typical metal stud and furring construction system including details around openings and corner details.
  3. Typical shaft wall assembly

4. Typical fire rated assembly and column fireproofing showing details of construction same as that used in fire rating test.

D. Test Results: Fire rating test designation, each fire rating required for each assembly.

#### **1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE**

In accordance with the requirements of ASTM C754.

#### **1.6 APPLICABLE PUBLICATIONS**

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

B. American Society For Testing And Materials (ASTM)

A641-09.....Zinc-Coated (Galvanized) Carbon Steel Wire

A653/653M-11.....Specification for Steel Sheet, Zinc Coated  
(Galvanized) or Zinc-Iron Alloy-Coated  
(Galvannealed) by Hot-Dip Process.

C11-10.....Terminology Relating to Gypsum and Related  
Building Materials and Systems

C635-07.....Manufacture, Performance, and Testing of Metal  
Suspension System for Acoustical Tile and  
Lay-in Panel Ceilings

C636-08.....Installation of Metal Ceiling Suspension  
Systems for Acoustical Tile and Lay-in Panels

C645-09.....Non-Structural Steel Framing Members

C754-11.....Installation of Steel Framing Members to  
Receive Screw-Attached Gypsum Panel Products

C841-03 (R2008).....Installation of Interior Lathing and Furring

C954-10.....Steel Drill Screws for the Application of  
Gypsum Panel Products or Metal Plaster Bases to  
Steel Studs from 0.033 in. (0.84 mm) to 0.112  
in. (2.84 mm) in Thickness

E580-11.....Application of Ceiling Suspension Systems for  
Acoustical Tile and Lay-in Panels in Areas  
Requiring Moderate Seismic Restraint.

#### **PART 2 - PRODUCTS**



**2.1 PROTECTIVE COATING**

Galvanize steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G40 or equivalent.

**2.2 STEEL STUDS AND RUNNERS (TRACK)**

- A. ASTM C645, modified for thickness specified and sizes as shown.
  - 1. Use C 645 steel, 0.75 mm (0.0296-inch) minimum base-metal (30 mil).
  - 2. Runners same thickness as studs.
  - 3. Exception: Members that can show certified third party testing with gypsum board in accordance with ICC ES AC86 (Approved May 2012) need not meet the minimum thickness limitation or minimum section properties set forth in ASTM C 645. The submission of an evaluation report is acceptable to show conformance to this requirement. Use C 645 steel, 0.48mm (0.019 inch) minimum base-metal (19 mil).
- B. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24-inch) centers.
- C. Doubled studs for openings and studs for supporting concrete backer-board.
- D. Studs 3600 mm (12 feet) or less in length shall be in one piece.
- E. Shaft Wall Framing:
  - 1. Conform to rated wall construction.
  - 2. C-H Studs or C-T Studs.
  - 3. E Studs.
  - 4. J Runners.
  - 5. Steel Jamb-Strut.

**2.3 FURRING CHANNELS**

- A. Rigid furring channels (hat shape): ASTM C645.
- B. Resilient furring channels:
  - 1. Not less than 0.45 mm (0.0179-inch) thick bare metal.
  - 2. Semi-hat shape, only one flange for anchorage with channel web leg slotted on anchorage side, channel web leg on other side stiffens fastener surface but shall not contact anchorage surface other channel leg is attached to.
- C. "Z" Furring Channels:
  - 1. Not less than 0.45 mm (0.0179-inch)-thick base metal, with 32 mm (1-1/4 inch) and 19 mm (3/4-inch) flanges.
  - 2. Web furring depth to suit thickness of insulation.

- D. Rolled Steel Channels: ASTM C754, cold rolled; or, ASTM C841, cold rolled.

#### **2.4 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES**

- A. ASTM C754, except as otherwise specified.
- B. For fire rated construction: Type and size same as used in fire rating test.
- C. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.
- D. Clips: ASTM C841 (paragraph 6.11), manufacturer's standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.
- E. Concrete ceiling hanger inserts (anchorage for hanger wire and hanger straps): Steel, zinc-coated (galvanized), manufacturers standard items, designed to support twice the hanger loads imposed and the type of hanger used.
- F. Tie Wire and Hanger Wire:
  - 1. ASTM A641, soft temper, Class 1 coating.
  - 2. Gage (diameter) as specified in ASTM C754 or ASTM C841.
- G. Attachments for Wall Furring:
  - 1. Manufacturers standard items fabricated from zinc-coated (galvanized) steel sheet.
  - 2. For concrete or masonry walls: Metal slots with adjustable inserts or adjustable wall furring brackets. Spacers may be fabricated from 1 mm (0.0396-inch) thick galvanized steel with corrugated edges.
- H. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

#### **2.5 SUSPENDED CEILING SYSTEM FOR GYPSUM BOARD (OPTION)**

- A. Conform to ASTM C635, heavy duty, with not less than 35 mm (1-3/8 inch) wide knurled capped flange face designed for screw attachment of gypsum board.
- B. Wall track channel with 35 mm (1-3/8 inch) wide flange.

### **PART 3 - EXECUTION**

### 3.1 INSTALLATION CRITERIA

- A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.
- B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

### 3.2 INSTALLING STUDS

- A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.
- B. Space studs not more than 610 mm (24 inches) on center.
- C. Cut studs 6 mm to 9 mm (1/4 to 3/8-inch) less than floor to underside of structure overhead when extended to underside of structure overhead.
- D. Where studs are shown to terminate above suspended ceilings, provide bracing as shown or extend studs to underside of structure overhead.
- E. Extend studs to underside of structure overhead for fire rated partitions, smoke partitions, shafts, and sound rated partitions and insulated exterior wall furring.
- F. At existing plaster ceilings and where shown, studs may terminate at ceiling as shown in construction documents.
- G. Openings:
  - 1. Frame jambs of openings in stud partitions and furring with two studs placed back to back or as shown.
  - 2. Fasten back to back studs together with 9 mm (3/8-inch) long Type S pan head screws at not less than 600 mm (two feet) on center, staggered along webs.
  - 3. Studs fastened flange to flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.
- H. Fastening Studs:
  - 1. Fasten studs located adjacent to partition intersections, corners and studs at jambs of openings to flange of runner tracks with two screws through each end of each stud and flange of runner.
  - 2. Do not fasten studs to top runner track when studs extend to underside of structure overhead.
- I. Chase Wall Partitions:

1. Locate cross braces for chase wall partitions to permit the installation of pipes, conduits, carriers and similar items.
  2. Use studs or runners as cross bracing not less than 63 mm (2-1/2 inches wide).
- J. Form building seismic or expansion joints with double studs back to back spaced 75 mm (three inches) apart plus the width of the seismic or expansion joint.
- K. Form control joint, with double studs spaced 13 mm (1/2-inch) apart.

### **3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY**

- A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.
- B. Wall furring-Stud System:
1. Framed with 63 mm (2-1/2 inch) or narrower studs, 600 mm (24 inches) on center.
  2. Brace as specified in ASTM C754 for Wall Furring-Stud System or brace with sections or runners or studs placed horizontally at not less than three foot vertical intervals on side without finish.
  3. Securely fasten braces to each stud with two Type S pan head screws at each bearing.
- C. Direct attachment to masonry or concrete; rigid channels or "Z" channels:
1. Install rigid (hat section) furring channels at 600 mm (24 inches) on center, horizontally or vertically.
  2. Install "Z" furring channels vertically spaced not more than 600 mm (24 inches) on center.
  3. At corners where rigid furring channels are positioned horizontally, provide mitered joints in furring channels.
  4. Ends of spliced furring channels shall be nested not less than 200 mm (8 inches).
  5. Fasten furring channels to walls with power-actuated drive pins or hardened steel concrete nails. Where channels are spliced, provide two fasteners in each flange.
  6. Locate furring channels at interior and exterior corners in accordance with wall finish material manufacturers printed erection instructions. Locate "Z" channels within 100 mm (4 inches) of corner.
- D. Installing Wall Furring-Bracket System: Space furring channels not more than 400 mm (16 inches) on center.

**3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES**

- A. Provide for attachment and support of electrical outlets, plumbing, laboratory or heating fixtures, recessed type plumbing fixture accessories, access panel frames, wall bumpers, wood seats, toilet stall partitions, dressing booth partitions, urinal screens, chalkboards, tackboards, wall-hung casework, handrail brackets, recessed fire extinguisher cabinets and other items like auto door buttons and auto door operators supported by stud construction.
- B. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, securely fastened to metal studs.

**3.5 INSTALLING FURRED AND SUSPENDED CEILINGS OR SOFFITS**

- A. Install furred and suspended ceilings or soffits in accordance with ASTM C754 or ASTM C841 except as otherwise specified or shown for screw attached gypsum board ceilings and for plaster ceilings or soffits.
  - 1. Space framing at 400 mm (16-inch) centers for metal lath anchorage.
  - 2. Space framing at 600 mm (24-inch) centers for gypsum board anchorage.
- B. Where bar joists or beams are more than 1200 mm (48 inches) apart, provide intermediate hangers so that spacing between supports does not exceed 1200 mm (48 inches). Use clips, bolts, or wire ties for direct attachment to steel framing.
- C. Existing concrete construction exposed or concrete on steel decking:
  - 1. Use power actuated fasteners either eye pin, threaded studs or drive pins for type of hanger attachment required.
  - 2. Install fasteners at approximate mid height of concrete beams or joists. Do not install in bottom of beams or joists.
- D. Steel decking without concrete topping:
  - 1. Do not fasten to steel decking 0.76 mm (0.0299-inch) or thinner.
  - 2. Toggle bolt to decking 0.9 mm (0.0359-inch) or thicker only where anchorage to steel framing is not possible.
- E. Installing suspended ceiling system for gypsum board (ASTM C635 Option):
  - 1. Install only for ceilings to receive screw attached gypsum board.
  - 2. Install in accordance with ASTM C636.
    - a. Install main runners spaced 1200 mm (48 inches) on center.
    - b. Install 1200 mm (four foot) tees not over 600 mm (24 inches) on center; locate for edge support of gypsum board.
    - c. Install wall track channel at perimeter.

**F. Installing Ceiling Bracing System:**

1. Construct bracing of 38 mm (1-1/2 inch) channels for lengths up to 2400 mm (8 feet) and 50 mm (2 inch) channels for lengths over 2400 mm (8 feet) with ends bent to form surfaces for anchorage to carrying channels and over head construction. Lap channels not less than 600 mm (2 feet) at midpoint back to back. Screw or bolt lap together with two fasteners.
2. Install bracing at an approximate 45 degree angle to carrying channels and structure overhead; secure as specified to structure overhead with two fasteners and to carrying channels with two fasteners or wire ties.
3. Brace suspended ceiling or soffit framing in seismic areas in accordance with ASTM E580.

**3.6 TOLERANCES**

- A. Fastening surface for application of subsequent materials shall not vary more than 3 mm (1/8-inch) from the layout line.
- B. Plumb and align vertical members within 3 mm (1/8-inch.)
- C. Level or align ceilings within 3 mm (1/8-inch.)

- - - E N D - - -

**SECTION 09 23 00  
GYPSUM PLASTERING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies metal and gypsum lathing and gypsum plaster.

**1.2 RELATED WORK:**

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Steel framing members for attachment of plaster bases:
1. Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- C. Room finish schedule: Section 09 06 00, SCHEDULE FOR FINISHES.
- D. Cement plaster: Section 09 24 00, PORTLAND CEMENT PLASTERING.

**1.3 TERMINOLOGY:**

- A. Definitions and description of terms to be in accordance with ASTM C11, ASTM C841, and ASTM C842 and as specified.
- B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead is the underside of the floor or roof construction supported by beams, trusses, and bar joists.
- C. Self-furring Lath: Metal plastering bases having dimples or crimps designed to hold the back plane of the lath 6 to 10 mm (1/4 to 3/8 inch) away from the plane of the solid backing.
- D. Solid Backing or Solid Bases: Concrete, masonry, sheathing, rigid insulation, and similar materials to which plaster is directly applied.
- E. Wet Areas: Areas of a building where cyclic or continuous exposure to very humid or wet conditions, or in which a dew point condition may occur in the plaster.

**1.4 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
1. Details of floating interior angle unrestrained construction.
  2. Details of assembly and anchorage of lath and accessories.
- C. Manufacturers' Literature and Data:
1. Accessories for plaster, each type.
  2. Metal plaster bases, each type.

3. Fasteners.
4. Bonding compounds, including application instructions.
5. Admixtures, including mixing and application instructions.

D. Manufacturers certificates:

1. Gypsum plaster.

E. Installer qualifications.

**1.5 DELIVERY, STORAGE, AND PROTECTION:**

- A. Deliver manufactured materials in the manufacturers' original unbroken packages or containers which are labeled plainly with the manufacturers' names and brands. Keep cementitious materials dry and stored off the ground, under cover, and away from sweating walls and other damp surfaces until ready for use.

**1.6 PROJECT CONDITIONS:**

- A. Comply with ASTM C842 requirements.
- B. Maintain work areas at not less than 13 degrees C (55 degrees F) or greater than 27 degrees C (80 degrees F) for not less than one (1) week prior to application of plaster, continuously during application of plaster, and one (1) week after plaster has set or until plaster has dried.

**1.7 QUALITY ASSURANCE:**

- A. Installers qualifications: Work to be performed by installer having a minimum of three (3) years' experience for work relating to this Section.

**1.8 PERFORMANCE REQUIREMENTS:**

- A. Where indicated on construction documents, provide gypsum plaster assemblies identical to those of assemblies tested for fire resistance according to ASTM E119 by a qualified testing agency.
- B. Where indicated on construction documents provide gypsum plaster assemblies identical to those of assemblies tested for STC ratings according to ASTM E90 and classified according to ASTM E413 by a qualified testing agency.

**1.9 APPLICABLE PUBLICATIONS:**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.
- B. ASTM International (ASTM):



- A641/A641M-09a.....Zinc-Coated (Galvanized) Carbon Steel Wire  
 A653/A653M-13 Steel Sheet, Zinc-Coated  
 (Galvanized) or Zinc-Iron Alloy-Coated  
 (Galvannealed) by the Hot-Dip Process
- C11-13.....Terminology Relating to Gypsum and Related  
 Building Materials and Systems.
- C28/C28M-10.....Gypsum Plasters
- C35-01 (R2014).....Inorganic Aggregates For Use in Gypsum Plaster
- C206-03 (R2009).....Finishing Hydrated Lime
- C472-99 (R2014).....Physical Testing of Gypsum, Gypsum Plaster and  
 Gypsum Concrete
- C631-09 (R2014).....Bonding Compounds for Interior Gypsum  
 Plastering
- C841-03 (R2013).....Installation of Interior Lathing and Furring
- C842-05 (R2010).....Application of Interior Gypsum Plaster
- C847-14a.....Metal Lath
- C1002-14.....Steel Self-Piercing Tapping Screws for the  
 Application of Gypsum Panel Products or Metal  
 Plaster Bases to Wood Studs or Steel Studs
- D3678-14.....Rigid Poly (Vinyl Chloride) (PVC)  
 Interior-Profile Extrusions
- E413-10.....Classification for Rating Sound Insulation
- E90-09.....Test Method for Laboratory Measurement of  
 Airborne Sound Transmission Loss of Building  
 Partitions and Elements
- C. Commercial Item Description (CID):
- A-A-55615-95 (R2006).....Shield, Expansion; (Wood Screw and Log Bolt  
 Self-Threading Anchor)

## **PART 2 - PRODUCTS**

### 1.

#### **2.1 PLASTERING BASES (LATH):**

- A. Expanded-Metal Lath: ASTM C847, cold-rolled carbon-steel sheet with  
 ASTM A653/A653M, G60 (Z180), hot-dip galvanized-zinc coating.
1. Paper Backing: Kraft paper factory bonded to back of lath.
  2. Diamond-Mesh Lath:
    - a. Type: Flat.
    - b. Weight: 1.4 kg/sq. m (2.5 lb/sq. yd.).

3. Flat-Rib Lath: Rib depth of not more than 3 mm (1/8 inch),  
1.5 kg/sq. m (2.75 lb/sq. yd.).

B. Gypsum Lath:

1. Sheet; 610 mm x 2438 mm (2 ft. x 8 ft.).
2. 10 mm (3/8 inch) thick.
3. Type "X" for fire rated assemblies.

**2.2 GYPSUM PLASTERS:**

- A. Base Coat: High strength gypsum plaster with a minimum average, dry compressive strength of 19 MPa (2800 psi) according to ASTM C472 for a mix of 45 kg (100 lb.) of plaster and .06 cu. m (2 cu. ft.) of sand.
- B. Finish Coat: High strength gypsum gauging plaster with a minimum average dry compressive strength of 34 MPa (5000 psi) according to ASTM C472.

**2.3 LIME**

- A. ASTM C206, Type S.

**2.4 AGGREGATES:**

- A. Natural sand, except grade aggregates in accordance with ASTM C35, "TABLE 1".
- B. Vermiculite and perlite aggregates are not acceptable, except where required for fire rated assemblies.

**2.5 BONDING COMPOUND (FOR INTERIOR WORK):**

- A. ASTM C631, except water re-emulsifiable compound is prohibited.

**2.6 ACCESSORIES FOR GYPSUM PLASTER:**

- A. General: Coordinate depth of trim and accessories with thicknesses and number of plaster coats required as per ASTM C841.
- B. Cornerite: Fabricated from expanded-metal lath with ASTM A653/A653M, G60 (Z180), hot-dip galvanized-zinc coating.
- C. Striplath: Fabricated from expanded-metal lath with ASTM A653/A653M, G60 (Z180), hot-dip galvanized-zinc coating.
- D. Cornerbeads: Fabricated from zinc-coated (galvanized) steel.
  1. Smallnose cornerbead with expanded flanges; use unless otherwise indicated on construction documents.
  2. Smallnose cornerbead with perforated flanges; use on curved corners.
  3. Smallnose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing unit masonry corners.
  4. Bullnose cornerbead, radius 19 mm (3/4 inch) minimum, with expanded flanges; use at locations indicated on construction documents.

- E. Casing Beads: Fabricated from zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
- F. Control Joints: Fabricated from zinc-coated (galvanized) steel; one-piece type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.

## **2.7 FASTENERS:**

- A. Tie wire, screws, staples, clips, nails, and other fasteners ASTM C841, except as otherwise specified.
- B. Provide fasteners for securing metal plastering bases having heads, or inserted through washers large enough to engage two strands (1 on each side of the washer) of the metal plastering base.
- C. For fire rated construction type and size as used in fire rated test.
- D. Screws: ASTM C1002.
- E. Expansion Shields: CID A-A-55615.

## **PART 3 - EXECUTION**

### **3.1 APPLYING LATH BASES:**

- A. Apply lath base in accordance with ASTM C841, except as otherwise specified or shown.
- B. Provide metal plastering bases where plaster is required on partitions, ceilings and furring.
  - 1. Where plaster is required on solid bases, metal plastering bases are not required, unless shown on the construction documents.
  - 2. Form true surfaces, straight or in moderate curves where shown on construction documents, without sags or buckles and with long dimension of lath at right angles to direction of supports.
  - 3. Shape lathing to within 19 mm (3/4 inch) of finished profiles of irregular surfaces.
  - 4. Terminate lath for ceiling construction at casing bead (Floating Angle Construction) where butting into or penetrated by walls, columns, beams, and similar elements.
- C. Gypsum lath may be used in lieu of expanded metal lath for gypsum plaster only on straight flat surfaces of partitions and walls, and on furring, except for lathing in wet areas and as a base for marble finishes.
- D. Installing Metal Plastering Bases:
  - 1. Select type of expanded metal lath to conform to Table 2 of ASTM C841.

2. Select type of fasteners based upon expanded metal lath type to be installed to conform to Table 1 of ASTM C841.
3. Where metal plastering bases are required over solid backing, provide self-furring, diamond-mesh lath type.
4. Attach self-furring diamond-mesh lath directly to masonry and concrete with hardened nails, power actuated drive pins. Locate fasteners at the dimples or crimps only.
5. Where metal plastering bases are required over steel columns and studless solid plaster partitions supports by L-runners, provide rib lath.
6. Provide rib lath above ceramic tile wainscots where the finish above the wainscot is required to finish flush with the tile face.
7. Do not install continuous plastering bases through expansion and control joints. Terminate plastering base at each side of joint.

### **3.2 SURFACE PREPARATION OF SOLID BASES:**

- A. Prepare in accordance with ASTM C842, except as otherwise specified.
- B. Terminate concrete form ties and other metal projections not less than 3.2 mm (1/8 inch) below the surface of concrete.
- C. Remove projections and fill depressions, holes, cracks and similar voids flush with patching compound compatible with the substrate and plaster, within the tolerance, specified in ASTM C842.
- D. Clean existing concrete surfaces specified to receive plaster to ensure bonding as specified in ASTM C842.
- E. Condition new or existing concrete surfaces specified to receive plaster by applying bonding compound as specified in ASTM C842.
- F. Condition existing, new, masonry surfaces (solid backing) specified to receive plaster by applying metal plastering base as specified in ASTM C842.

### **3.3 INSTALLING PLASTERING ACCESSORIES:**

- A. Install accessories in accordance with ASTM C841, except as follows:
  1. Set plastering accessories plumb, level and true to line, mitered at corners and intersections, and securely attach to supporting surfaces.
  2. Install in one piece, within the limits of the longest commercially available lengths.
  3. Wood plugs are not acceptable anchorage for fasteners.
- B. Corner Beads: Install at external plaster corners.

## C. Strip Lath:

1. Install centered over joints between dissimilar materials, such as clay tile, brick, concrete masonry units, concrete, and expanded metal and gypsum lath. Install where surfaces are required to be plastered and are in contact with each other in same plane, except where expansion joints and casing beads are required.
2. Wire tie, staple, screw, or nail strip lath to base along both edges at not over 152 mm (6 inches) on centers.
3. Reinforce gypsum lath at corners of openings, at internal corners, and at chases and similar breaks in continuity in accordance with ASTM C841.

## D. Casing Beads:

1. Provide at locations where plaster terminates against other materials.
2. Provide where indicated in construction documents.
3. Provide where plaster terminates against trim of steel frames and trim of other materials and equipment, except where trim overlaps plaster.
4. Provide where plaster for new walls or furring (vertical or horizontal) terminates against existing construction.
5. Provide around perimeter of openings for recessed casework and equipment, except where edge is covered by flanges. Locate to conform to dimensions shown on approved shop drawings.
6. Both sides of expansion and control joints, unless shown otherwise.
7. Where ceilings butt into or are penetrated by walls, columns, beams, and similar elements so as to provide floating angle (unrestrained) construction in accordance with ASTM C841.

## E. Cornerites:

1. Provide at interior corners of walls, partitions, and other vertical surfaces to be plastered, except where lath is carried around angle.
2. Fasten only as necessary to retain position during plastering.
3. Omit cornerites at junction of new plastered walls with existing plastered walls.
4. Provide where metal plastering bases are specified not to be carried around internal angles, and at locations where casing beads are specified and shown.

## F. Control Joints:

1. Where control joints are placed parallel to framing members, install joints within 101 mm (4 inches) of framing member.
2. Install control joints only to the edges of abutting sheets of lath so that the lath is not continuous or tied across joint.
3. Extend control joints the full width and height of the wall or length of soffit/ceiling plaster membrane.

#### **3.4 GYPSUM PLASTER APPLICATION:**

- A. Proportion, mix, and apply plaster in accordance with ASTM C842.
- B. Thickness of Plaster: ASTM C842, except as follows:
  1. Where greater thickness is indicated on construction documents.
  2. Where thickness is required to match existing.
  3. On metal plaster base 19 mm (3/4 inch), except where greater thickness is required for fire rated construction.
  4. Apply finish coats to a uniform thickness of approximately 2 mm (1/16 inch) with not more than 3 mm (1/8 inch) thickness at any point.
- C. Cut 2 mm (1/16 inch) deep V-joint in finish coat of plaster adjacent to metal door frames and wherever plaster finishes flush with other materials, except where casing beads are required. Omit 2 mm (1/16 inch) deep V-joint on walls and partitions where plaster is recessed back from face of door frames, or similar conditions.
- D. Plaster to have a smooth-trowel finish unless specified or shown otherwise.
- E. Apply gypsum plaster in three (3) coats except as follows: Gypsum plaster applied to masonry using the two-coat double back method.
- F. Gypsum Plaster Base Coat: Apply base coats with sufficient pressure and ensure plaster is sufficiently plastic to provide a strong bond to bases. Work base coats into screeds at intervals from 1524 to 2438 mm (5 to 8 ft.). Plaster must not be continuous across expansion and control joints occurring in walls, partitions, and ceilings. Finish work level, plumb, square, and true, within a tolerance of 3 mm in 2438 mm (1/8 inch in 8 ft.) without waves, cracks, blisters, pits, crazing, discoloration, projections, or other imperfections. Form plaster work carefully around angles and contours, and well up to screeds. Take special care to prevent sagging and consequent dropping of applications. There must be no visible junction marks in finish coat where one day's work adjoins another.

1. Gypsum Two-Coat Base Coat: Apply the first coat to cover the base with sufficient material and pressure to form a good bond on the wall or ceiling base. Before the first coat has set and without scratching or cracking the surface, apply a second coat (double back) of the same material proportion as the base coat to the screeds. Straighten to a true surface without application of water, and cross rake or scratch to receive the finish coat.
  2. Gypsum Three-Coat Base Coat: Apply scratch coat 5 to 6 mm (3/16 to 1/4 inch) thick to cover the base with sufficient material and pressure to form a good bond on the wall or ceiling base. Rake or scratch the surface and allow to set firm and hard. Apply the brown coat to bring the base coat out to the screeds, compact, and straighten to a true surface without the application of water, and cross rake or scratch to receive the finish coat.
- G. Gypsum Plaster Finish Coats: Moderately moisten or fog spray base coat of plaster that has become dry before finish coat is applied. Accelerate plaster, if necessary, to provide a setting time of not more than four (4) hours from the time the plaster is mixed.
1. Lime-Putty and Gypsum Gauged Finish Coat: Apply lime-putty gypsum finish white coat over the base coat, scratch in thoroughly, lay on well, double back, and fill out to a true, even surface. Allow the finish to dry not more than five (5) minutes, then trowel well with water. Apply maximum pressure in order to compact the finish coat and provide a smooth finish free from blemishes and irregularities. Apply trowel finish coats of gypsum-gauged lime-putty over properly prepared base coats as thin as possible and 2 to 3 mm (1/16 to 1/8 inch) thick for conventional plaster system, except as necessary in spots to level out hollows in base coat.
- H. Concealed Plaster:
1. Where plaster is concealed behind built in cabinets, furnishings, or equipment, apply finish coat.
  2. Where plaster is concealed above ceilings, omit finish coat.
  3. Where plaster is used as a base for adhesive application of tile and similar finishes, omit finish coat.

### 3.5 PATCHING:

- A. After all work except painting is finished, point around trim, frames, and similar items.

- B. Patch damaged plaster to match previously applied plaster in color and texture.
- C. Sanding plaster is prohibited.
- D. Patch, alter and replace existing plaster surfaces as required to complete work.
- E. Patching of Rated Construction: Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with patching plaster. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with same materials used in construction so as to provide fire protection equivalent to the fire rated construction, STC equivalent to the sound rated construction, and construction that will not permit the passage of smoke.

### **3.6 CLEANING AND PROTECTION:**

Remove temporary protection and enclosure of other work after plastering is complete. Remove droppings or splatterings from other surfaces not indicated to be plastered. Leave clean and in a condition to receive paint or other finish.

- - - E N D - - -



**SECTION 09 29 00  
GYPSUM BOARD**

**PART 1 - GENERAL****1.1 DESCRIPTION**

This section specifies installation and finishing of gypsum board.

**1.2 RELATED WORK**

- A. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- B. Sound deadening board: Section 07 21 13, THERMAL INSULATION.
- C. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.
- D. Lay in gypsum board ceiling panels: Section 09 51 00, ACOUSTICAL CEILING.

**1.3 TERMINOLOGY**

- A. Definitions and description of terms shall be in accordance with ASTM C11, C840, and as specified.
- B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by the trusses or bar joists.
- C. "Yoked": Gypsum board cut out for opening with no joint at the opening (along door jamb or above the door).

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Cornerbead and edge trim.
  - 2. Finishing materials.
  - 3. Laminating adhesive.
  - 4. Gypsum board, each type.
- C. Shop Drawings:
  - 1. Typical gypsum board installation, showing corner details, edge trim details and the like.
  - 2. Typical sound rated assembly, showing treatment at perimeter of partitions and penetrations at gypsum board.
  - 3. Typical shaft wall assembly.
  - 4. Typical fire rated assembly and column fireproofing, indicating details of construction same as that used in fire rating test.

## D. Samples:

1. Cornerbead.
2. Edge trim.
3. Control joints.

## E. Test Results:

1. Fire rating test, each fire rating required for each assembly.
2. Sound rating test.

## F. Certificates: Certify that gypsum board types, gypsum backing board types, cementitious backer units, and joint treating materials do not contain asbestos material.

**1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE**

In accordance with the requirements of ASTM C840.

**1.6 ENVIRONMENTAL CONDITIONS**

In accordance with the requirements of ASTM C840.

**1.7 APPLICABLE PUBLICATIONS**

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

## B. American Society for Testing And Materials (ASTM):

|               |  |
|---------------|--|
| C11-08.....   | Terminology Relating to Gypsum and Related Building Materials and Systems  |
| C475-02.....  | Joint Compound and Joint Tape for Finishing Gypsum Board   |
| C840-08.....  | Application and Finishing of Gypsum Board  |
| C919-08.....  | Sealants in Acoustical Applications  |
| C954-07.....  | Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) in thickness |
| C1002-07..... | Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs                    |
| C1047-05..... | Accessories for Gypsum Wallboard and Gypsum Veneer Base  |
| C1177-06..... | Glass Mat Gypsum Substrate for Use as Sheathing  |
| C1658-06..... | Glass Mat Gypsum Panels  |
| C1396-06..... | Gypsum Board   |

E84-08.....Surface Burning Characteristics of Building  
Materials

- C. Underwriters Laboratories Inc. (UL):  
Latest Edition.....Fire Resistance Directory
- D. Inchcape Testing Services (ITS):  
Latest Editions.....Certification Listings

## **PART 2 - PRODUCTS**

### **2.1 GYPSUM BOARD**

- A. Gypsum Board: ASTM C1396, Type X, 16 mm (5/8 inch) thick unless shown otherwise. Shall contain a minimum of 20 percent recycled gypsum.
- B. Coreboard or Shaft Wall Liner Panels.
  - 1. ASTM C1396, Type X.
  - 2. ASTM C1658: Glass Mat Gypsum Panels,
  - 3. Coreboard for shaft walls 300, 400, 600 mm (12, 16, or 24 inches) wide by required lengths 25 mm (one inch) thick with paper faces treated to resist moisture.
- C. Water Resistant Gypsum Backing Board: ASTM C620, Type X, 16 mm (5/8 inch) thick.
- D. Gypsum cores shall contain maximum percentage of post industrial recycled gypsum content available in the area (a minimum of 95 percent post industrial recycled gypsum content). Paper facings shall contain 100 percent post-consumer recycled paper content.

### **2.2 GYPSUM SHEATHING BOARD**

- A. ASTM C1396, Type X, water-resistant core, 16 mm (5/8 inch) thick.
- B. ASTM C1177, Type X.

### **2.3 ACCESSORIES**

- A. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet or rigid PVC plastic.
- B. Flanges not less than 22 mm (7/8 inch) wide with punchouts or deformations as required to provide compound bond.

### **2.4 FASTENERS**

- A. ASTM C1002 and ASTM C840, except as otherwise specified.
- B. ASTM C954, for steel studs thicker than 0.04 mm (0.33 inch).
- C. Select screws of size and type recommended by the manufacturer of the material being fastened.
- D. For fire rated construction, type and size same as used in fire rating test.

- E. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.

## **2.5 FINISHING MATERIALS AND LAMINATING ADHESIVE**

ASTM C475 and ASTM C840. Free of antifreeze, vinyl adhesives, preservatives, biocides and other VOC. Adhesive shall contain a maximum VOC content of 50 g/l.

## **PART 3 - EXECUTION**

### **3.1 GYPSUM BOARD HEIGHTS**

- A. Extend all layers of gypsum board from floor to underside of structure overhead on following partitions and furring:
1. Two sides of partitions:
    - a. Fire rated partitions.
    - b. Smoke partitions.
    - c. Sound rated partitions.
    - d. Full height partitions shown (FHP).
    - e. Corridor partitions.
  2. One side of partitions or furring:
    - a. Inside of exterior wall furring or stud construction.
    - b. Room side of room without suspended ceilings.
    - c. Furring for pipes and duct shafts, except where fire rated shaft wall construction is shown.
  3. Extend all layers of gypsum board construction used for fireproofing of columns from floor to underside of structure overhead, unless shown otherwise.
- B. In locations other than those specified, extend gypsum board from floor to heights as follows:
1. Not less than 100 mm (4 inches) above suspended acoustical ceilings.
  2. At ceiling of suspended gypsum board ceilings.
  3. At existing ceilings.

### **3.2 INSTALLING GYPSUM BOARD**

- A. Coordinate installation of gypsum board with other trades and related work.
- B. Install gypsum board in accordance with ASTM C840, except as otherwise specified.
- C. Moisture and Mold-Resistant Assemblies: Provide and install moisture and mold-resistant glass mat gypsum wallboard products with moisture-resistant surfaces complying with ASTM C1658 where shown and in

locations which might be subject to moisture exposure during construction.

- D. Use gypsum boards in maximum practical lengths to minimize number of end joints.
- E. Bring gypsum board into contact, but do not force into place.
- F. Ceilings:
  - 1. For single-ply construction, use perpendicular application.
  - 2. For two-ply assemblies:
    - a. Use perpendicular application.
    - b. Apply face ply of gypsum board so that joints of face ply do not occur at joints of base ply with joints over framing members.
- G. Walls (Except Shaft Walls):
  - 1. When gypsum board is installed parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board, and 200 mm (8 inches) on center along edges.
  - 2. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.
  - 3. Stagger screws on abutting edges or ends.
  - 4. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints except gypsum board shall be applied vertically over "Z" furring channels.
  - 5. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
  - 6. For three-ply gypsum board assemblies, apply plies in same manner as for two-ply assemblies, except that heads of fasteners need only be driven flush with surface for first and second plies. Apply third ply of wallboard in same manner as second ply of two-ply assembly, except use fasteners of sufficient length enough to have the same penetration into framing members as required for two-ply assemblies.
  - 7. No offset in exposed face of walls and partitions shall be permitted because of single-ply and two-ply or three-ply application requirements.

8. Installing Two Layer Assembly Over Sound Deadening Board:
  - a. Apply face layer of wallboard vertically with joints staggered from joints in sound deadening board over framing members.
  - b. Fasten face layer with screw, of sufficient length to secure to framing, spaced 300 mm (12 inches) on center around perimeter, and 400 mm (16 inches) on center in the field.
9. Control Joints ASTM C840 and as follows:
  - a. Locate at both side jambs of openings if gypsum board is not "yoked". Use one system throughout.
  - b. Not required for wall lengths less than 9000 mm (30 feet).
  - c. Extend control joints the full height of the wall or length of soffit/ceiling membrane.
- H. Acoustical or Sound Rated Partitions, Fire and Smoke Partitions:
  1. Cut gypsum board for a space approximately 3 mm to 6 mm (1/8 to 1/4 inch) wide around partition perimeter.
  2. Coordinate for application of caulking or sealants to space prior to taping and finishing.
  3. For sound rated partitions, use sealing compound (ASTM C919) to fill the annular spaces between all receptacle boxes and the partition finish material through which the boxes protrude to seal all holes and/or openings on the back and sides of the boxes. STC minimum values as shown.
- I. Electrical and Telecommunications Boxes:
  1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board partitions.
- J. Accessories:
  1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.
  2. Install in one piece, without the limits of the longest commercially available lengths.
  3. Corner Beads:
    - a. Install at all vertical and horizontal external corners and where shown.
    - b. Use screws only. Do not use crimping tool.
  4. Edge Trim (casings Beads):
    - a. At both sides of expansion and control joints unless shown otherwise.

- b. Where gypsum board terminates against dissimilar materials and at perimeter of openings, except where covered by flanges, casings or permanently built-in equipment.
- c. Where gypsum board surfaces of non-load bearing assemblies abut load bearing members.
- d. Where shown.

### **3.3 INSTALLING GYPSUM SHEATHING**

- A. Install in accordance with ASTM C840, except as otherwise specified or shown.
- B. Use screws of sufficient length to secure sheathing to framing.
- C. Space screws 9 mm (3/8 inch) from ends and edges of sheathing and 200 mm (8 inches) on center. Space screws a maximum of 200 mm (8 inches) on center on intermediate framing members.
- D. Apply 600 mm by 2400 mm (2 foot by 8 foot) sheathing boards horizontally with tongue edge up.
- E. Apply 1200 mm by 2400 mm or 2700 mm (4 ft. by 8 ft. or 9 foot) gypsum sheathing boards vertically with edges over framing.

### **3.4 CAVITY SHAFT WALL**

- A. Coordinate assembly with Section 09 22 16, NON-STRUCTURAL METAL FRAMING, for erection of framing and gypsum board.
- B. Conform to UL Design No. U438 or FM WALL CONSTRUCTION 12-2/HR (Nonbearing for two-hour fire rating. Conform to FM WALL CONSTRUCTION 25-1/HR (Non-loadbearing) for one-hour fire rating where shown.
- C. Cut coreboard (liner) panels 25 mm (one inch) less than floor-to-ceiling height, and erect vertically between J-runners on shaft side.
  - 1. Where shaft walls exceed 4300 mm (14 feet) in height, position panel end joints within upper and lower third points of wall.
  - 2. Stagger joints top and bottom in adjacent panels.
  - 3. After erection of J-struts of opening frames, fasten panels to J-struts with screws of sufficient length to secure to framing staggered from those in base, spaced 300 mm (12 inches) on center.
- D. Gypsum Board:
  - 1. Two hour wall:
    - a. Erect base layer (backing board) vertically on finish side of wall with end joints staggered. Fasten base layer panels to studs with 25 mm (one inch) long screws, spaced 600 mm (24 inches) on center.

- b. Use laminating adhesive between plies in accordance with UL or FM if required by fire test.
- c. Apply face layer of gypsum board required by fire test vertically over base layer with joints staggered and attach with screws of sufficient length to secure to framing staggered from those in base, spaced 300 mm (12 inches) on center.
- 2. One hour wall with one layer on finish side of wall: Apply face layer of gypsum board vertically. Attach to studs with screws of sufficient length to secure to framing, spaced 300 mm (12 inches) on center in field and along edges.
- 3. Where coreboard is covered with face layer of gypsum board, stagger joints of face layer from those in the coreboard base.
- E. Treat joints, corners, and fasteners in face layer as specified for finishing of gypsum board.

### **3.5 FINISHING OF GYPSUM BOARD**

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for all finished areas open to public view.
- B. Before proceeding with installation of finishing materials, assure the following:
  - 1. Gypsum board is fastened and held close to framing or furring.
  - 2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.
- C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of non decorated smoke barrier, fire rated, and sound rated gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the construction. Sanding is not required of non decorated surfaces.

### **3.6 REPAIRS**

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including nondecorated surfaces.
- B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.



- C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.
- D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non decorated surface to provide smoke tight construction fire protection equivalent to the fire rated construction and STC equivalent to the sound rated construction.

### **3.7 UNACCESSIBLE CEILINGS**

At Mental Health and Behavioral Nursing Units, areas accessible to patients and not continuously observable by staff (e.g., patient bedrooms, day rooms), ceilings shall be a solid material such as gypsum board. This shall limit patient access. Access doors are needed to access electrical and mechanical equipment above the ceiling. These doors shall be locked to prevent unauthorized access and secured to ceiling using tamper resistant fasteners.

- - - E N D - - -

**SECTION 09 30 13  
CERAMIC/PORCELAIN TILING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

A. This section specifies interior ceramic and porcelain tile.

**1.2 RELATED WORK:**

**A. SUSTAINABLE DESIGN REQUIREMENTS: SECTION 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.**

B. Sealing of Joints: Section 07 92 00, JOINT SEALANTS.

C. Color, Texture, Pattern, and Size of Field Tile and Trim Shapes, and Color of Grout Specified: match existing.

**1.3 SUBMITTALS:**

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Sustainable Design Submittals as described below:

1. Volatile organic compounds per volume as specified in  
PART 2 - PRODUCTS.

C. Samples:

1. Base tile, each type, each color, each size.
2. Porcelain tile, each type, color, patterns and size.
3. Wall (or wainscot) tile, each color, size and pattern.
4. Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, color, and size.

D. Product Data:

1. Ceramic and porcelain tile, marked to show each type, size, and shape required.
2. Chemical resistant mortar and grout (epoxy and furan).
3. Cementitious backer unit.
4. Dry-set portland cement mortar and grout.
5. Divider strip.
6. Elastomeric membrane and bond coat.
7. Reinforcing tape.
8. Leveling compound.
9. Latex-portland cement mortar and grout.
10. Commercial portland cement grout.
11. Organic adhesive.

12. Slip resistant tile.
13. Waterproofing isolation membrane.
14. Fasteners.

E. Certification:

1. Master grade certificate, ANSI A137.1.
2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
  - a. Chemical resistant mortar and grout (epoxy and furan).
  - b. Modified epoxy emulsion.
  - c. Commercial portland cement grout.
  - d. Cementitious backer unit.
  - e. Dry-set portland cement mortar and grout.
  - f. Elastomeric membrane and bond coat.
  - g. Reinforcing tape.
  - h. Latex-portland cement mortar and grout.
  - i. Leveling compound.
  - j. Organic adhesive.
  - k. Waterproof isolation membrane.
  - l. Factory back mounted tile documentation for suitability for application in wet area.

F. Installer Qualifications:

1. Submit letter stating installer's experience.

**1.4 DELIVERY AND STORAGE:**

- A. Deliver materials in containers with labels legible and intact and grade-seals unbroken.
- B. Store material to prevent damage or contamination.

**1.5 QUALITY ASSURANCE:**

- A. Installers to be from a company specializing in performing installation of products specified and have a minimum of three (3) years' experience.
- B. Each type and color of tile to be provided from a single source.
- C. Each type and color of mortar, adhesive, and grout to be provided from the same source.

**1.6 WARRANTY:**

- A. Manufacturer Warranty: Manufacturer warranty shall be for a minimum of one (1) year from the date of installation and final acceptance by the Government. Submit manufacturer warranty.

**1.7 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.
- B. American National Standards Institute (ANSI):
- A10.20-06(R2011).....Safe Operating Practices for Tile, Terrazzo and Marble Work
  - A108/A118/A136-14 Installation of Ceramic Tile
  - A108.01-10.....Subsurfaces and Preparations by Other Trades
  - A108.02-10.....Materials, Environmental, and Workmanship
  - A108.1A-11.....Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar
  - A108.1B-11.....Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar
  - A108.1C-11.....Contractors Option; Installation of Ceramic Tile in the Wet-Set method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar
  - A108.4-10.....Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive
  - A108.6-10.....Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy
  - A108.8-10.....Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout
  - A108.10-10.....Grout in Tilework
  - A108.13-10.....Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone
  - A118.1-10.....Dry-Set Portland Cement Mortar
  - A118.3-11.....Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive
  - A118.4-10.....Latex-Portland Cement Mortar
  - A118.5-10.....Chemical Resistant Furan Mortars and Grouts
  - A118.6-10.....Cement Grouts for Tile Installation
  - A118.7-10.....High Performance Cement Grouts for Tile Installation

- A118.9-10.....Installation of Ceramic Tile with Modified  
Epoxy Emulsion Mortar/Grout
- A118.10-10.....Load Bearing, Bonded, Waterproof Membranes for  
Thin-Set Ceramic Tile and Dimension Stone  
Installation
- A136.1-11.....Organic Adhesives for Installation of Ceramic  
Tile
- A137.1-13.....American National Standard Specifications for  
Ceramic Tile
- C. ASTM International (ASTM):
- A666-10.....Annealed or Cold-Worked Austenitic Stainless  
Steel Sheet, Strip, Plate and Flat Bar
- A1064/A1064M-14.....Carbon-Steel Wire and Welded Wire  
Reinforcement, Plain and Deformed, for Concrete
- C109/C109M-13.....Standard Test Method for Compressive Strength  
of Hydraulic Cement Mortars (Using 2 inch. or  
[50-mm] Cube Specimens)
- C241/C241M-13.....Abrasion Resistance of Stone Subjected to Foot  
Traffic
- C348-14.....Standard Test Method for Flexural Strength of  
Hydraulic-Cement Mortars
- C627-10.....Evaluating Ceramic Floor Tile Installation  
Systems Using the Robinson-Type Floor Tester
- C954-11.....Steel Drill Screws for the Application of  
Gypsum Board on Metal Plaster Base to Steel  
Studs from 0.033 in (0.84 mm) to 0.112 in (2.84  
mm) in thickness
- C979/C979M-10.....Pigments for Integrally Colored Concrete
- C1002-14.....Steel Self-Piercing Tapping Screws for the  
Application of Panel Products
- C1027-09.....Test Method for Determining Visible Abrasion  
Resistance of Glazed Ceramic Tile
- C1127-01 (R2009).....Standard Guide for Use of High Solids Content,  
Cold Liquid-Applied Elastomeric Waterproofing  
Membrane with an Integral Wearing Surface
- C1178/C1178M-13.....Standard Specification for Coated Glass Mat  
Water-Resistant Gypsum Backing Panel

- C1325-14.....Non-Asbestos Fiber-Mat Reinforced Cementitious  
Backer Units
- C1353/C1353M-09(R2013)..Abrasion Resistance of Dimension Stone  
Subjected to Foot Traffic Using a Rotary  
Platform, Double-Head Abraser
- D1204-14.....Test Method for Linear Dimensional Changes of  
Nonrigid Thermoplastic Sheeting or Film at  
Elevated Temperature
- D2240-05(R2010).....Test Method for Rubber Property - Durometer  
Hardness
- D2497-07(R2012).....Tolerances for Manufactured Organic-Base  
Filament Single Yarns
- D3045-92(R2010).....Heat Aging of Plastics Without Load
- D4397-10.....Standard Specification for Polyethylene  
Sheeting for Construction, Industrial and  
Agricultural Applications
- D5109-12.....Standard Test Methods for Copper-Clad  
Thermosetting Laminates for Printed Wiring  
Boards
- D. Code of Federal Regulation (CFR):
- 40 CFR 59.....Determination of Volatile Matter Content, Water  
Content, Density Volume Solids, and Weight  
Solids of Surface Coating
- E. Marble Institute of America (MIA): Design Manual III-2007
- F. Tile Council of North America, Inc. (TCNA):  
Handbook for Ceramic Tile Installation (2014)  
DCOF AcuTest-2012.....Dynamic Coefficient of Friction Test

## **PART 2 - PRODUCTS**

### **2.1 TILE:**

- A. Comply with ANSI A137.1, Standard Grade, except as modified:
1. Inspection procedures listed under the Appendix of ANSI A137.1.
  2. Abrasion Resistance Classification:
    - a. Tested in accordance with values listed in Table 1, ASTM C1027.
    - b. Class V, 12000 revolutions for floors in Corridors, Kitchens,  
Storage including Refrigerated Rooms
    - c. Class IV, 6000 revolutions for remaining areas.

3. Factory Blending: For tile with color variations, within the ranges selected during sample submittals blend tile in the factory and package so tile units taken from one (1) package show the same range in colors as those taken from other packages and match approved samples.
4. Factory-Applied Temporary Protective Coating:
  - a. Protect exposed face surfaces (top surface) of tile against adherence of mortar and grout by pre-coating with a continuous film of hot applied petroleum paraffin wax.
  - b. Do not coat unexposed tile surfaces.
  - c. Pre-wax tiles set or grouted with furan, epoxy, or latex modified mortars.
- B. Glazed Wall Tile: Cushion edges, glazing.
- C. Porcelain Paver Tile: Nominal 8 mm (5/16 inch) thick, with cushion edges. Porcelain tile produced by the dust pressed method are to be made of approximately 50% feldspar; the remaining 50% is to be made up of various high-quality light firing ball clays yielding a tile with a water absorption rate of 0.5% or less and a breaking strength of between 176 to 181 kg (390 to 400 lbs.).
- D. Trim Shapes:
  1. Conform to applicable requirements of adjoining floor and wall tile.
  2. Use trim shapes sizes conforming to size of adjoining field wall tile including existing spaces.
  3. Internal and External Corners:
    - a. Square internal and external corner joints are not acceptable.
    - b. External corners including edges: Use bullnose shapes.
    - c. Internal corners: Use cove shapes.
    - d. Base to floor internal corners: Use special shapes providing integral cove vertical and horizontal joint.
    - e. Base to floor external corners: Use special shapes providing bullnose vertical edge with integral cove horizontal joint. Use stop at bottom of openings having bullnose return to wall.
    - f. Wall top edge internal corners: Use special shapes providing integral cove vertical joint with bullnose top edge.
    - g. Wall top edge external corners: Use special shapes providing bullnose vertical and horizontal joint edge.
    - h. For unglazed ceramic mosaic and glazed wall tile installed in portland cement mortar setting bed, use cove and bullnose shapes

as applicable. When ceramic mosaic wall and base tile is required, use C Series cove and bullnose shapes.

- i. For unglazed ceramic mosaic and glazed wall tile installed in dry-set portland cement mortar, latex-portland cement mortar, and organic adhesive (thin set methods), use cove and surface bullnose shapes as applicable.
- j. Provide cove and bullnose shapes required to complete tile work.

## **2.2 BACKER UNITS:**

### **A. Cementitious Backer Units:**

- 1. Use in showers or wet areas.
- 2. Conform to ASTM C1325; Type A.
- 3. Use in maximum lengths available to minimize end to end butt joints.

## **2.3 JOINT MATERIALS FOR CEMENTITIOUS BACKER UNITS:**

- A. Reinforcing Tape: Vinyl coated woven glass fiber mesh tape, open weave, 50 mm (2 inches) wide. Tape with pressure sensitive adhesive backing will not be permitted.
- B. Tape Embedding Material: Latex-portland cement mortar complying with ANSI A108.1.
- C. Joint material, including reinforcing tape, and tape embedding material, shall be as specifically recommended by the backer unit manufacturer.

## **2.4 FASTENERS:**

### **A. Screws for Cementitious Backer Units.**

- 1. Standard screws for gypsum board are not acceptable.
- 2. Minimum 11 mm (7/16 inch) diameter head, corrosion resistant coated, with washers.
- 3. ASTM C954 for steel 1 mm (0.033 inch) thick.
- 4. ASTM C1002 for steel framing less than 0.0329 inch thick.

### **B. Washers: Galvanized steel, 13 mm (1/2 inch) minimum diameter.**

## **2.5 SETTING MATERIALS OR BOND COATS:**

### **A. Conform to TCNA Handbook for Ceramic Tile Installation.**

### **B. Portland Cement Mortar: ANSI A108.02.**

### **C. Latex-Portland Cement Mortar: ANSI A118.4.**

- 1. For wall applications, provide non-sagging, latex-portland cement mortar complying with ANSI A118.4.
- 2. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and



other ingredients to which only water needs to be added at Project site.

- D. Dry-Set Portland Cement Mortar: ANSI A118.1. For wall applications, provide non-sagging, latex-portland cement mortar complying with ANSI A118.1.
- E. Organic Adhesives: ANSI A136.1, Type 1.
- F. Chemical-Resistant Bond Coat:
  - 1. Epoxy Resin Type: ANSI A118.3.
  - 2. Furan Resin Type: ANSI A118.5.
- G. Elastomeric Waterproofing Membrane and Bond Coat:
  - 1. TCNA F122-14 (on ground concrete) and TCNA F112A-14 (above ground concrete).
  - 2. ANSI A118.10.
  - 3. One component polyurethane, liquid applied material having the following additional physical properties:
    - a. Hardness: Shore "A" between 40-60.
    - b. Elongation: Between 300-600 percent.
    - c. Tensile strength: Between .27 - .41 Newton per square millimeter (40-60 pounds per square inch gauge).
    - d. No volatile compounds (VOC).
  - 4. Coal tar modified urethanes are not acceptable.
- H. Waterproofing Isolation Membrane:
  - 1. Sheet System TCNA F122-14 (on-ground concrete) and TCNA F122A-14 (above-ground concrete).
  - 2. Composite sheet consisting of ASTM D5109, Type II, Grade I Chlorinated Polyethylene (CM) sheet reinforced on both sides with a non-woven polyester fiber.
  - 3. Designed for use in wet areas as an isolation and positive waterproofing membranes for thin-set bonding of sheet to substrate and thin-set bonding of ceramic and porcelain tile or marble to sheet. Suited for both horizontal and vertical applications.
  - 4. Conform to the following additional physical properties:

| Property            | Units   | Results          | Test Method                       |
|---------------------|---------|------------------|-----------------------------------|
| Hardness<br>Shore A | Points  | 70-80            | ASTM D2240<br>(10 Second Reading) |
| Shrinkage           | Percent | 5 maximum        | ASTM D1204                        |
| Brittleness         |         | No crack remains | ASTM D2497                        |

|  |                     |   |   |
|--|---------------------|---|---|
|  |                     | flexible at temperature<br>-37 degrees C<br>(-35 degrees F) | 13 mm (1/2-inch)<br>Mandrel Bend                                |
| Retention of Properties after Heat Aging | Percent of original | 80 Tensile<br>80 Breaking<br>80 Elongation                  | ASTM D3045,<br>90 degrees C<br>(194 degrees F)<br>for 168 hours |

5. Manufacturer's standard sheet size with prefabricated or preformed inside and outside corners.
6. Sheet manufacturer's solvent welding liquid or xylene and edge sealant.

## 2.6 GROUTING MATERIALS:

### A. Coloring Pigments:

1. Pure mineral pigments, lime proof and nonfading, complying with ASTM C979/C979M.
2. Coloring pigments may only be added to grout by the manufacturer.
3. Job colored grout is not acceptable.
4. Use is required in Commercial Portland Cement Grout, Dry-Set Grout, and Latex-Portland Cement Grout.

### B. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated. Zero VOC content.

### C. Standard Cement Grout: ANSI A118.6.

### D. High Performance Tile Grout: ANSI A118.7 with a VOC content of 65 g/L or less when calculated according to 40 CFR 59 (EPA Method 24).

1. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.
2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.

### E. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59 (EPA Method 24).

1. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 60 and 100 degrees C (140 and 212 degrees F), respectively, and certified by manufacturer for intended use.

**2.7 PATCHING AND LEVELING COMPOUND:**

- A. Portland cement base, polymer-modified, self-leveling compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.
- B. Provide a patching and leveling compound with the following minimum physical properties:
  - 1. Compressive strength - 25 MPa (3500 psig) per ASTM C109/C109M.
  - 2. Flexural strength - 7 MPa (1000 psig) per ASTM C348 (28 day value).
  - 3. Tensile strength - 4.1 MPa (600 psi) per ANSI 118.7.
  - 4. Density - 1.9.
- C. Capable of being applied in layers up to 38 mm (1-1/2 inches) thick without fillers and up to 101 mm (4 inches) thick with fillers, being brought to a feather edge, and being trowelled to a smooth finish.
- D. Primers, fillers, and reinforcement as required by manufacturer for application and substrate condition.
- E. Ready for use in 48 hours after application.

**2.8 METAL DIVIDER STRIPS:**

- A. Terrazzo type divider strips.
- B. Heavy top type strip with 5 mm (3/16 inch) wide top and 38 mm (1 1/2 inch) long leg. Height to match tile and setting-bed thickness.
- C. Embedded leg perforated and deformed for keying to mortar.
- D. Stainless-steel, ASTM A666, 300 Series exposed-edge material.

**2.9 WATER:**

- A. Clean, potable and free from salts and other injurious elements to mortar and grout materials.

**2.10 CLEANING COMPOUNDS:**

- A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.
- B. Materials containing acid or caustic Material are not acceptable.

**2.11 FLOOR MORTAR BED REINFORCING:**

- A. ASTM A1064/A1064M welded wire fabric without backing, MW3 x MW3 (2 x 2-W0.5 x W0.5).

**2.12 POLYETHYLENE SHEET:**

- A. Polyethylene sheet conforming to ASTM D4397.
- B. Nominal thickness: 0.15 mm (6 mils).

**PART 3 - EXECUTION****3.1 ENVIRONMENTAL REQUIREMENTS:**

- A. Maintain ambient temperature of work areas at not less than 16 degrees C (60 degrees F), without interruption, for not less than 24 hours before installation and not less than three (3) days after installation.
- B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation and ANSI Specifications for installation.
- C. Do not install tile when the temperature is above 38 degrees C (100 degrees F).
- D. Do not install materials when the temperature of the substrate is below 16 degrees C (60 degrees F).
- E. Do not allow temperature to fall below 10 degrees C (50 degrees F) after third day of completion of tile work.

**3.2 ALLOWABLE TOLERANCE:**

- A. Variation in plane of sub-floor, including concrete fills leveling compounds and mortar beds:
  - 1. Not more than 6 mm in 3048 mm (1/4 inch in 10 feet) from required elevation where portland cement mortar setting bed is used.
  - 2. Not more than 3 mm in 3048 mm (1/8 inch in 10 feet) where dry-set portland cement, and latex-portland cement mortar setting beds and chemical-resistant bond coats are used.
- B. Variation in Plane of Wall Surfaces:
  - 1. Not more than 6 mm in 2438 mm (1/4 inch in 8 feet) from required plane where portland cement mortar setting bed is used.
  - 2. Not more than 3 mm in 2438 mm (1/8 inch in 8 feet) where dry-set or latex-portland cement mortar or organic adhesive setting materials is used.

**3.3 SURFACE PREPARATION:**

- A. Cleaning Existing Concrete or Masonry:
  - 1. Chip out loose material, clean off all oil, grease dirt, adhesives, curing compounds, and other deterrents to bonding by mechanical method, or by using products specifically designed for cleaning concrete and masonry.
  - 2. Use self-contained power blast cleaning systems to remove curing compounds and steel trowel finish from concrete slabs where ceramic

tile will be installed directly on concrete surface with thin-set materials.

3. Steam cleaning or the use of acids and solvents for cleaning will not be permitted.

B. Patching and Leveling:

1. Mix and apply patching and leveling compound in accordance with manufacturer's instructions.
2. Fill holes and cracks and align concrete floors that are out of required plane with patching and leveling compound.
  - a. Thickness of compound as required to bring finish tile system to elevation shown on construction documents.
  - b. Float finish except finish smooth for elastomeric waterproofing.
  - c. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
3. Apply patching and leveling compound to concrete and masonry wall surfaces that are out of required plane.
4. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.

C. Mortar Bed for Slopes to Drains:

1. Slope compound to drain where drains are shown on construction documents.
2. Install mortar bed in depressed slab sloped to drains not less than 3.2 mm in 305 mm (1/8 inch per foot).
3. Allow not less than 50 mm (2 inch) depression at edge of depressed slab.
4. Screed for slope to drain and float finish.
5. Cure mortar bed for not less than seven (7) days. Do not use curing compounds or coatings.
6. Perform flood test to verify mortar bed slopes to drain before installing tile. Contracting Officer Representative (COR) to be present during flood test.

D. Additional preparation of concrete floors for tile set with epoxy, or furan-resin is to be in accordance with the manufacturer's printed instructions.

E. Walls:

1. In showers or other wet areas cover studs with polyethylene sheet.

2. Apply patching and leveling compound to concrete and masonry surfaces that are out of required plane.
3. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.
4. Apply metal lath to framing in accordance with ANSI A108.1:
  - a. Use fasteners specified in paragraph "Fasteners." Use washers when lath opening is larger than screw head.
  - b. Apply scratch and leveling coats to metal lath in accordance with ANSI A108.1C.
  - c. Total thickness of scratch and leveling coats:
    - 1) Apply 9 mm to 16 mm (3/8 inch to 5/8 inch) thick over solid backing.
    - 2) 16 mm to 19 mm (5/8 to 3/4 inch) thick on metal lath over studs.
    - 3) Where wainscots are required to finish flush with wall surface above, adjust thickness required for flush finish.
  - d. Apply scratch and leveling coats more than 19 mm (3/4 inch) thick in two (2) coats.

F. Existing Floors and Walls:

1. Remove existing composition floor finishes and adhesive. Prepare surface by grinding, chipping, self-contained power blast cleaning or other suitable mechanical methods to completely expose uncontaminated concrete or masonry surfaces. Follow safety requirements of ANSI A10.20.
2. Remove existing concrete fill or topping to structural slab. Clean and level the substrate for new setting bed and waterproof membrane or cleavage membrane.
3. Where new tile bases are required to finish flush with plaster above or where they are extensions of similar bases in conjunction with existing floor tiles, cut channel in floor slab and expose rough wall construction sufficiently to accommodate new tile base and setting material.

**3.4 CEMENTITIOUS BACKER UNITS:**

- A. Remove polyethylene wrapping from cementitious backer units and separate to allow for air circulation. Allow moisture content of backer units to dry down to a maximum of 35 percent before applying joint treatment and tile.

- B. Install in accordance with ANSI A118.9 except as specified otherwise.
- C. Install units horizontally or vertically to minimize joints with end joints over framing members. Units with rounded edges; face rounded edge away from studs to form a "V" joint for joint treatment.
- D. Secure cementitious backer units to each framing member with screws spaced not more than 203 mm (8 inches) on center and not closer than 13 mm (1/2 inch) from the edge of the backer unit or as recommended by backer unit manufacturer. Install screws so that the screw heads are flush with the surface of the backer unit.
- E. Where backer unit joins shower pans or waterproofing, lap backer unit over turned up waterproof system. Install fasteners only through top one-inch of turned up waterproof systems.
- F. Do not install joint treatment for seven (7) days after installation of cementitious backer unit.
- G. Joint Treatment:
  - 1. Fill horizontal and vertical joints and corners with latex-portland cement mortar. Apply fiberglass tape over joints and corners and embed with same mortar.
  - 2. Leave 6 mm (1/4 inch) space for sealant at lips of tubs, sinks, or other plumbing receptors.

### **3.5 GLASS MAT WATER-RESISTANT BACKING BOARD:**

- A. Install in accordance with manufacturer's instructions.  
TCNA Systems W245-1.
- B. Treat joints with tape and latex-portland cement mortar or adhesive.

### **3.6 METAL DIVIDER STRIPS:**

- A. Install metal divider strips in floor joints between ceramic and quarry tile floors and between tile floors and adjacent flooring of other materials where the finish floors are flush unless shown otherwise on construction documents.
- B. Set divider strip in mortar bed to line and level centered under doors or in openings.

### **3.7 CERAMIC TILE - GENERAL:**

- A. Comply with ANSI A108/A118/A136 series of tile installation standards applicable to methods of installation and TCNA Installation Guidelines.
- B. Installing Mortar Beds for Floors:
  - 1. Install mortar bed in a manner that does not damage cleavage or waterproof membrane; 32 mm (1-1/2 inch) minimum thickness.
  - 2. Install floor mortar bed reinforcing centered in mortar fill.

3. Screed finish to level plane or slope to drains shown on construction documents, float finish.
4. For thin set systems cure mortar bed not less than seven (7) days. Do not use curing compounds or coatings.
5. For tile set with portland cement paste over plastic mortar bed coordinate to set tile before mortar bed sets.

C. Setting Beds or Bond Coats:

1. Where recessed or depressed floor slabs are filled with portland cement mortar bed, set ceramic mosaic floor tile in either portland cement paste over plastic mortar bed or latex-portland cement mortar over cured mortar bed except as specified otherwise, ANSI A108-1C, TCNA System F121-14 or F111-14.
2. Set floor tile in elastomeric bond coat over elastomeric membrane per ANSI 108.13, TCNA System F122-14 where indicated on construction documents.
3. Set wall tile installed over concrete or masonry in dry-set portland cement mortar, or latex-portland cement mortar, ANSI 108.1B and TCNA System W211-14, W221-14 or W222-14.
4. Set wall tile installed over concrete backer board in latex-portland cement mortar, ANSI A108.1B.
5. Set wall tile installed over portland cement mortar bed on metal lath base in portland cement paste over plastic mortar bed, or dry-set portland cement mortar or latex-portland cement mortar over a cured mortar bed, ANSI A108.1C, TCNA System W231-14, W241-14.
6. Set tile over concrete in therapeutic pools in portland cement paste or dry set portland cement mortar, ANSI A108.1C, TCNA System P601MB-14.
7. Set tile installed over gypsum board and gypsum plaster in organic adhesive, ANSI A108.1, TCNA System W242-14.
8. Set trim shapes in same material specified for setting adjoining tile.

D. Workmanship:

1. Lay out tile work so that no tile less than one-half full size is used. Make all cuts on the outer edge of the field.
2. Set tile firmly in place with finish surfaces in true planes. Align tile flush with adjacent tile unless shown otherwise on construction documents.
3. Form intersections and returns accurately.



4. Cut and drill tile neatly without marring surface.
5. Cut edges of tile abutting penetrations, finish, or built-in items:
  - a. Fit tile closely around electrical outlets, piping, fixtures and fittings, so that plates, escutcheons, collars and flanges will overlap cut edge of tile.
  - b. Seal tile joints water tight as specified in Section 07 92 00, JOINT SEALANTS, around electrical outlets, piping fixtures and fittings before cover plates and escutcheons are set in place.
6. Completed work is to be free from hollow sounding areas and loose, cracked or defective tile.
7. Remove and reset tiles that are out of plane or misaligned.
8. Floors:
  - a. Extend floor tile beneath casework and equipment, except those units mounted in wall recesses.
  - b. Align finish surface of new tile work flush with other and existing adjoining floor finish where indicated in construction documents.
  - c. In areas where floor drains occur, slope tile to drains.
  - d. Push and vibrate tiles over 203 mm (8 inches) square to achieve full support of bond coat.
9. Walls:
  - a. Cover walls and partitions, including pilasters, furred areas, and freestanding columns from floor to ceiling, or from floor to nominal wainscot heights as indicated in construction documents with tile.
  - b. Finish reveals of openings with tile, except where other finish materials are indicated in construction documents.
  - c. At window openings, provide tile stools and reveals.
  - d. Finish wall surfaces behind and at sides of casework and equipment, except those units mounted in wall recesses, with same tile as scheduled for room proper.
10. Joints:
  - a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise on construction documents.
  - b. Make joints 2 mm (1/16 inch) wide for glazed wall tile and mosaic tile work.

- c. Make joints in quarry tile work not less than 6 mm (1/4 inch) nor more than 9 mm (3/8 inch) wide. Finish joints flush with surface of tile.
  - d. Make joints in paver tile, porcelain type; maximum 3 mm (1/8 inch) wide.
11. Back Buttering: For installations indicated below, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108/A118/A136 series of tile installation standards:
- a. Tile wall installations in wet areas, including showers, tub enclosures, laundries and swimming pools.
  - b. Tile installed with chemical-resistant mortars and grouts.
  - c. Tile wall installations composed of tiles 203 by 203 mm (8 by 8 inches) or larger.
  - d. Exterior tile wall installations.

**3.8 CERAMIC TILE INSTALLED WITH PORTLAND CEMENT MORTAR:**

- A. Mortar Mixes for Floor, Wall and Base Tile (including Showers): ANSI A108.1A, except specified otherwise.
- B. Installing Wall and Base Tile: ANSI A108.1A, except specified otherwise.
- C. Installing Floor Tile: ANSI A108.1A, except as specified otherwise. Slope mortar beds to floor drains at a minimum of 3 mm in 305 mm (1/8 inch per foot).

**3.9 PORCELAIN TILE INSTALLED WITH LATEX PORTLAND CEMENT BONDING MORTAR:**

- A. Due to the denseness of porcelain tile use latex portland cement bonding mortar that meets the requirements of ANSI A108.01. Mix bonding mortars in accordance with manufacturer's instructions. Provide liquid ratios and comply with dwell times during the placement of bonding mortar and tile.

**3.10 THIN SET CERAMIC AND PORCELAIN TILE INSTALLED WITH DRY-SET PORTLAND CEMENT AND LATEX-PORTLAND CEMENT MORTAR:**

- A. Installation of Tile: ANSI A108.1B, except as specified otherwise.
- B. Slope tile work to drains at not less than 3 mm in 305 mm (1/8 inch per foot).

**3.11 THIN SET CERAMIC AND PORCELAIN TILE INSTALLED WITH ORGANIC ADHESIVE**

- A. Installation of Tile: ANSI A108.4.

**3.12 THIN SET CERAMIC AND PORCELAIN TILE INSTALLED WITH CHEMICAL-RESISTANT BOND COAT:**

- A. Epoxy Resin Type: Install tile in accordance with Installation of Tile with Epoxy Mortar; ANSI A108.6.
- B. Furan Resin Type: Proportion, mix and place in accordance with the manufacturer's printed instructions. Set tile in accordance with ANSI A108.8.

**3.13 CERAMIC AND PORCELAIN TILE INSTALLED WITH ELASTOMERIC BOND COAT:**

- A. Surface Preparation: Prepare surfaces as specified.
- B. Installation of Elastomeric Membrane: ANSI A108.10 and TCNA F122-14 (on ground concrete) and F122A-14 (above-ground concrete).
  - 1. Prime surfaces, where required, in accordance with manufacturer's instructions.
  - 2. Install first coat of membrane material in accordance with manufacturer's instructions, in thickness of 0.76 to 1.3 mm (30 to 50 mils).
  - 3. Extend material over flashing rings of drains and turn up vertical surfaces not less than 101 mm (4 inches) above finish floor surface.
  - 4. When material has set, recoat areas with a second coat of elastomeric membrane material for a total thickness of 1.3 to 1.9 mm (50 to 75 mils).
  - 5. After curing test for leaks with 25 mm (1 inch) of water for 24 hours.
- C. Installation of Tile in Elastomeric Membrane:
  - 1. Spread no more material than can be covered with tile before material starts to set.
  - 2. Apply tile in second coat of elastomeric membrane material in accordance with the coating manufacturer's instructions in lieu at aggregate surfacing specified in ASTM C1127. Do not install top coat over tile.

**3.14 GROUTING:**

- A. Grout Type and Location:
  - 1. Grout for glazed wall and base tile, paver tile and unglazed mosaic tile portland cement grout, latex-portland cement grout, dry-set grout, or commercial portland cement grout.
  - 2. Grout for quarry tile floor and base:
    - a. Grout for floors of walk-in refrigerated rooms: Epoxy grout.
    - b. Therapeutic pool areas: Portland cement grout.

c. Grout for Kitchens:

- 1) Chemical-resistant grout as specified and recommended by manufacturer of bond coat.
  - 2) Use only furan resin grout within 609 mm (2 feet) of ovens, steam kettles, water heaters, and steam pipes in rooms.
  - 3) Epoxy grout designed for equivalent heat resistance to furan resin grout may be used for furan resin grout.
3. Grout for tile of therapeutic pools: Portland cement grout.

B. Workmanship:

1. Install and cure grout in accordance with the applicable standard.
2. Sand Portland Cement Grout: ANSI A108.10.
3. Standard Cement Grout: ANSI A118.6.
4. High Performance Grout: ANSI A118.7.
5. Epoxy Grout: ANSI A108.6.
6. Water-Cleanable Epoxy Grout: ANSI A118.3.
7. Furan and Commercial Portland Cement Grout: ANSI A118.5 and in accordance with the manufacturer's printed instructions.

**3.15 MOVEMENT JOINTS:**

- A. Prepare tile expansion, isolation, construction and contraction joints for installation of sealant. Refer to Section 07 92 00, JOINT SEALANTS.
- B. TCNA details EJ 171-14.
- C. At expansion joints, rake out joint full depth of tile and setting bed and mortar bed. Do not cut waterproof or isolation membrane.
- D. Rake out grout at joints between tile, at toe of base, and where indicated in construction documents not less than 6 mm (1/4 inch) deep.

**3.16 CLEANING:**

- A. Thoroughly sponge and wash tile. Polish glazed surfaces with clean dry cloths.
- B. Methods and materials used are not permitted to damage or impair appearance of tile surfaces.
- C. The use of acid or acid cleaners on glazed tile surfaces is prohibited.
- D. Clean tile grouted with epoxy, furan and commercial portland cement grout and tile set in elastomeric bond coat as recommended by the manufacturer of the grout and bond coat.

**3.17 PROTECTION:**

- A. Keep traffic off tile floor, until grout and setting material is fully set and cured.

- B. Where traffic occurs over tile floor is unavoidable, cover tile floor with not less than 9 mm (3/8 inch) thick plywood, wood particle board, or hardboard securely taped in place. Do not remove protective cover until time for final inspection. Clean tile of any tape, adhesive and stains.

**3.18 TESTING FINISH FLOOR:**

- A. Test floors in accordance with ASTM C627 to show compliance with codes 1 through 10.
- B. Test kitchen and storage rooms.

- - - E N D - - -

**SECTION 09 51 00  
ACOUSTICAL CEILINGS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Acoustical units.
  - 2. Metal ceiling suspension system for acoustical ceilings.
  - 3. Adhesive application.

**1.2 RELATED REQUIREMENTS**

- A. Adhesive VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Color, pattern, and location of each type of acoustical unit: match existing.
- C. Ceiling Suspension System: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- D. Lay in gypsum board ceiling panels: Section 09 29 00, GYPSUM BOARD.

**1.3 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
  - 1. A641/A641M-09a(2014) - Zinc-coated (Galvanized) Carbon Steel Wire.
  - 2. A653/A653M-15e1 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process.
  - 3. C423-09a - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
  - 4. C634-13 - Terminology Relating to Environmental Acoustics.
  - 5. C635/C635M-13a - Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
  - 6. C636/C636M-13 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
  - 7. D1779-98(2011) - Adhesive for Acoustical Materials.
  - 8. E84-15b - Surface Burning Characteristics of Building Materials.
  - 9. E119-16 - Fire Tests of Building Construction and Materials.
  - 10. E413-16 - Classification for Rating Sound Insulation.
  - 11. E580/E580M-14 - Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
  - 12. E1264-14 - Classification for Acoustical Ceiling Products.

C. International Organization for Standardization (ISO):

1. ISO 14644-1 - Classification of Air Cleanliness.

**1.4 PREINSTALLATION MEETINGS**

A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this section.

1. Required Participants:

- a. Contracting Officer's Representative.
- b. Architect/Engineer and Interior Designer.
- c. VA Interior Designer.
- d. Contractor.
- e. Installer.
- f. Manufacturer's field representative.
- g. Other installers responsible for adjacent and intersecting work, including sprinkler, HVAC, and lighting installers.

2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.

- a. Installation schedule.
- b. Installation sequence.
- c. Preparatory work.
- d. Protection before, during, and after installation.
- e. Installation.
- f. Terminations.
- g. Transitions and connections to other work.
- h. Inspecting and testing.
- i. Other items affecting successful completion.

3. Document and distribute meeting minutes to participants to record decisions affecting installation.

**1.5 SUBMITTALS**

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:

1. Show size, configuration, and fabrication and installation details.

C. Manufacturer's Literature and Data:

1. Description of each product.
2. Ceiling suspension system indicating manufacturer recommendation for each application.
3. Installation instructions.

4. Warranty.

D. Samples:

1. Acoustical units, 150 mm (6 inches) in size, each type, including units specified to match existing.
  - a. Submit quantity required to show full color and texture range.
2. Suspension system, trim and molding, 300 mm (12 inches) long.
3. Colored markers for access service.
4. Approved samples may be incorporated into work.

E. Sustainable Construction Submittals:

1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
2. Biobased Content:
  - a. Show type and quantity for each product.
  - b. Show volatile organic compound types and quantities.

F. Certificates: Certify each product complies with specifications.

1. Acoustical units, each type.

G. Qualifications: Substantiate qualifications comply with specifications.

1. Manufacturer with project experience list.

H. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

#### **1.6 QUALITY ASSURANCE**

A. Manufacturer Qualifications:

1. Regularly manufactures specified products.
2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
  - a. Project Experience List: Provide contact names and addresses for completed projects.

#### **1.7 DELIVERY**

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

#### **1.8 STORAGE AND HANDLING**

- A. Store products indoors in dry, weathertight conditioned facility.
- B. Protect products from damage during handling and construction operations.



**1.9 FIELD CONDITIONS****A. Environment:**

1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.
2. Work Area Ambient Conditions: HVAC systems are complete, operational, and maintaining facility design operating conditions continuously, beginning 48 hours before installation until Government occupancy.
3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

**PART 2 - PRODUCTS****2.1 SYSTEM DESCRIPTION**

- A. Ceiling System: Acoustical ceiling units on exposed grid suspension systems.

**2.2 SYSTEM PERFORMANCE**

- A. Design product complying with specified performance:
1. Maximum Deflection: 1/360 of span, maximum.
- B. Surface Burning Characteristics: When tested according to ASTM E84.
1. Flame Spread Rating: 25 maximum.
  2. Smoke Developed Rating: 450 maximum.

**2.3 PRODUCTS - GENERAL**

- A. Basis of Design: match existing - CertainTeed 520 finished.
- B. Provide acoustical units from one manufacturer.
1. Provide each product exposed to view from one production run.
- C. Provide suspension system from same manufacturer.
- D. Sustainable Construction Requirements:
1. Mineral Base Recycled Content: 15 percent, post-consumer recycled content, minimum.
  2. Steel Recycled Content: 30 percent total recycled content, minimum.
  3. Aluminum Recycled Content: 50 percent total recycled content, minimum.
  4. Biobased Content: 37 percent by weight biobased material, minimum.
  5. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
    - a. Non-flooring adhesives and sealants.

**2.4 ACOUSTICAL UNITS****A. General:**

1. Ceiling Panel and Tile: ASTM E1264, bio-based content according to USDA Bio-Preferred Product requirements.
  - a. Mineral Fiber: 3.6 kg/sq. m (3/4 psf) weight, minimum.
  - b. Integrally colored units.
2. Classification: Provide type and form as follows:
  - a. Type III Units - Mineral base with water-based painted finish maximum 10 g/l VOC; Form 2 - Water felted, minimum 16 mm (5/8 inch) thick.
  - b. Type IV Units - Mineral base with membrane-faced overlay, Form 2 - Water felted, minimum 16 mm (5/8 inch) thick. Apply poly (vinyl) chloride over paint coat.
  - c. NRC (Noise Reduction Coefficient): ASTM C423, minimum 0.55.
  - d. CAC (Ceiling Attenuation Class): ASTM E413, 40-44 range.
  - e. LR (Light Reflectance): Minimum 0.75.
3. Lay-in panels: Sizes as indicated on Drawings to match existing, withsquare edges orreveal edges.

**2.5 METAL SUSPENSION SYSTEM****A. General:** ASTM C635, heavy-duty system, except as otherwise specified.

1. Suspension System: Provide the following:
  - a. Galvanized cold-rolled steel, bonderized.
  - b. Extruded aluminum.
2. Main and Cross Runner: Use same construction Do not use lighter-duty sections for cross runners.

**B. Exposed Grid Suspension System: Support of lay-in panels.**

1. Grid Width: 22 mm (7/8 inch) minimum with8 mm (5/16 inch) minimum panel bearing surface.
2. Molding: Fabricate from the same material with same exposed width and finish.
3. Finish: Baked-on enamel flat texture finish.
  - a. Color: To match adjacent acoustical units.

**C. Carrying Channels Secondary Framing: Cold-rolled or hot-rolled steel, black asphaltic paint finish, rust free.**

1. Weight per 300 m (per thousand linear feet), minimum:

|      |             |            |
|------|-------------|------------|
| Size | Cold-rolled | Hot-rolled |
|------|-------------|------------|

| mm | inches | kg    | pound | kg    | pound |
|----|--------|-------|-------|-------|-------|
| 38 | 1-1/2  | 215.4 | 475   | 508   | 1120  |
| 50 | 2      | 267.6 | 590   | 571.5 | 1260  |

D. Anchors and Inserts: Provide anchors or inserts to support twice the loads imposed by hangers.

1. Hanger Inserts: Steel, zinc-coated (galvanized after fabrication).

a. Nailing type option for wood forms:

- 1) Upper portion designed for anchorage in concrete and positioning lower portion below surface of concrete approximately 25 mm (one inch).
- 2) Lower portion provided with minimum 8 mm (5/16 inch) hole to permit attachment of hangers.

b. Flush ceiling insert type:

- 1) Designed to provide a shell covered opening over a wire loop to permit attachment of hangers and keep concrete out of insert recess.
- 2) Insert opening inside shell approximately 16 mm (5/8 inch) wide by 9 mm (3/8 inch) high over top of wire.
- 3) Wire 5 mm (3/16 inch) diameter with length to provide positive hooked anchorage in concrete.

E. Clips: Galvanized steel, designed to secure framing member in place.

F. Tile Splines: ASTM C635.

G. Wire: ASTM A641.

1. Size:

- a. Wire Hangers: Minimum diameter 2.68 mm (0.1055 inch).
- b. Bracing Wires: Minimum diameter 3.43 mm (0.1350 inch).

## 2.6 ACCESSORIES

A. Adhesives: Low pollutant-emitting, water based type recommended by adhered product manufacturer for each application.

B. Perimeter Seal: Vinyl, polyethylene or polyurethane open cell sponge material, density of 1.3 plus or minus 10 percent, compression set less than 10 percent with pressure sensitive adhesive coating on one side.

1. Thickness: As required to fill voids between back of wall molding and finish wall.
2. Size: Minimum 9 mm (3/8 inch) wide strip.

C. Access Identification Markers: Colored markers with pressure sensitive adhesive on one side, paper or plastic, 6 to 9 mm (1/4 to 3/8 inch) diameter.

1. Color Code: Provide the following color markers for service identification:

| Color  | Service                                  |
|--------|--|
| Red    | Sprinkler System: Valves and Controls    |
| Green  | Domestic Water: Valves and Controls      |
| Yellow | Chilled Water and Heating Water          |
| Orange | Ductwork: Fire Dampers                   |
| Blue   | Ductwork: Dampers and Controls           |
| Black  | Gas: Laboratory, Medical, Air and Vacuum |

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Remove existing acoustical panels and suspension system to permit new installation.
  1. Retain existing acoustical panels and suspension system for reuse if undamaged.
  2. Dispose of other removed materials.

#### **3.2 INSTALLATION - GENERAL**

- A. Install products according to manufacturer's instructions.
  1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

#### **3.3 ACOUSTICAL UNIT INSTALLATION**

- A. Applications:
  1. Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding.
- B. Layout acoustical unit symmetrically, with minimum number of joints.
- C. Installation:
  1. Install acoustic tiles after wet finishes have been installed and solvents have cured.

2. Install lay-in acoustic panels in exposed grid with minimum 6 mm (1/4 inch) bearing at edges on supports.
  - a. Install tile to lay level and in full contact with exposed grid.
  - b. Replace cracked, broken, stained, or dirty tile.
3. Tile in concealed grid upward access suspension system:
  - a. Install acoustical tile with joints close, straight and true to line, and with exposed surfaces level and flush at joints.
  - b. Make corners and arises full, and without worn or broken places.
  - c. Locate acoustical units providing access to service systems.
4. Adhesive applied tile:
  - a. Condition of surface according to ASTM D1779, Note 1, Cleanliness of Surface, and Note 4, Rigidity of Base Surface.
  - b. Size or seal surface as recommended by manufacturer of adhesive and allow to dry before installing units.
5. Markers:
  - a. Install color coded markers to identify the various concealed piping, mechanical, and plumbing systems.
  - b. Attach colored markers to exposed grid on opposite sides of the units providing access.
  - c. Attach marker on exposed ceiling surface of upward access acoustical unit.
- D. Touch up damaged factory finishes.
  1. Repair painted surfaces with touch up primer.

### **3.4 CEILING SUSPENSION SYSTEM INSTALLATION**

- A. General: Install according to ASTM C636.
  1. Use direct or indirect hung suspension system or combination of both.
  2. Support a maximum area of 1.48 sq. m (16 sq. ft.) of ceiling per hanger.
  3. Prevent deflection in excess of 1/360 of span of cross runner and main runner.
  4. Provide additional hangers located at each corner of support components.
  5. Provide minimum 100 mm (4 inch) clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams or joists; and steel beam or bar joist unless furred system is shown.
  6. Provide main runners minimum 1200 mm (48 inches) in length.

7. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.
- B. Direct Hung Suspension System: ASTM C635.
1. Support main runners by hanger wires attached directly to the structure overhead.
  2. Maximum spacing of hangers, 1200 mm (4 feet) on centers unless interference occurs by mechanical systems. Use indirect hung suspension system where not possible to maintain hanger spacing.
- C. Anchorage to Structure:
1. Concrete:
    - a. Install hanger inserts and wire loops required for support of hanger wire. Install hanger wires with looped ends through steel deck when steel deck does not have attachment device.
    - b. Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger and bracing wire. Install in sides of concrete beams or joists at mid height.
  2. Steel:
    - a. Install carrying channels for attachment of hanger wires.
      - 1) Size and space carrying channels to support load within performance limit.
      - 2) Attach hangers to steel carrying channels, spaced four feet on center, unless area supported or deflection exceeds the amount specified.
    - b. Attach carrying channels to the bottom flange of steel beams spaced not 1200 mm (4 feet) on center before fireproofing is installed. Weld or use steel clips for beam attachment.
    - c. Attach hangers to bottom chord of bar joists or to carrying channels installed between the bar joists when hanger spacing prevents anchorage to joist. Rest carrying channels on top of the bottom chord of the bar joists, and securely wire tie or clip to joist.
- D. Indirect Hung Suspension System: ASTM C635.
1. Space carrying channels for indirect hung suspension system maximum 1200 mm (4 feet) on center. Space hangers for carrying channels maximum 2400 mm (8 feet) on center or for carrying channels less than 1200 mm (4 feet) on center so as to insure that specified requirements are not exceeded.

2. Support main runners by specially designed clips attached to carrying channels.

### **3.5 CEILING TREATMENT**

#### **A. Moldings:**

1. Install metal wall molding at perimeter of room, column, or edge at vertical surfaces.
2. Install special shaped molding at changes in ceiling heights and at other breaks in ceiling construction to support acoustical units and to conceal their edges.

#### **B. Perimeter Seal:**

1. Install perimeter seal between vertical leg of wall molding and finish wall, partition, and other vertical surfaces.
2. Install perimeter seal to finish flush with exposed faces of horizontal legs of wall molding.

#### **C. Existing ceiling:**

1. Where extension of existing ceilings occurs, match existing.
2. Where acoustical units are salvaged and reinstalled or joined, use salvaged units within a space. Do not mix new and salvaged units within a space which results in contrast between old and new acoustic units.
3. Comply with specifications for new acoustical units for new units required to match appearance of existing units.

### **3.6 CLEANING**

- A. Remove excess adhesive before adhesive sets.
- B. Clean exposed surfaces. Remove contaminants and stains.

- - - E N D - - -

**SECTION 09 72 16**  
**VINYL-COATED FABRIC WALL COVERINGS**

**PART 1 - GENERAL****1.1 DESCRIPTION:**

- A. Section specifies vinyl coated fabric wall covering and installation.

**1.2 RELATED WORK:**

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Color, pattern, type, direction of hanging and areas to receive wall covering: to match existing.

**1.3 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Samples:
1. Each type and pattern to match existing.
  2. Size: Full width of mill run not less than 450 mm (18 inches) in length.
- D. Manufacturer's Certificates:
1. Compliance with WA W-101.
  2. Wall covering manufacturer's approval of adhesive.
- E. Manufacturer's Literature and Data:
1. Wall covering primer and adhesive.
  2. Installation instructions.
  3. Maintenance instructions, including recommended materials and methods for maintaining wall covering with precautions in use of cleaning material.
  4. Adhesive for edge guard and wainscot cap as needed.
- F. Tests: Substrate moisture.

**1.4 QUALITY ASSURANCE:**

- A. Finish one complete wall (full height, not less than 2438 mm (8 feet) in length) of each type (color and pattern) of wall covering showing specified colors and patterns.
- B. After Contracting Officer Representative (COR) approval, the sample installation will serve as a standard for work throughout the project.



**1.5 DELIVERY, STORAGE AND HANDLING:**

- A. Deliver in original unopened containers bearing the manufacturer's name, brand name, and product designation.
- B. Store in accordance with manufacturer's instructions.
- C. Handle to prevent damage to material.

**1.6 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. ASTM International (ASTM):
  - E84-14.....Surface Burning Characteristics of Building Materials
  - G21-13.....Determining Resistance of Synthetic Polymeric Materials to Fungi
- C. Code of Federal Regulation (CFR):
  - 40 CFR 59.....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating
- D. Wallcovering Association (WA):
  - W-101-13.....Quality Standard Polymer Coated Fabric Wallcoverings

**PART 2 - PRODUCTS****2.1 VINYL COATED FABRIC WALL COVERING:**

- A. Comply with WA W-101.
- B. Fungi Resistance: ASTM G21, rating of zero (0).
- C. Factory-applied clear delustered polyvinyl-fluoride (PVF) coating:
  - 1. Minimum 0.0125 mm (1/2 mil) thickness.
  - 2. Do not include PVF coating weight in minimum total weight.
  - 3. Fire hazard classification with PVF coating: Class A unless specified otherwise.
- D. Type I (Light Duty).
- E. Type II (Medium Duty).
- F. Type III (Heavy Duty).

**2.2 PRIMER AND ADHESIVE:**

- A. Adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, (EPA Method 24).

- B. Vermin, mildew resistant and germicidal inhibiting type recommended by wall covering manufacturer for use on substrate to receive wall covering.

### **PART 3 - EXECUTION**

#### **3.1 JOB CONDITIONS:**

- A. Temperatures:
  - 1. Do not perform work until surfaces and materials have been maintained at minimum of 16 degrees C (60 degrees F) for three (3) days before work begins.
  - 2. Maintain minimum temperatures of 16 degrees C (60 degrees F) until adhesives are dried or cured.
- B. Lighting:
  - 1. Do not proceed unless a minimum lighting level of 15 candela per 0.09 square meter (15 candela per square foot) is provided.
  - 2. Measure light level at mid-height of wall.
- C. Ventilation: Provide continuous ventilation as required to rid the spaces in which the wall coverings are being installed of volatile compounds given off by the wall coverings, sealers and adhesives and as recommended by the product manufacturer for full drying or curing.
- D. Protect other surfaces from damage resulting from installation of wall coverings. Provide drop cloths, shields and protective equipment to prevent primers, adhesives or wall covering from fouling adjacent surfaces and in particular, storage and preparation areas.
- E. Store flammable rubbish, waste, cloths and materials which may constitute a fire hazard, in closed metal containers. Daily remove and properly dispose of flammable wastes from the site.

#### **3.2 SURFACE CONDITION AND PREPARATION:**

- A. Inspect surfaces to receive wall coverings to assure that:
  - 1. Patches and repairs to substrates are completed.
  - 2. Surfaces are clean, smooth and prime painted.
  - 3. Masonry and concrete walls are to have flush joints. Coat these walls with cement plaster or wall/liner as substrate preparation.
- B. Surfaces to receive wall covering are to be dry. Test moisture content of plaster, concrete, and masonry walls with an electric moisture meter. The moisture content is not permitted to be more than 5 percent. Submit test results.
- C. Do not proceed until discovered defects have been corrected by other trades and surfaces are ready to receive wall covering.

- D. Carefully remove electrical outlet and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings and fastenings, prior to starting work and store items for reinstallation.

### **3.3 APPLICATION OF ADHESIVE:**

- A. Mix and apply adhesives in accordance with manufacturer's directions.
- B. Prevent adhesive from getting on face of wall covering.
- C. Apply adhesive to wall covering back.

### **3.4 INSTALLATION:**

- A. Use wall covering of same batch or run in each area. Use fabric rolls in consecutive numerical sequence of manufacture.
- B. Install material completely adhered, smooth, clean, without wrinkles, air pockets, gaps or overlaps.
- C. Extend wall covering continuous behind non-built-in casework and other items which are not bolted to the walls.
- D. Install wall covering before installation of resilient base. Extend wall covering not more than 6 mm (1/4 inch) below top of resilient base.
- E. Install wall covering panels consecutively in order in which they are cut from the roll including filling spaces above or below windows, doors, or similar penetrations.
- F. Do not install horizontal seams.
- G. Except on match patterns, hang fabric by reversing alternate strips, except as recommended by the manufacturer.
- H. Cutting:
  - 1. Cut on a work table with a straight edge.
  - 2. Joints or seams that are not cut clean are unacceptable.
  - 3. Trim additional selvage to achieve a color and pattern match at seams. Overlapped seams are not allowed.
  - 4. Do not double cut seams on wall unless specified.
  - 5. If double cutting on the wall is necessary, place a three inch strip of Type I wall covering under pasted edge.
    - a. Do not cut into wall surface.
    - b. After cutting, remove strip and excess adhesive from seam before proceeding to next seam.
    - c. Smooth down seam in adhesive for tight bond and joint.
- I. Trim strip-matched patterns which are not factory pre-trimmed.
- J. Inside Corners:

1. Wrap wall covering around corners.
2. Do not seam within 50 mm (2 inches) of inside corners.
3. Double cut seams.

K. Outside Corners:

1. Wrap wall covering around corners.
2. Do not seam within 152 mm (6 inches) of outside corners.
3. Double cut seams.

**3.5 PATCHING:**

- A. Replace surface damaged wall covering in a space as specified for new work:
1. Replace full height of surface.
  2. Replace from break in plane to break in plane when same batch or run is not used.
  3. Double cut seams.
  4. Adjoining differential colors from separate batches or runs is not acceptable.
- B. Correct loose or raised seams with adhesives to lay flat with tight bonded joint as specified for new work.

**3.6 CLEANING AND INSTALLING TEMPORARY REMOVED ITEMS:**

- A. Remove adhesive from wall covering as work proceeds.
- B. Remove adhesives where spilled, splashed or splattered on wall coverings or adjacent surfaces in a manner not to damage surface from which it is removed.
- C. Upon completion of work, leave wall covering free of dirt or soil.
- D. Remove all debris associated with wall covering installation.
- E. Reinstall previously removed electrical outlet and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings and fastenings.

- - - E N D - - -

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

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the painting and finishing as shown on the construction documents and/or specified herein including the following:
1. Prime coats which shall be applied in shop under other sections.
  2. Prime painting unprimed surfaces to be painted under this Section.
  3. Painting items furnished with a prime coat of paint, including touching up of or repairing of abraded, damaged or rusted prime coats applied by others.
  4. Painting ferrous metal (except stainless steel) exposed to view.
  5. Painting galvanized ferrous metals exposed to view.
  6. Painting interior concrete block exposed to view.
  7. Painting gypsum drywall exposed to view.
  8. Painting of wood exposed to view, except items which are specified to be painted or finished under other Sections of these specifications. Back painting of all wood in contact with concrete, masonry or other moisture areas.
  9. Painting pipes, pipe coverings, conduit, ducts, insulation, hangers, supports and other mechanical and electrical items and equipment exposed to view.
  10. Painting surfaces above, behind or below grilles, gratings, diffusers, louvers lighting fixtures, and the like, which are exposed to view through these items.
  11. Painting includes shellacs, stains, varnishes, coatings specified, and striping or markers and identity markings.
  12. Incidental painting and touching up as required to produce proper finish for painted surfaces, including touching up of factory finished items.
  13. Painting of any surface not specifically mentioned to be painted herein or on construction documents, but for which painting is obviously necessary to complete the job, or work which comes within the intent of these specifications, is to be included as though specified.

**1.2 RELATED WORK:**

- A. Activity Hazard Analysis: Section 01 35 26, SAFETY REQUIREMENTS.

- B. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS.
- C. Lead Paint Removal: Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.
- D. Masonry Repairs: Section 04 05 13, MASONRY MORTARING D. Shop prime painting of steel and ferrous metals: Division 26 - ELECTRICAL
- E. Type of Finish, Color, and Gloss Level of Finish Coat: Section 09 06 00, SCHEDULE FOR FINISHES.
- F. GYPSUM BOARD, Section 09 29 00.

### 1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals as described below:
  - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Painter qualifications.
- D. Manufacturer's Literature and Data:
  - 1. Before work is started, or sample panels are prepared, submit manufacturer's literature and technical data, the current Master Painters Institute (MPI) "Approved Product List" indicating brand label, product name and product code as of the date of contract award, shall be used to determine compliance with the submittal requirements of this specification. The Contractor shall choose to use subsequent MPI "Approved Product List", however, only one (1) list shall be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate shall be from a single manufacturer. No variation from the MPI "Approved Product List" where applicable is acceptable.
- E. Sample Panels:
  - 1. After painters' materials have been approved and before work is started submit sample panels showing each type of finish and color specified.
  - 2. Panels to Show Color: Composition board, 100 x 250 mm (4 x 10 inch).
  - 3. Panel to Show Transparent Finishes: Wood of same species and grain pattern as wood approved for use, 100 x 250 mm (4 x 10 inch face) minimum, and where both flat and edge grain shall be exposed, 250 mm (10 inches) long by sufficient size, 50 x 50 mm (2 x 2 inch) minimum or actual wood member to show complete finish.
  - 4. Attach labels to panel stating the following:

- a. Federal Specification Number or manufacturers name and product number of paints used.
- b. Specification code number specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- c. Product type and color.
- d. Name of project.
- 5. Strips showing not less than 50 mm (2 inch) wide strips of undercoats and 100 mm (4 inch) wide strip of finish coat.
- F. Sample of identity markers if used.
- G. Manufacturers' Certificates indicating compliance with specified requirements:
  - 1. Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.
  - 2. High temperature aluminum paint.
  - 3. Epoxy coating.
  - 4. Intumescent clear coating or fire retardant paint.
  - 5. Plastic floor coating.

#### **1.4 DELIVERY AND STORAGE:**

- A. Deliver materials to site in manufacturer's sealed container marked to show following:
  - 1. Name of manufacturer.
  - 2. Product type.
  - 3. Batch number.
  - 4. Instructions for use.
  - 5. Safety precautions.
- B. In addition to manufacturer's label, provide a label legibly printed as following:
  - 1. Federal Specification Number, where applicable, and name of material.
  - 2. Surface upon which material is to be applied.
  - 3. Specify Coat Types: Prime; body; finish.
- C. Maintain space for storage, and handling of painting materials and equipment in a ventilated, neat and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.
- D. Store materials at site at least 24 hours before using, at a temperature between 7 and 30 degrees C (45 and 85 degrees F).

#### **1.5 QUALITY ASSURANCE:**

- A. Qualification of Painters: Use only qualified journeyman painters for the mixing and application of paint on exposed surfaces. Submit evidence that

key personnel have successfully performed surface preparation and application of coating on a minimum of three (3) similar projects within the past three (3) years.

- B. Paint Coordination: Provide finish coats which are compatible with the prime paints used. Review other Sections of these specifications in which prime paints shall be provided to ensure compatibility of the total coatings system for the various substrates. Upon request from other subcontractors, furnish information on the characteristics of the finish materials proposed to be used, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the Contracting Officer Representative (COR) in writing of any anticipated problems using the coating systems as specified with substrates primed by others.

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

- A. Paint materials are to conform to the restrictions of the local Environmental and Toxic Control jurisdiction.
1. Volatile Organic Compounds (VOC) Emissions Requirements: Field-applied paints and coatings that are inside the waterproofing system to not exceed limits of authorities having jurisdiction.
  2. Lead-Based Paint:
    - a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
    - b. Regulations concerning prohibition against use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.
    - c. Do not use coatings having a lead content over 0.06 percent by weight of non-volatile content.
    - d. For lead-paint removal, see Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.
  3. Asbestos: Provide materials that do not contain asbestos.
  4. Chromate, Cadmium, Mercury, and Silica: Provide materials that do not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
  5. Human Carcinogens: Provide materials that do not contain any of the ACGIH-BKLT and ACGIH-DOC confirmed or suspected human carcinogens.
  6. Use high performance acrylic paints in place of alkyd paints.



**1.7 SAFETY AND HEALTH**

- A. Apply paint materials using safety methods and equipment in accordance with the following:
  - 1. Comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis (AHA) as specified in Section 01 35 26, SAFETY REQUIREMENTS. The AHA is to include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.
- B. Safety Methods Used During Paint Application: Comply with the requirements of SSPC PA Guide 10.
- C. Toxic Materials: To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:
  - 1. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.
  - 2. 29 CFR 1910.1000.
  - 3. ACHIH-BKLT and ACGIH-DOC, threshold limit values.

**1.8 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.
- B. American Conference of Governmental Industrial Hygienists (ACGIH):
  - ACGIH TLV-BKLT-2012.....Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
  - ACGIH TLV-DOC-2012.....Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)
- C. ASME International (ASME):
  - A13.1-07(R2013).....Scheme for the Identification of Piping Systems
- D. Code of Federal Regulation (CFR):
  - 40 CFR 59.....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating
- E. Commercial Item Description (CID):
  - A-A-1272A.....Plaster Gypsum (Spackling Compound)
- F. Federal Specifications (Fed Spec):
  - TT-P-1411A.....Paint, Copolymer-Resin, Cementitious (For Waterproofing Concrete and Masonry Walls) (CEP)

## G. Master Painters Institute (MPI):

- 1.....Aluminum Paint
- 4.....Interior/ Exterior Latex Block Filler
- 5.....Exterior Alkyd Wood Primer
- 7.....Exterior Oil Wood Primer
- 8.....Exterior Alkyd, Flat MPI Gloss Level 1
- 9.....Exterior Alkyd Enamel MPI Gloss Level 6
- 10.....Exterior Latex, Flat
- 11.....Exterior Latex, Semi-Gloss
- 18.....Organic Zinc Rich Primer
- 22.....Aluminum Paint, High Heat (up to 590° - 1100F)
- 27.....Exterior / Interior Alkyd Floor Enamel, Gloss
- 31.....Polyurethane, Moisture Cured, Clear Gloss
- 36.....Knot Sealer
- 43.....Interior Satin Latex, MPI Gloss Level 4
- 44.....Interior Low Sheen Latex, MPI Gloss Level 2
- 45.....Interior Primer Sealer
- 46.....Interior Enamel Undercoat
- 47.....Interior Alkyd, Semi-Gloss, MPI Gloss Level 5
- 48.....Interior Alkyd, Gloss, MPI Gloss Level 6
- 50.....Interior Latex Primer Sealer
- 51.....Interior Alkyd, Eggshell, MPI Gloss Level 3
- 52.....Interior Latex, MPI Gloss Level 3
- 53.....Interior Latex, Flat, MPI Gloss Level 1
- 54.....Interior Latex, Semi-Gloss, MPI Gloss Level 5
- 59.....Interior/Exterior Alkyd Porch & Floor Enamel, Low  
Gloss
- 60.....Interior/Exterior Latex Porch & Floor Paint, Low  
Gloss
- 66.....Interior Alkyd Fire Retardant, Clear Top-Coat (ULC  
Approved)
- 67.....Interior Latex Fire Retardant, Top-Coat (ULC  
Approved)
- 68.....Interior/ Exterior Latex Porch & Floor Paint,  
Gloss
- 71.....Polyurethane, Moisture Cured, Clear, Flat
- 77.....Epoxy Cold Cured, Gloss
- 79.....Marine Alkyd Metal Primer

|          |  |
|----------|--|
| 90.....  | Interior Wood Stain, Semi-Transparent  |
| 91.....  | Wood Filler Paste  |
| 94.....  | Exterior Alkyd, Semi-Gloss   |
| 95.....  | Fast Drying Metal Primer   |
| 98.....  | High Build Epoxy Coating   |
| 101..... | Epoxy Anti-Corrosive Metal Primer  |
| 108..... | High Build Epoxy Coating, Low Gloss  |
| 114..... | Interior Latex, Gloss  |
| 119..... | Exterior Latex, High Gloss (acrylic)   |
| 134..... | Galvanized Water Based Primer  |
| 135..... | Non-Cementitious Galvanized Primer   |
| 138..... | Interior High Performance Latex, MPI Gloss Level 2                             |
| 139..... | Interior High Performance Latex, MPI Gloss Level 3                             |
| 140..... | Interior High Performance Latex, MPI Gloss Level 4                             |
| 141..... | Interior High Performance Latex (SG) MPI Gloss<br>Level 5                      |
| 163..... | Exterior Water Based Semi-Gloss Light Industrial<br>Coating, MPI Gloss Level 5 |

H. Society for Protective Coatings (SSPC):

|                           |   |
|---------------------------|---|
| SSPC SP 1-82 (R2004)..... | Solvent Cleaning                        |
| SSPC SP 2-82 (R2004)..... | Hand Tool Cleaning                      |
| SSPC SP 3-28 (R2004)..... | Power Tool Cleaning                     |
| SSPC SP 10/NACE No.2..... | Near-White Blast Cleaning               |
| SSPC PA Guide 10.....     | Guide to Safety and Health Requirements |

I. Maple Flooring Manufacturer's Association (MFMA):

J. U.S. National Archives and Records Administration (NARA):

|                       |                  |
|-----------------------|------------------|
| 29 CFR 1910.1000..... | Air Contaminants |
|-----------------------|------------------|

K. Underwriter's Laboratory (UL)

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS:**

- A. Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents.

### **2.2 PAINT PROPERTIES:**

- A. Use ready-mixed (including colors), except two component epoxies, polyurethanes, polyesters, paints having metallic powders packaged separately and paints requiring specified additives.

- B. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.
- C. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only to recommended limits.
- D. VOC Content: For field applications that are inside the weatherproofing system, paints and coating to comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
  - 1. Flat Paints and Coatings: 50 g/L.
  - 2. Non-flat Paints and Coatings: 150 g/L.
  - 3. Dry-Fog Coatings: 400 g/L.
  - 4. Primers, Sealers, and Undercoaters: 200 g/L.
  - 5. Anticorrosive and Antirust Paints applied to Ferrous Metals: 250 g/L.
  - 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
  - 7. Pretreatment Wash Primers: 420 g/L.
- E. VOC test method for paints and coatings is to be in accordance with 40 CFR 59 (EPA Method 24). Part 60, Appendix A with the exempt compounds' content determined by Method 303 (Determination of Exempt Compounds) in the South Coast Air Quality Management District's (SCAQMD) "Laboratory Methods of Analysis for Enforcement Samples" manual.

### **2.3 PLASTIC TAPE:**

- A. Pigmented vinyl plastic film in colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES or specified.
- B. Pressure sensitive adhesive back.
- C. Widths as shown on construction documents.

## **PART 3 - EXECUTION**

### **3.1 JOB CONDITIONS:**

- A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling and application of painting materials.
  - 1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
  - 2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each day's work.
- B. Atmospheric and Surface Conditions:
  - 1. Do not apply coating when air or substrate conditions are:

- a. Less than 3 degrees C (5 degrees F) above dew point.
  - b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the COR and the product manufacturer. Under no circumstances are application conditions to exceed manufacturer recommendations.
  - c. When the relative humidity exceeds 85 percent; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.
2. Maintain interior temperatures until paint dries hard.
  3. Do no exterior painting when it is windy and dusty.
  4. Do not paint in direct sunlight or on surfaces that the sun will warm.
  5. Apply only on clean, dry and frost free surfaces except as follows:
    - a. Apply water thinned acrylic and cementitious paints to damp (not wet) surfaces only when allowed by manufacturer's printed instructions.
    - b. Concrete and masonry when permitted by manufacturer's recommendations, dampen surfaces to which water thinned acrylic and cementitious paints are applied with a fine mist of water on hot dry days to prevent excessive suction and to cool surface.

### **3.2 INSPECTION:**

- A. Examine the areas and conditions where painting and finishing shall be applied and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

### **3.3 GENERAL WORKMANSHIP REQUIREMENTS:**

- A. Application shall be by brush or roller. Spray application only upon acceptance from the COR in writing.
- B. Furnish to the COR a painting schedule indicating when the respective coats of paint for the various areas and surfaces shall be completed. This schedule is to be kept current as the job progresses.
- C. Protect work at all times. Protect all adjacent work and materials by suitable covering or other method during progress of work. Upon completion of the work, remove all paint and varnish spots from floors, glass and other surfaces. Remove from the premises all rubbish and accumulated materials of whatever nature not caused by others and leave work in a clean condition.
- D. Remove and protect hardware, accessories, device plates, lighting fixtures, and factory finished work, and similar items, or provide in

place protection. Upon completion of each space, carefully replace all removed items by workmen skilled in the trades involved.

- E. When indicated to be painted, remove electrical panel box covers and doors before painting walls. Paint separately and re-install after all paint is dry.
- F. Materials shall be applied under adequate illumination, evenly spread and flowed on smoothly to avoid runs, sags, holidays, brush marks, air bubbles and excessive roller stipple.
- G. Apply materials with a coverage to hide substrate completely. When color, stain, dirt or undercoats show through final coat of paint, the surface is to be covered by additional coats until the paint film is of uniform finish, color, appearance and coverage, at no additional cost to the Government.
- H. All coats shall be dry to manufacturer's recommendations before applying succeeding coats.
- I. All suction spots or "hot spots" in plaster after the application of the first coat shall be touched up before applying the second coat.
- J. Do not apply paint behind frameless mirrors that use mastic for adhering to wall surface.

### **3.4 SURFACE PREPARATION:**

#### **A. General:**

- 1. The Contractor shall be held wholly responsible for the finished appearance and satisfactory completion of painting work. Properly prepare all surfaces to receive paint, which includes cleaning, sanding, and touching-up of all prime coats applied under other Sections of the work. Broom clean all spaces before painting is started. All surfaces to be painted or finished shall be completely dry, clean and smooth.
- 2. See other sections of specifications for specified surface conditions and prime coat.
- 3. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
- 4. Clean surfaces before applying paint or surface treatments with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use solvents, acid, or steam on concrete and masonry. Schedule the cleaning

- and painting so that dust and other contaminants from the cleaning process shall not fall in wet, newly painted surfaces.
5. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
    - a. Concrete: 12 percent.
    - b. Fiber-Cement Board: 12 percent.
    - c. Masonry (Clay and CMU's): 12 percent.
    - d. Wood: 15 percent.
    - e. Gypsum Board: 12 percent.
    - f. Plaster: 12 percent.
- B. Wood:
1. Sand to a smooth even surface and then dust off.
  2. Sand surfaces showing raised grain smooth between each coat.
  3. Wipe surface with a tack rag prior to applying finish.
  4. Surface painted with an opaque finish:
    - a. Coat knots, sap and pitch streaks with MPI 36 (Knot Sealer) before applying paint.
    - b. Apply two coats of MPI 36 (Knot Sealer) over large knots.
  5. After application of prime or first coat of stain, fill cracks, nail and screw holes, depressions and similar defects with wood filler paste. Sand the surface to make smooth and finish flush with adjacent surface.
  6. Before applying finish coat, reapply wood filler paste if required, and sand surface to remove surface blemishes. Finish flush with adjacent surfaces.
  7. Fill open grained wood such as oak, walnut, ash and mahogany with MPI 91 (Wood Filler Paste), colored to match wood color.
    - a. Thin filler in accordance with manufacturer's instructions for application.
    - b. Remove excess filler, wipe as clean as possible, dry, and sand as specified.
- C. Ferrous Metals:
1. Remove oil, grease, soil, drawing and cutting compounds, flux and other detrimental foreign matter in accordance with SSPC-SP 1 (Solvent Cleaning).
  2. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, as defined in SSPC-SP 2 (Hand Tool Cleaning) and SSPC-SP 3

- (Power Tool Cleaning). Where high temperature aluminum paint is used, prepare surface in accordance with paint manufacturer's instructions.
3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish with TT-F-322D (Filler, Two-Component Type, For Dents, Small Holes and Blow-Holes). Finish flush with adjacent surfaces.
    - a. Fill flat head countersunk screws used for permanent anchors.
    - b. Do not fill screws of item intended for removal such as glazing beads.
  4. Spot prime abraded and damaged areas in shop prime coat which expose bare metal with same type of paint used for prime coat. Feather edge of spot prime to produce smooth finish coat.
  5. Spot prime abraded and damaged areas which expose bare metal of factory finished items with paint as recommended by manufacturer of item.
- D. Zinc-Coated (Galvanized) Metal, Aluminum, Copper and Copper Alloys Surfaces Specified Painted:
1. Clean surfaces to remove grease, oil and other deterrents to paint adhesion in accordance with SSPC-SP 1 (Solvent Cleaning).
  2. Spot coat abraded and damaged areas of zinc-coating which expose base metal on hot-dip zinc-coated items with MPI 18 (Organic Zinc Rich Coating). Prime or spot prime with MPI 134 (Waterborne Galvanized Primer) or MPI 135 (Non-Cementitious Galvanized Primer) depending on finish coat compatibility.
- E. Masonry, Concrete, Cement Board, Cement Plaster and Stucco:
1. Clean and remove dust, dirt, oil, grease efflorescence, form release agents, laitance, and other deterrents to paint adhesion.
  2. Use emulsion type cleaning agents to remove oil, grease, paint and similar products. Use of solvents, acid, or steam is not permitted.
  3. Remove loose mortar in masonry work.
  4. Replace mortar and fill open joints, holes, cracks and depressions with new mortar specified in Section 04 05 13, MASONRY MORTARING. Do not fill weep holes. Finish to match adjacent surfaces.
  5. Neutralize Concrete floors to be painted by washing with a solution of 1.4 Kg (3 pounds) of zinc sulfate crystals to 3.8 L (1 gallon) of water, allow to dry three (3) days and brush thoroughly free of crystals.



6. Repair broken and spalled concrete edges with concrete patching compound to match adjacent surfaces as specified in Division 03, CONCRETE Sections. Remove projections to level of adjacent surface by grinding or similar methods.

F. Gypsum Plaster and Gypsum Board:

1. Remove efflorescence, loose and chalking plaster or finishing materials.
2. Remove dust, dirt, and other deterrents to paint adhesion.
3. Fill holes, cracks, and other depressions with CID-A-A-1272A finished flush with adjacent surface, with texture to match texture of adjacent surface. Patch holes over 25 mm (1-inch) in diameter as specified in Section for plaster or gypsum board.

**3.5 PAINT PREPARATION:**

- A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.
- B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.
- C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles.
- D. Mix two (2) component and two (2) part paint and those requiring additives in such a manner as to uniformly blend as specified in manufacturer's printed instructions unless specified otherwise.
- E. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

**3.6 APPLICATION:**

- A. Start of surface preparation or painting shall be construed as acceptance of the surface as satisfactory for the application of materials.
- B. Unless otherwise specified, apply paint in three (3) coats; prime, body, and finish. When two (2) coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.
- C. Apply each coat evenly and cover substrate completely.
- D. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by COR.
- E. Apply by brush or roller. Spray application for new or existing occupied spaces only upon approval by acceptance from COR in writing.

- F. Do not paint in closed position operable items such as access doors and panels, window sashes, overhead doors, and similar items except overhead roll-up doors and shutters.

### **3.7 PRIME PAINTING:**

- A. After surface preparation, prime surfaces before application of body and finish coats, except as otherwise specified.
- B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.
- C. Additional field applied prime coats over shop or factory applied prime coats are not required except for exterior exposed steel apply an additional prime coat.
- D. Prime rabbets for stop and face glazing of wood, and for face glazing of steel.
- E. Wood and Wood Particleboard:
1. Use same kind of primer specified for exposed face surface.
    - a. Exterior wood: MPI 7 (Exterior Oil Wood Primer) for new construction and MPI 5 (Exterior Alkyd Wood Primer) for repainting bare wood primer except where MPI 90 (Interior Wood Stain, Semi-Transparent) is scheduled.
    - b. Interior wood except for transparent finish: MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat), thinned if recommended by manufacturer.
    - c. Transparent finishes as specified under "Transparent Finishes on Wood Except Floors Article".
  2. Apply two (2) coats of primer MPI 7 (Exterior Oil Wood Primer) or MPI 5 (Exterior Alkyd Wood Primer) or sealer MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) to surfaces of wood doors, including top and bottom edges, which are cut for fitting or for other reason.
  3. Apply one (1) coat of primer MPI 7 (Exterior Oil Wood Primer) or MPI 5 (Exterior Alkyd Wood Primer) or sealer MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) as soon as delivered to site to surfaces of unfinished woodwork, except concealed surfaces of shop fabricated or assembled millwork and surfaces specified to have varnish, stain or natural finish.
  4. Back prime and seal ends of exterior woodwork, and edges of exterior plywood specified to be finished.

5. Apply MPI 67 (Interior Latex Fire Retardant, Top-Coat (UL Approved) to wood for fire retardant finish.F. Metals except boilers, incinerator stacks, and engine exhaust pipes:
  1. Steel and iron: MPI 95 (Fast Drying Metal Primer). Use MPI 101 (Cold Curing Epoxy Primer) where MPI 77 (Epoxy Cold Cured, Gloss finish is specified).
  2. Zinc-coated steel and iron: MPI 134 (Waterborne Galvanized Primer) .
  3. Aluminum scheduled to be painted: MPI 95 (Fast Drying Metal Primer).
  4. Terne Metal: MPI 79 (Marine Alkyd Metal Primer) 5. Copper and copper alloys scheduled to be painted: MPI 95 (Fast Drying Metal Primer).
  6. Machinery not factory finished: MPI 9 (Exterior Alkyd Enamel).
  7. Asphalt coated metal: MPI 1 (Aluminum Paint).
  8. Metal over 94 degrees C (201 degrees F), Boilers, Incinerator Stacks, and Engine Exhaust Pipes: MPI 22 (High Heat Resistant Coating).
- F. Gypsum Board and Hardboard:
  1. Surfaces scheduled to have MPI 53 (Interior Latex, Flat), MPI Gloss Level 1; MPI 52 (Interior Latex, MPI Gloss Level 3); MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5); or MPI 114 (Interior Latex, Gloss) finish to match existing: Use MPI 53 (Interior Latex, MPI Gloss Level 3), MPI 52 (Interior Latex, MPI Gloss Level 3), MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5), or MPI 114 (Interior Latex, Gloss) respectively.
  2. Primer: MPI 50 (Interior Latex Primer Sealer).
  3. Surfaces scheduled to receive vinyl coated fabric wall covering: Use MPI 45 (Interior Primer Sealer).

### **3.8 EXTERIOR FINISHES:**

- A. Apply following finish coats where specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Wood:
  1. Do not apply finish coats on surfaces concealed after installation, top and bottom edges of wood doors and sash, or on edges of wood framed insect screens.
  2. Two (2) coats of MPI 10 Exterior Latex, Flat), MPI 11 (Exterior Latex, Semi-Gloss), orMPI 119 (Exterior Latex, High Gloss (acrylic)) on exposed surfaces to match existing, except where transparent finish is specified.

3. Two (2) coats of MPI 31 (Polyurethane, Moisture Cured, Clear Gloss) or MPI 71 (Polyurethane, Moisture Cured, Clear Flat) for transparent finish to match existing.

C. Steel and Ferrous Metal, Including Tern:

1. Two (2) coats of MPI 94 (Exterior Alkyd, Semi-Gloss) on exposed surfaces, except on surfaces over 94 degrees C (201 degrees F).

D. Concrete Masonry Units, Brick, Cement Plaster, Concrete, Concrete Sill:

1. General:

- a. See Section 07 24 00, EXTERIOR INSULATION AND FINISH SYSTEMS.

**3.9 INTERIOR FINISHES:**

- A. Apply following finish coats over prime coats in spaces or on surfaces specified in Section 09 06 00, SCHEDULE FOR FINISHES.

B. Gypsum Board:

1. One (1) coat of MPI 45 (Interior Primer Sealer) plus two (2) coats of paint to match existing color, finish, and sheen.

C. Wood:

1. Sanding:

- a. Use 220-grit sandpaper.
- b. Sand sealers and varnish between coats.
- c. Sand enough to scarify surface to assure good adhesion of subsequent coats, to level roughly applied sealer and varnish, and to knock off "whiskers" of any raised grain as well as dust particles.

2. Sealers:

- a. MPI 31 (gloss) or MPI 71 (flat) thinned as recommended by manufacturer at rate of one (1) part of thinner to four (4) parts of varnish.
- b. Apply sealers specified except sealer may be omitted where pigmented, penetrating, or wiping stains containing resins are used.
- c. Allow manufacturer's recommended drying time before sanding, but not less than 24 hours or 36 hours in damp or muggy weather.
- d. Sand as specified.

3. Paint Finish: select from the following to match existing in color, finish, and sheen:

- a. One (1) coat of MPI 45 (Interior Primer Sealer) plus one (1) coat of MPI 47 (Interior Alkyd, Semi-Gloss).
- b. One (1) coat of MPI 45 Interior Primer Sealer) plus one (1) coat of MPI 48 (Interior Alkyd Gloss).
- c. Two (2) coats of MPI 51 (Interior Alkyd, Eggshell).

4. Transparent Finishes on Wood Except Floors.

a. Natural Finish: select from the following to match existing in color, finish, and sheen:

- 1) One (1) coat of sealer MPI 31 (gloss) or MPI 71 (flat) thinned with thinner recommended by manufacturer at rate of one (1) part of thinner to four (4) parts of varnish.
- 2) Two (2) coats of MPI 71 (Polyurethane, Moisture Cured, Clear Flat or MPI 31 (Polyurethane, Moisture Cured, Clear Gloss).

b. Stain Finish: select from the following to match existing in color, finish, and sheen:

- 1) One (1) coat of MPI 90 (Interior Wood Stain, Semi-Transparent).
- 2) Use wood stain of type and color required to achieve finish specified. Do not use varnish type stains.
- 3) One (1) coat of sealer MPI 31 (gloss) or MPI 71 (flat) thinned as recommended by manufacturer at rate of one (1) part of thinner to four (4) parts of varnish.
- 4) Two (2) coats of MPI 71 (Polyurethane, Moisture Cured, Clear Flat) or MPI 31 (Polyurethane Moisture Cured, Clear Gloss).

c. Varnish Finish:

- 1) One (1) coat of sealer MPI 31 (gloss) or MPI 71 (flat) thinned as recommended by manufacturer at rate of one (1) part of thinner to four (4) parts of varnish.
- 2) Two (2) coats of MPI 71 (Polyurethane, Moisture Cured, Clear Flat) or MPI 31 (Polyurethane Moisture Cured, Clear Gloss).

D. Miscellaneous:

1. Apply where specified in drawings.

**3.10 PAINT COLOR:**

A. Color and gloss of finish coats to match existing adjacent surface.

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.

**3.11 MECHANICAL AND ELECTRICAL WORK FIELD PAINTING SCHEDULE:**

A. Field painting of mechanical and electrical consists of cleaning, touching-up abraded shop prime coats, and applying prime, body and finish coats to materials and equipment if not factory finished in space scheduled to be finished.

- B. In spaces not scheduled to be finish painted in Section 09 06 00, SCHEDULE FOR FINISHES paint as specified below.
- C. Paint various systems specified in Division 26 - ELECTRICAL
- D. Paint after tests have been completed.
- E. Omit prime coat from factory prime-coated items.
- F. Finish painting of electrical equipment is not required when located in interstitial spaces, above suspended ceilings, in concealed areas such as electric closets, attics, roof spaces, shafts and furred spaces except on electrical conduit containing feeders 600 volts or more.
- G. Color:
  - 1. Paint items having no color specified in Section 09 06 00, SCHEDULE FOR FINISHES to match surrounding surfaces.
  - 2. Paint colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES except for following:
    - a. Federal Safety Orange: Entire lengths of electrical conduits containing feeders 600 volts or more.
- H. Apply paint systems on properly prepared and primed surface as follows:
  - 1. Interior Locations:
    - a. Apply two (2) coats of MPI 47 (Interior Alkyd, Semi-Gloss) to following items:
      - 1) Equipment and systems such as hinged covers and frames for control cabinets and boxes, cast-iron radiators, electric conduits and panel boards.

### **3.12 BUILDING AND STRUCTURAL WORK FIELD PAINTING:**

- A. Painting and finishing of interior and exterior work except as specified here-in-after.
  - 1. Painting and finishing of new and existing work including colors and gloss of finish selected is specified in Finish Schedule, Section 09 06 00, SCHEDULE FOR FINISHES.
  - 2. Painting of disturbed, damaged and repaired or patched surfaces when entire space is not scheduled for complete repainting or refinishing.
  - 3. Painting of ferrous metal and galvanized metal.
  - 4. Identity painting and safety painting.
- B. Building and Structural Work not Painted:
  - 1. Prefinished items:

- a. Casework, doors, elevator entrances and cabs, metal panels, wall covering, and similar items specified factory finished under other sections.
- b. Factory finished equipment and pre-engineered metal building components such as metal roof and wall panels.
- 2. Finished surfaces:
  - a. Hardware except ferrous metal.
  - b. Anodized aluminum, stainless steel, chromium plating, copper, and brass, except as otherwise specified.
  - c. Signs, fixtures, and other similar items integrally finished.
- 3. Concealed surfaces:
  - a. Inside dumbwaiter, elevator and duct shafts, interstitial spaces, pipe basements, crawl spaces, pipe tunnels, above ceilings, attics, except as otherwise specified.
  - b. Inside walls or other spaces behind access doors or panels.
  - c. Surfaces concealed behind permanently installed casework and equipment.
- 4. Moving and operating parts:
  - a. Shafts, chains, gears, mechanical and electrical operators, linkages, and sprinkler heads, and sensing devices.
  - b. Tracks for overhead or coiling doors, shutters, and grilles.
- 5. Labels:
  - a. Code required label, such as Underwriters Laboratories Inc., Intertek Testing Service or Factory Mutual Research Corporation.
  - b. Identification plates, instruction plates, performance rating, and nomenclature.
- 6. Ceilings, walls, columns in interstitial spaces.

### **3.13 IDENTITY PAINTING SCHEDULE:**

- A. Identify designated service in new buildings or projects with extensive remodeling in accordance with ASME A13.1, unless specified otherwise, on exposed piping, piping above removable ceilings, piping in accessible pipe spaces, interstitial spaces, and piping behind access panels. For existing spaces where work is minor match existing.
  - 1. Legend shall be identified using snap-on coil plastic markers or by paint stencil applications.
  - 2. Apply legends adjacent to changes in direction, on branches, where pipes pass through walls or floors, adjacent to operating accessories such as valves, regulators, strainers and cleanouts a minimum of 12.2 M

- (40 feet) apart on straight runs of piping. Identification next to plumbing fixtures is not required.
3. Locate Legends clearly visible from operating position.
  4. Use arrow to indicate direction of flow using black stencil paint.
  5. Identify pipe contents with sufficient additional details such as temperature, pressure, and contents to identify possible hazard. Insert working pressure shown on construction documents where asterisk appears for High, Medium, and Low Pressure designations as follows:
    - a. High Pressure - 414 kPa (60 psig) and above.
    - b. Medium Pressure - 104 to 413 kPa (15 to 59 psig).
    - c. Low Pressure - 103 kPa (14 psig) and below.
    - d. Add Fuel oil grade numbers.
  6. Legend name in full or in abbreviated form as follows:

| PIPING                                | COLOR OF<br>EXPOSED PIPING | COLOR OF<br>BACKGROUND | COLOR OF<br>LETTERS | LEGEND<br>ABBREVIATIONS |
|---------------------------------------|----------------------------|------------------------|---------------------|-------------------------|
| Blow-off                              |                            | Green                  | White               | Blow-off                |
| Boiler Feedwater                      |                            | Green                  | White               | Blr Feed                |
| A/C Condenser Water Supply            |                            | Green                  | White               | A/C Cond Wtr Sup        |
| A/C Condenser Water Return            |                            | Green                  | White               | A/C Cond Wtr Ret        |
| Chilled Water Supply                  |                            | Green                  | White               | Ch. Wtr Sup             |
| Chilled Water Return                  |                            | Green                  | White               | Ch. Wtr Ret             |
| Shop Compressed Air                   |                            | Blue                   | White               | Shop Air                |
| Air-Instrument Controls               |                            | Green                  | White               | Air-Inst Cont           |
| Drain Line                            |                            | Green                  | White               | Drain                   |
| Emergency Shower                      |                            | Green                  | White               | Emg Shower              |
| High Pressure Steam                   |                            | Green                  | White               | H.P. _____*             |
| High Pressure Condensate Return       |                            | Green                  | White               | H.P. Ret _____*         |
| Medium Pressure Steam                 |                            | Green                  | White               | M. P. Stm _____*        |
| Medium Pressure Condensate Return     |                            | Green                  | White               | M.P. Ret _____*         |
| Low Pressure Steam                    |                            | Green                  | White               | L.P. Stm _____*         |
| Low Pressure Condensate Return        |                            | Green                  | White               | L.P. Ret _____*         |
| High Temperature Water Supply         |                            | Green                  | White               | H. Temp Wtr Sup         |
| High Temperature Water Return         |                            | Green                  | White               | H. Temp Wtr Ret         |
| Hot Water Heating Supply              |                            | Green                  | White               | H. W. Htg Sup           |
| Hot Water Heating Return              |                            | Green                  | White               | H. W. Htg Ret           |
| Gravity Condensate Return             |                            | Green                  | White               | Gravity Cond Ret        |
| Pumped Condensate Return              |                            | Green                  | White               | Pumped Cond Ret         |
| Vacuum Condensate Return              |                            | Green                  | White               | Vac Cond Ret            |
| Fuel Oil - Grade                      | Brown                      | White                  |                     | Fuel Oil-Grade          |
| (Diesel Fuel included under Fuel Oil) |                            |                        |                     |                         |
| Boiler Water Sampling                 |                            | Green                  | White               | Sample                  |



|                         |       |        |       |              |
|-------------------------|-------|--------|-------|--------------|
| Chemical Feed           |       | Green  | White | Chem Feed    |
| Continuous Blow-Down    |       | Green  | White | Cont. B D    |
| Pumped Condensate       |       | Green  | White | Pump Cond    |
| Pump Recirculating      |       | Green  | White | Pump-Recirc. |
| Vent Line               |       | Green  | White | Vent         |
| Alkali                  |       | Orange | Black | Alk          |
| Bleach                  |       | Orange | Black | Bleach       |
| Detergent               |       | Yellow | Black | Det          |
| Liquid Supply           |       | Yellow | Black | Liq Sup      |
| Reuse Water             |       | Yellow | Black | Reuse Wtr    |
| Cold Water (Domestic)   | White | Green  | White | C.W. Dom     |
| Hot Water (Domestic)    |       |        |       |              |
| Supply                  | White | Yellow | Black | H.W. Dom     |
| Return                  | White | Yellow | Black | H.W. Dom Ret |
| Tempered Water          | White | Yellow | Black | Temp. Wtr    |
| Ice Water               |       |        |       |              |
| Supply                  | White | Green  | White | Ice Wtr      |
| Return                  | White | Green  | White | Ice Wtr Ret  |
| Reagent Grade Water     |       | Green  | White | RG           |
| Reverse Osmosis         |       | Green  | White | RO           |
| Sanitary Waste          |       | Green  | White | San Waste    |
| Sanitary Vent           |       | Green  | White | San Vent     |
| Storm Drainage          |       | Green  | White | St Drain     |
| Pump Drainage           |       | Green  | White | Pump Disch   |
| Chemical Resistant Pipe |       |        |       |              |
| Waste                   |       | Orange | Black | Acid Waste   |
| Vent                    |       | Orange | Black | Acid Vent    |
| Atmospheric Vent        |       | Green  | White | ATV          |
| Silver Recovery         |       | Green  | White | Silver Rec   |
| Oral Evacuation         |       | Green  | White | Oral Evac    |
| Fuel Gas                |       | Yellow | Black | Gas          |
| Fire Protection Water   |       |        |       |              |
| Sprinkler               |       | Red    | White | Auto Spr     |
| Standpipe               |       | Red    | White | Stand        |
| Sprinkler               |       | Red    | White | Drain        |

### 3.14 PROTECTION CLEAN UP, AND TOUCH-UP:

- A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.
- B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted, of paint drops or smears.

C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

- - - E N D - - -

**SECTION 12 24 00  
WINDOW SHADES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section includes venetian blinds. Provide window shades complete, including brackets, fittings and hardware.

**1.2 RELATED WORK:**

- A. Color of exposed parts of venetian blinds, (including tapes and cords):  
Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 QUALITY ASSURANCE:**

- A. Manufacturer's Qualification: Submit evidence that the manufacture has a minimum of three (3) years' experience in providing item of type specified, and that the blinds have performed satisfactorily on similar installations. Submit qualifications.
- B. Submit qualifications for installers who are trained and approved by manufacturer for installation of units provided.
- C. Electrical Requirements:
  - 1. NFPA 70 Article 100.
  - 2. Listed and labeled in accordance with UL 325.
  - 3. Marked for intended use, and tested as a system.
  - 4. Individual testing of components is not acceptable in lieu of system testing.

**1.4 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
  - 1. Venetian blind slats, 305 mm (12 inches) long, including cord and tape, showing color and finish.
- C. Manufacturer's literature and data; showing details of construction and hardware for:
  - 1. Venetian blinds
- D. Shop Drawings: Provide fabrication and installation details for cloth shades, including shade cloth materials, their orientation to rollers, and their seam and batten locations.
- E. Fire Testing: Submit report of flame spread and smoke developed during product material tests by independent testing laboratory.

F. Manufacturer's warranty.

#### **1.5 WARRANTY:**

A. Manufacturer Warranty: Manufacturer shall warranty their window shades for a minimum of five (5) years from date of installation and final acceptance by the Government. Submit manufacturer's warranty.

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

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced to in the text by the basic designation only.
- B. Federal Specifications (Fed. Spec.):  
AA-V-00200B.....Venetian Blinds, Shade, Roller, Window, Roller, Slat, Cord, and Accessories
- C. ASTM International (ASTM):  
A240/A240M-14.....Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications  
B221-14.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes  
B221M-13.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)  
  
G21-13.....Determining Resistance of Synthetic Polymeric Materials to Fungi
- D. National Electric Manufacturer's Association (NEMA):  
ICS 6-93(R2006).....Industrial Control and Systems Closures
- E. National Fire Protection Association (NFPA):  
70-14.....National Electrical Code (NEC)  
701-15.....Fire Tests for Flame Propagation of Textiles and Films
- F. Underwriters Laboratories Inc. (UL):  
325-06(R2013).....Door, Drapery, Gate, Louver, and Window Operators and Systems

### **PART 2 - PRODUCTS**

#### **2.1 VENETIAN BLINDS:**

- A. Fed. Spec. AA-V-00200B, Type II, 25 mm (1 inch slats) fabricated of 8-gauge aluminum. Pre-production sample is not required.
- B. Manual Lift-Operator and Tilt-Operator Locations: Manufacturer's standard.

**2.2 Materials:**

- A. Stainless Steel: ASTM A240/A240M.
- B. Extruded Aluminum: ASTM B221M (B221).
- C. Cords for Venetian Blinds: No. 4 braided nylon or No. 4-1/2 braided cotton or #10 stainless steel chain having not less than 80 kg (175 pounds) breaking strength.

**2.3 FASTENINGS:**

- A. Zinc-coated or cadmium plated steel or stainless steel fastenings of length and type recommended by manufacturer. Except as otherwise specified, provide fastenings for installation with various structural materials as follows:

| Type of Fastening                                     | Structural Material                      |
|---|--|
| Wood screw  | Wood                                     |
| Tap screw   | Metal                                    |
| Case-hardened, self-tapping screw in pre-drilled hole | Solid masonry, concrete                  |
| Screw or bolt in expansion shields                    | Solid masonry, concrete                  |
| Toggle bolts  | Hollow blocks, gypsum wallboard, plaster |

**2.4 FABRICATION:**

- A. Fabricate venetian blinds to fit measurements of finished openings obtained at site.
- B. Venetian Blinds: Provide venetian blinds with 25 mm (1 inch) width horizontal slats positioned within ladder tapes. Provide multiple blinds of same type in openings and divided at mullions.
  - 1. Provide head-rails that enclose operating mechanism on three sides and ends.
  - 2. Provide enclosed bottom rails that prevent contact of tapes and sill at underside.
  - 3. In lobbies, provide aluminum bottom rails and head boxes.
  - 4. Finish concealed metal work of head-rails including concealed mechanism, with one (1) shop coat of paint. Do not paint parts that have non-rusting finish, or parts where motion of friction occurs.

**PART 3 - EXECUTION****3.1 INSTALLATION:**

- A. Measure openings before fabrication. Do not scale construction documents.
- B. Venetian Blinds: Support blinds in level position by brackets and intermediate supports that -permit easy removal and replacement of units without damage to blind, or adjacent surfaces. Provide at least two (2) fasteners for each bracket or other support.
  - 1. Install blinds between jambs on window openings with steel trim. Mount brackets on trim reveal, flush with face of trim and secure with steel screws.
  - 2. Install blinds between jambs on window openings with wood trim. Mount brackets on trim or on wood plaster-mold set against plaster or other wall finish, and secure in place.
  - 3. Mount brackets and intermediate supports of lobby blinds on face of trim members, and secure with stainless steel standard tap or thread-forming machine screws, or by cadmium-plated molley or toggle bolts. Penetrate screws and bolts through, and lock behind steel sub-frame.
  - 4. Where blinds abut glass partitions of vestibules, extend head rails to trim at head of partition frame with slats sufficiently long to clear transom bars.
  - 5. Furnish one (1) brush of an approved type suitable for cleaning blinds for each floor of each building.

**3.2 ADJUSTING:**

- A. Adjust and shades to operate smoothly, free from binding or malfunction throughout entire operational range.

**3.3 CLEANING AND PROTECTION:**

- A. Clean shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions that ensure that shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged shades that cannot be repaired, in a manner approved by COR before time of Substantial Completion.

- - - E N D - - -

**SECTION 12 36 00  
COUNTERTOPS**

**PART 1 - GENERAL****1.1 DESCRIPTION**

A. This section specifies window stools.

**1.2 RELATED WORK**

A. Color and patterns of solid surface: SECTION 09 06 00, SCHEDULE FOR FINISHES.

**1.3 SUBMITTALS**

A. Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings

1. Show dimensions of section and method of assembly.
2. Show details of construction at a scale of ½ inch to a foot.

C. Samples:

1. 150 mm (6 inch) square samples each top.
2. Front edge, back splash, end splash and core with surface material and booking.

**1.4 APPLICABLE PUBLICATIONS**

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

B. American Hardboard Association (AHA):

A135.4-95.....Basic Hardboard

C. Composite Panel Association (CPA):

A208.1-09.....Particleboard

D. American Society of Mechanical Engineers (ASME):

A112.18.1-12.....Plumbing Supply Fittings

A112.1.2-12.....Air Gaps in Plumbing System

A112.19.3-08(R2004).....Stainless Steel Plumbing Fixtures (Designed for Residential Use)

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

A167-99 (R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A1008-10.....Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength, Low Alloy

D256-10.....Pendulum Impact Resistance of Plastic

- D570-98 (R2005).....Water Absorption of Plastics
- D638-10.....Tensile Properties of Plastics
- D785-08.....Rockwell Hardness of Plastics and Electrical  
Insulating Materials
- D790-10.....Flexural Properties of Unreinforced and  
Reinforced Plastics and Electrical Insulating  
Materials
- D4690-99 (2005).....Urea-Formaldehyde Resin Adhesives
- F. Federal Specifications (FS):
- A-A-1936.....Adhesive, Contact, Neoprene Rubber
- G. U.S. Department of Commerce, Product Standards (PS):
- PS 1-95.....Construction and Industrial Plywood
- H. National Electrical Manufacturers Association (NEMA):
- LD 3-05.....High Pressure Decorative Laminates

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### A. Fasteners:

1. Metals used for welding same metal as materials joined.
2. Use studs, bolts, spaces, threaded rods with nuts or screws suitable for materials being joined with metal splice plates, channels or other supporting shape.

#### B. Solid Polymer Material:

1. Filled Methyl Methacrylic Polymer.
2. Performance properties required:

| Property                        | Result  | Test                     |
|---------------------------------|---|--------------------------|
| Elongation                      | 0.3% min.   | ASTM D638                |
| Hardness                        | 90 Rockwell M   | ASTM D785                |
| Gloss (60° Gordon)              | 5-20  | NEMA LD3.1               |
| Color stability                 | No change   | NEMA LD3 except 200 hour |
| Abrasion resistance             | No loss of pattern<br>Max wear depth 0.0762 mm<br>(0.003 in) - 10000 cycles | NEMA LD3                 |
| Water absorption weight (5 max) | 24 hours 0.9  | ASTM D-570               |
| Izod impact                     | 14 N·m/m<br>(0.25 ft-lb/in)   | ASTM D256<br>(Method A)  |



| Property                         | Result                 | Test  |
|----------------------------------|------------------------|---|
| Impact resistance                | No fracture            | NEMA LD-3 900 mm (36") drop 1 kg (2 lb.) ball |
| Boiling water surface resistance | No visible change      | NEMA LD3                                      |
| High temperature resistance      | Slight surface dulling | NEMA LD3                                      |

3. Cast into sheet form.
4. Color throughout with subtle veining through thickness.
5. Joint adhesive and sealer: Manufacturers silicone adhesive and sealant for joining methyl methacrylic polymer sheet.
6. Bio-based products will be preferred.

## 2.2 WINDOW STOOLS

- A. Fabricate in largest sections practicable.
- B. Fabricate with joints flush on top surface.
- C. Fabricate window stools to overhang front of cabinets and end of assemblies 12.5 mm (1/2 inch) except where against walls.
- D. Provide 1 mm (0.039 inch) thick metal plate connectors or fastening devices (except epoxy resin tops).
- E. Join edges in a chemical resistant waterproof cement or epoxy cement, except weld metal tops.
- F. Methyl Methacrylic Polymer Tops:
  1. Fabricate countertop of methyl methacrylic polymer cast sheet, 13 mm (1/2 inch) thick.
  2. Fabricate in one piece for full length from corner to corner up to 3600 mm (12 feet).
  3. Join pieces with adhesive sealant.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Before installing window stools verify that wall surfaces have been finished as specified and that mechanical and electrical service locations are as required.
- B. Secure countertops to supporting rails of cabinets / wall system with metal fastening devices, or screws through pierced slots in rails.

1. Where type, size or spacing of fastenings is not shown or specified, submit shop drawings showing proposed fastenings and method of installation.
2. Use round head bolts or screws.
3. Use epoxy or silicone to fasten the epoxy resin countertops to the cabinets.
4. Use wood or sheet metal screws for wood or plastic laminate tops; minimum penetration into top 16 mm (5/8 inch), screw size No 8, or 10.

C. Rubber Moldings:

1. Where shown install molding with butt joints in horizontal runs and mitered joints at corners where ceramic tile occurs omit molding.
2. Fasten molding to wall and to splashbacks and splashends with adhesive.

### 3.2 PROTECTION AND CLEANING

- A. Tightly cover and protect against dirt, water, and chemical or mechanical injury.
- B. Clean at completion of work.

- - - E N D - - -

**SECTION 26 05 11**  
**REQUIREMENTS FOR ELECTRICAL INSTALLATIONS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section applies to all sections of Division 26.
- B. Furnish and install electrical systems, materials, equipment, and accessories in accordance with the specifications and drawings. Capacities and ratings of motors, transformers, conductors and cable, switchboards, switchgear, panelboards, motor control centers, generators, automatic transfer switches, and other items and arrangements for the specified items are shown on the drawings.
- C. C. Conductor ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways sized per NEC. Aluminum conductors are prohibited.

**1.2 MINIMUM REQUIREMENTS**

- A. The latest International Building Code (IBC), Underwriters Laboratories, Inc. (UL), Institute of Electrical and Electronics Engineers (IEEE), and National Fire Protection Association (NFPA) codes and standards are the minimum requirements for materials and installation.
- B. The drawings and specifications shall govern in those instances where requirements are greater than those stated in the above codes and standards.

**1.3 TEST STANDARDS**

- A. All materials and equipment shall be listed, labeled, or certified by a Nationally Recognized Testing Laboratory (NRTL) to meet Underwriters Laboratories, Inc. (UL), standards where test standards have been established. Materials and equipment which are not covered by UL standards shall be accepted, providing that materials and equipment are listed, labeled, certified or otherwise determined to meet the safety requirements of a NRTL. Materials and equipment which no NRTL accepts, certifies, lists, labels, or determines to be safe, shall be considered if inspected or tested in accordance with national industrial standards, such as ANSI, NEMA, and NETA. Evidence of compliance shall include certified test reports and definitive shop drawings.
- B. Definitions:

1. Listed: Materials and equipment included in a list published by an organization that is acceptable to the Authority Having Jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production or listed materials and equipment or periodic evaluation of services, and whose listing states that the materials and equipment either meets appropriate designated standards or has been tested and found suitable for a specified purpose.
2. Labeled: Materials and equipment to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the Authority Having Jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled materials and equipment, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
3. Certified: Materials and equipment which:
  - a. Have been tested and found by a NRTL to meet nationally recognized standards or to be safe for use in a specified manner.
  - b. Are periodically inspected by a NRTL.
  - c. Bear a label, tag, or other record of certification.
4. Nationally Recognized Testing Laboratory: Testing laboratory which is recognized and approved by the Secretary of Labor in accordance with OSHA regulations.

#### **1.4 QUALIFICATIONS (PRODUCTS AND SERVICES)**

- A. Manufacturer's Qualifications: The manufacturer shall regularly and currently produce, as one of the manufacturer's principal products, the materials and equipment specified for this project, and shall have manufactured the materials and equipment for at least three years.
- B. Product Qualification:
  1. Manufacturer's materials and equipment shall have been in satisfactory operation, on three installations of similar size and type as this project, for at least three years.
  2. The Government reserves the right to require the Contractor to submit a list of installations where the materials and equipment have been in operation before approval.

#### **1.5 APPLICABLE PUBLICATIONS**

- A. Applicable publications listed in all Sections of Division 26 shall be the latest issue, unless otherwise noted.

- B. Products specified in all sections of Division 26 shall comply with the applicable publications listed in each section.

#### **1.6 MANUFACTURED PRODUCTS**

- A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, and for which replacement parts shall be available. Materials and equipment furnished shall be new, and shall have superior quality and freshness.
- B. When more than one unit of the same class or type of materials and equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components:
1. Components of an assembled unit need not be products of the same manufacturer.
  2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
  3. Components shall be compatible with each other and with the total assembly for the intended service.
  4. Constituent parts which are similar shall be the product of a single manufacturer.
- D. Factory wiring and terminals shall be identified on the equipment being furnished and on all wiring diagrams.
- E. When Factory Tests are specified, Factory Tests shall be performed in the factory by the equipment manufacturer, and witnessed by the contractor. In addition, the following requirements shall be complied with:
1. The Government shall have the option of witnessing factory tests. The Contractor shall notify the Government through the COR a minimum of thirty (30) days prior to the manufacturer's performing of the factory tests.
  2. When factory tests are successful, contractor shall furnish four (4) copies of the equipment manufacturer's certified test reports to the COR fourteen (14) days prior to shipment of the equipment, and not more than ninety (90) days after completion of the factory tests.
  3. When factory tests are not successful, factory tests shall be repeated in the factory by the equipment manufacturer, and witnessed by the Contractor. The Contractor shall be liable for all

additional expenses for the Government to witness factory re-testing.

#### **1.7 VARIATIONS FROM CONTRACT REQUIREMENTS**

- A. Where the Government or the Contractor requests variations from the contract requirements, the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

#### **1.8 MATERIALS AND EQUIPMENT PROTECTION**

- A. Materials and equipment shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.
1. Store materials and equipment indoors in clean dry space with uniform temperature to prevent condensation.
  2. During installation, equipment shall be protected against entry of foreign matter, and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
  3. Damaged equipment shall be repaired or replaced, as determined by the COR.
  4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
  5. Damaged paint on equipment shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

#### **1.9 WORK PERFORMANCE**

- A. All electrical work shall comply with requirements of the latest NFPA 70 (NEC), NFPA 70B, NFPA 70E, NFPA 99, NFPA 110, OSHA Part 1910 subpart J - General Environmental Controls, OSHA Part 1910 subpart K - Medical and First Aid, and OSHA Part 1910 subpart S - Electrical, in addition to other references required by contract.
- B. Job site safety and worker safety is the responsibility of the Contractor.
- C. Electrical work shall be accomplished with all affected circuits or equipment de-energized. However, energized electrical work shall be performed only for the non-destructive and non-invasive diagnostic testing(s), or when scheduled outage poses an imminent hazard to

patient care, safety, or physical security. In such case, all aspects of energized electrical work, such as the availability of appropriate/correct personal protective equipment (PPE) and the use of PPE, shall comply with the latest NFPA 70E, as well as the following requirements:

1. Only Qualified Person(s) shall perform energized electrical work. Supervisor of Qualified Person(s) shall witness the work of its entirety to ensure compliance with safety requirements and approved work plan.
  2. At least two weeks before initiating any energized electrical work, the Contractor and the Qualified Person(s) who is designated to perform the work shall visually inspect, verify and confirm that the work area and electrical equipment can safely accommodate the work involved.
  3. At least two weeks before initiating any energized electrical work, the Contractor shall develop and submit a job specific work plan, and energized electrical work request to the COR, and Medical Center's Chief Engineer or his/her designee. At the minimum, the work plan shall include relevant information such as proposed work schedule, area of work, description of work, name(s) of Supervisor and Qualified Person(s) performing the work, equipment to be used, procedures to be used on and near the live electrical equipment, barriers to be installed, safety equipment to be used, and exit pathways.
  4. Energized electrical work shall begin only after the Contractor has obtained written approval of the work plan, and the energized electrical work request from the COR, and Medical Center's Chief Engineer or his/her designee. The Contractor shall make these approved documents present and available at the time and place of energized electrical work.
  5. Energized electrical work shall begin only after the Contractor has invited and received acknowledgment from the COR, and Medical Center's Chief Engineer or his/her designee to witness the work.
- D. For work that affects existing electrical systems, arrange, phase and perform work to assure minimal interference with normal functioning of the facility. Refer to Article OPERATIONS AND STORAGE AREAS under Section 01 00 00, GENERAL REQUIREMENTS.

- E. New work shall be installed and connected to existing work neatly, safely and professionally. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.
- F. Coordinate location of equipment and conduit with other trades to minimize interference.

#### **1.10 EQUIPMENT INSTALLATION AND REQUIREMENTS**

- A. Equipment location shall be as close as practical to locations shown on the drawings.
- B. Working clearances shall not be less than specified in the NEC.
- C. Inaccessible Equipment:
  - 1. Where the Government determines that the Contractor has installed equipment not readily accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.
  - 2. "Readily accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

#### **1.11 EQUIPMENT IDENTIFICATION**

- A. In addition to the requirements of the NEC, install an identification sign which clearly indicates information required for use and maintenance of items such as switchboards and switchgear, panelboards, cabinets, motor controllers, fused and non-fused safety switches, generators, automatic transfer switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards, switchgear and motor control assemblies, control devices and other significant equipment.
- B. Identification signs for Normal Power System equipment shall be laminated black phenolic resin with a white core with engraved lettering. Identification signs for Essential Electrical System (EES) equipment, as defined in the NEC, shall be laminated red phenolic resin with a white core with engraved lettering. Lettering shall be a minimum of 12 mm (1/2 inch) high. Identification signs shall indicate equipment designation, rated bus amperage, voltage, number of phases, number of wires, and type of EES power branch as applicable. Secure nameplates with screws.



- C. Install adhesive arc flash warning labels on all equipment as required by the latest NFPA 70E. Label shall show specific and correct information for specific equipment based on its arc flash calculations. Label shall show the followings:
1. Nominal system voltage.
  2. Equipment/bus name, date prepared, and manufacturer name and address.
  3. Arc flash boundary.
  4. Available arc flash incident energy and the corresponding working distance.
  5. Minimum arc rating of clothing.
  6. Site-specific level of PPE.

#### **1.12 SUBMITTALS**

- A. Submit to the COR in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. The Government's approval shall be obtained for all materials and equipment before delivery to the job site. Delivery, storage or installation of materials and equipment which has not had prior approval shall not be permitted.
- C. All submittals shall include six copies of adequate descriptive literature, catalog cuts, shop drawings, test reports, certifications, samples, and other data necessary for the Government to ascertain that the proposed materials and equipment comply with drawing and specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify specific materials and equipment being submitted.
- D. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals shall not be considered for approval.
1. Mark the submittals, "SUBMITTED UNDER SECTION\_\_\_\_\_".
  2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
  3. Submit each section separately.
- E. The submittals shall include the following:
1. Information that confirms compliance with contract requirements.  
Include the manufacturer's name, model or catalog numbers, catalog

- information, technical data sheets, shop drawings, manuals, pictures, nameplate data, and test reports as required.
2. Elementary and interconnection wiring diagrams for communication and signal systems, control systems, and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
  3. Parts list which shall include information for replacement parts and ordering instructions, as recommended by the equipment manufacturer.
- F. Maintenance and Operation Manuals:
1. Submit as required for systems and equipment specified in the technical sections. Furnish in hardcover binders or an approved equivalent.
  2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, material, equipment, building, name of Contractor, and contract name and number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the material or equipment.
  3. Provide a table of contents and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.
  4. The manuals shall include:
    - a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
    - b. A control sequence describing start-up, operation, and shutdown.
    - c. Description of the function of each principal item of equipment.
    - d. Installation instructions.
    - e. Safety precautions for operation and maintenance.
    - f. Diagrams and illustrations.
    - g. Periodic maintenance and testing procedures and frequencies, including replacement parts numbers.
    - h. Performance data.
    - i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare and replacement parts, and name of servicing organization.

- j. List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.
- G. Approvals shall be based on complete submission of shop drawings, manuals, test reports, certifications, and samples as applicable.
- H. After approval and prior to installation, furnish the COR with one sample of each of the following:
  - 1. A minimum 300 mm (12 inches) length of each type and size of wire and cable along with the tag from the coils or reels from which the sample was taken. The length of the sample shall be sufficient to show all markings provided by the manufacturer.
  - 2. Each type of conduit coupling, bushing, and termination fitting.
  - 3. Conduit hangers, clamps, and supports.
  - 4. Duct sealing compound.
  - 5. Each type of receptacle, toggle switch, lighting control sensor, outlet box, manual motor starter, device wall plate, engraved nameplate, wire and cable splicing and terminating material, and branch circuit single pole molded case circuit breaker.

#### **1.13 SINGULAR NUMBER**

- A. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

#### **1.14 ACCEPTANCE CHECKS AND TESTS**

- A. The Contractor shall furnish the instruments, materials, and labor for tests.
- B. Where systems are comprised of components specified in more than one section of Division 26, the Contractor shall coordinate the installation, testing, and adjustment of all components between various manufacturer's representatives and technicians so that a complete, functional, and operational system is delivered to the Government.
- C. When test results indicate any defects, the Contractor shall repair or replace the defective materials or equipment, and repeat the tests for the equipment. Repair, replacement, and re-testing shall be accomplished at no additional cost to the Government.

**1.15 WARRANTY**

- A. All work performed and all equipment and material furnished under this Division shall be free from defects and shall remain so for a period of one year from the date of acceptance of the entire installation by the Contracting Officer for the Government.

**1.16 INSTRUCTION**

- A. Instruction to designated Government personnel shall be provided for the particular equipment or system as required in each associated technical specification section.
- B. Furnish the services of competent and factory-trained instructors to give full instruction in the adjustment, operation, and maintenance of the specified equipment and system, including pertinent safety requirements. Instructors shall be thoroughly familiar with all aspects of the installation, and shall be factory-trained in operating theory as well as practical operation and maintenance procedures.
- C. A training schedule shall be developed and submitted by the Contractor and approved by the COR at least 30 days prior to the planned training.

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

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

---END---

**SECTION 26 05 19**  
**LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

**PART 1 - GENERAL****1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, connection, and testing of the electrical conductors and cables for use in electrical systems rated 600 V and below, indicated as cable(s), conductor(s), wire, or wiring in this section.

**1.2 RELATED WORK**

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- B. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for conductors and cables.

**1.3 QUALITY ASSURANCE**

- A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 SUBMITTALS**

- A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:
1. Shop Drawings:
    - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
    - b. Submit the following data for approval:
      - 1) Electrical ratings and insulation type for each conductor and cable.
      - 2) Splicing materials and pulling lubricant.
  2. Certifications: Two weeks prior to final inspection, submit the following.
    - a. Certification by the manufacturer that the conductors and cables conform to the requirements of the drawings and specifications.
    - b. Certification by the Contractor that the conductors and cables have been properly installed, adjusted, and tested.

**1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by designation only.
- B. American Society of Testing Material (ASTM):
- D2301-10.....Standard Specification for Vinyl Chloride  
Plastic Pressure-Sensitive Electrical  
Insulating Tape
  - D2304-10.....Test Method for Thermal Endurance of Rigid  
Electrical Insulating Materials
  - D3005-10.....Low-Temperature Resistant Vinyl Chloride  
Plastic Pressure-Sensitive Electrical  
Insulating Tape
- C. National Electrical Manufacturers Association (NEMA):
- WC 70-09.....Power Cables Rated 2000 Volts or Less for the  
Distribution of Electrical Energy
- D. National Fire Protection Association (NFPA):
- 70-17.....National Electrical Code (NEC)
- E. Underwriters Laboratories, Inc. (UL):
- 44-14.....Thermoset-Insulated Wires and Cables
  - 83-14.....Thermoplastic-Insulated Wires and Cables
  - 467-13.....Grounding and Bonding Equipment
  - 486A-486B-13.....Wire Connectors
  - 486C-13.....Splicing Wire Connectors
  - 486D-15.....Sealed Wire Connector Systems
  - 486E-15.....Equipment Wiring Terminals for Use with  
Aluminum and/or Copper Conductors
  - 493-07.....Thermoplastic-Insulated Underground Feeder and  
Branch Circuit Cables
  - 514B-12.....Conduit, Tubing, and Cable Fittings

**PART 2 - PRODUCTS****2.1 CONDUCTORS AND CABLES**

- A. Conductors and cables shall be in accordance with ASTM, NEMA, NFPA, UL, as specified herein, and as shown on the drawings.
- B. All conductors shall be copper.
- C. Single Conductor and Cable:
1. No. 12 AWG: Minimum size, except where smaller sizes are specified herein or shown on the drawings.

2. No. 8 AWG and larger: Stranded.
3. No. 10 AWG and smaller: shall be stranded except where required by code to be solid.
4. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.

D. Color Code:

1. No. 10 AWG and smaller: Solid color insulation or solid color coating.
2. No. 8 AWG and larger: Color-coded using one of the following methods:
  - a. Solid color insulation or solid color coating.
  - b. Stripes, bands, or hash marks of color specified.
  - c. Color using 19 mm (0.75 inches) wide tape.
4. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.
5. Conductors shall be color-coded as follows:

| 208/120 V  | Phase   | 480/277 V |
|--|---------|-----------|
| Black  | A       | Brown     |
| Red  | B       | Orange    |
| Blue   | C       | Yellow    |
| White  | Neutral | Gray *    |
| * or white with colored (other than green) tracer. |         |           |

6. Lighting circuit "switch legs", and 3-way and 4-way switch "traveling wires," shall have color coding that is unique and distinct (e.g., pink and purple) from the color coding indicated above. The unique color codes shall be solid and in accordance with the NEC. Coordinate color coding in the field with the COR.
7. Color code for isolated power system wiring shall be in accordance with the NEC.

## 2.2 SPLICES

- A. Splices shall be in accordance with NEC and UL.
- B. Above Ground Splices for No. 10 AWG and Smaller:
  1. Solderless, screw-on, reusable pressure cable type, with integral insulation, approved for copper and aluminum conductors.
  2. The integral insulator shall have a skirt to completely cover the stripped conductors.

3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.

C. Above Ground Splices for No. 8 AWG to No. 4/0 AWG:

1. Compression, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.
2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
3. Splice and insulation shall be product of the same manufacturer.
4. All bolts, nuts, and washers used with splices shall be zinc-plated steel.

D. Plastic electrical insulating tape: Per ASTM D2304, flame-retardant, cold and weather resistant.

### **2.3 CONNECTORS AND TERMINATIONS**

- A. Mechanical type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.
- B. Long barrel compression type of high conductivity and corrosion-resistant material, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.
- C. All bolts, nuts, and washers used to connect connections and terminations to bus bars or other termination points shall be zinc-plated steel.

### **2.4 CONTROL WIRING**

- A. Unless otherwise specified elsewhere in these specifications, control wiring shall be as specified herein, except that the minimum size shall be not less than No. 14AWG.
- B. Control wiring shall be sized such that the voltage drop under in-rush conditions does not adversely affect operation of the controls.

### **2.5 WIRE LUBRICATING COMPOUND**

- A. Lubricating compound shall be suitable for the wire insulation and conduit, and shall not harden or become adhesive.
- B. Shall not be used on conductors for isolated power systems.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer's instructions.



- B. Install all conductors in raceway systems.
- C. Splice conductors only in outlet boxes, junction boxes, pullboxes, manholes, or handholes.
- D. Conductors of different systems (e.g., 120 V and 277 V) shall not be installed in the same raceway.
- E. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.
- F. In panelboards, cabinets, wireways, switches, enclosures, and equipment assemblies, neatly form, train, and tie the conductors with non-metallic ties.
- G. For connections to motors, transformers, and vibrating equipment, stranded conductors shall be used only from the last fixed point of connection to the motors, transformers, or vibrating equipment.
- H. Use expanding foam or non-hardening duct-seal to seal conduits entering a building, after installation of conductors.
- I. Conductor and Cable Pulling:
  - 1. Provide installation equipment that shall prevent the cutting or abrasion of insulation during pulling. Use lubricants approved for the cable.
  - 2. Use nonmetallic pull ropes.
  - 3. Attach pull ropes by means of either woven basket grips or pulling eyes attached directly to the conductors.
  - 4. All conductors in a single conduit shall be pulled simultaneously.
  - 5. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- J. No more than three branch circuits shall be installed in any one conduit.
- K. When stripping stranded conductors, use a tool that does not damage the conductor or remove conductor strands.

### **3.2 SPLICE AND TERMINATION INSTALLATION**

- A. Splices and terminations shall be mechanically and electrically secure, and tightened to manufacturer's published torque values using a torque screwdriver or wrench.
- B. Where the Government determines that unsatisfactory splices or terminations have been installed, replace the splices or terminations at no additional cost to the Government.

**3.3 CONDUCTOR IDENTIFICATION**

- A. When using colored tape to identify phase, neutral, and ground conductors larger than No. 8 AWG, apply tape in half-overlapping turns for a minimum of 75 mm (3 inches) from terminal points, and in junction boxes, pullboxes, and manholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable, stating size and insulation type.

**3.4 EXISTING CONDUCTORS**

- A. Unless specifically indicated on the plans, existing conductors shall not be reused.

**3.5 CONTROL WIRING INSTALLATION**

- A. Unless otherwise specified in other sections, install control wiring and connect to equipment to perform the required functions as specified or as shown on the drawings.
- B. Install a separate power supply circuit for each system, except where otherwise shown on the drawings.

**3.6 CONTROL WIRING IDENTIFICATION**

- A. Install a permanent wire marker on each wire at each termination.
- B. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.
- C. Wire markers shall retain their markings after cleaning.
- D. In each manhole and handhole, install embossed brass tags to identify the system served and function.

**3.7 ACCEPTANCE CHECKS AND TESTS**

- A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
  - 1. Visual Inspection and Tests: Inspect physical condition.
  - 2. Electrical tests:
    - a. After installation but before connection to utilization devices, such as fixtures, motors, or appliances, test conductors phase-to-phase and phase-to-ground resistance with an insulation resistance tester. Existing conductors to be reused shall also be tested.
    - b. Applied voltage shall be 500 V DC for 300 V rated cable, and 1000 V DC for 600 V rated cable. Apply test for one minute or until reading is constant for 15 seconds, whichever is longer. Minimum

insulation resistance values shall not be less than 25 megohms  
for 300 V rated cable and 100 megohms for 600 V rated cable.

c. Perform phase rotation test on all three-phase circuits.

---END---

**SECTION 26 05 33**  
**RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, and connection of conduit, fittings, and boxes, to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise.
- B. Definitions: The term conduit, as used in this specification, shall mean any or all of the raceway types specified.

**1.2 RELATED WORK**

- A. Section 06 10 00, ROUGH CARPENTRY: Mounting board for telephone closets.
- B. Section 07 60 00, FLASHING AND SHEET METAL: Fabrications for the deflection of water away from the building envelope at penetrations.
- C. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire rated construction.
- D. Section 07 92 00, JOINT SEALANTS: Sealing around conduit penetrations through the building envelope to prevent moisture migration into the building.
- E. Section 09 91 00, PAINTING: Identification and painting of conduit and other devices.
- F. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.

**1.3 QUALITY ASSURANCE**

Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
  - 1. Shop Drawings:
    - a. Size and location of main feeders.
    - b. Size and location of panels and pull-boxes.
    - c. Layout of required conduit penetrations through structural elements.
    - d. Submit the following data for approval:

- 1) Raceway types and sizes.
  - 2) Conduit bodies, connectors and fittings.
  - 3) Junction and pull boxes, types and sizes.
2. Certifications: Two weeks prior to final inspection, submit the following:
- a. Certification by the manufacturer that raceways, conduits, conduit bodies, connectors, fittings, junction and pull boxes, and all related equipment conform to the requirements of the drawings and specifications.
  - b. Certification by the Contractor that raceways, conduits, conduit bodies, connectors, fittings, junction and pull boxes, and all related equipment have been properly installed.

#### **1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. American National Standards Institute (ANSI):
- C80.1-05.....Electrical Rigid Steel Conduit
  - C80.3-05.....Steel Electrical Metal Tubing
  - C80.6-05.....Electrical Intermediate Metal Conduit
- C. National Fire Protection Association (NFPA):
- 70-11.....National Electrical Code (NEC)
- D. Underwriters Laboratories, Inc. (UL):
- 1-05.....Flexible Metal Conduit
  - 5-11.....Surface Metal Raceway and Fittings
  - 6-07.....Electrical Rigid Metal Conduit - Steel
  - 50-95.....Enclosures for Electrical Equipment
  - 360-13.....Liquid-Tight Flexible Steel Conduit
  - 467-13.....Grounding and Bonding Equipment
  - 514A-13.....Metallic Outlet Boxes
  - 514B-12.....Conduit, Tubing, and Cable Fittings
  - 514C-07.....Nonmetallic Outlet Boxes, Flush-Device Boxes  
and Covers
  - 651-11.....Schedule 40 and 80 Rigid PVC Conduit and  
Fittings
  - 651A-11.....Type EB and A Rigid PVC Conduit and HDPE  
Conduit

- 797-07.....Electrical Metallic Tubing
- 1242-06.....Electrical Intermediate Metal Conduit - Steel
- E. National Electrical Manufacturers Association (NEMA):
- TC-2-13.....Electrical Polyvinyl Chloride (PVC) Tubing and  
Conduit
- TC-3-13.....PVC Fittings for Use with Rigid PVC Conduit and  
Tubing
- FB1-12.....Fittings, Cast Metal Boxes and Conduit Bodies  
for Conduit, Electrical Metallic Tubing and  
Cable
- FB2.10-13.....Selection and Installation Guidelines for  
Fittings for use with Non-Flexible Conduit or  
Tubing (Rigid Metal Conduit, Intermediate  
Metallic Conduit, and Electrical Metallic  
Tubing)
- FB2.20-12.....Selection and Installation Guidelines for  
Fittings for use with Flexible Electrical  
Conduit and Cable
- F. American Iron and Steel Institute (AISI):
- S100-2007.....North American Specification for the Design of  
Cold-Formed Steel Structural Members

## **PART 2 - PRODUCTS**

### **2.1 MATERIAL**

- A. Conduit Size: In accordance with the NEC, but not less than 13 mm (0.5-inch) unless otherwise shown. Where permitted by the NEC, 13 mm (0.5-inch) flexible conduit may be used for tap connections to recessed lighting fixtures.
- B. Conduit:
1. Size: In accordance with the NEC, but not less than 13 mm (0.5-inch).
  2. Rigid Steel Conduit (RMC): Shall conform to UL 6 and ANSI C80.1.
  3. Rigid Intermediate Steel Conduit (IMC): Shall conform to UL 1242 and ANSI C80.6.
  4. Electrical Metallic Tubing (EMT): Shall conform to UL 797 and ANSI C80.3. Maximum size not to exceed 105 mm (4 inches) and shall be permitted only with cable rated 600 V or less.
  5. Flexible Metal Conduit: Shall conform to UL 1.
  6. Liquid-tight Flexible Metal Conduit: Shall conform to UL 360.

7. Surface Metal Raceway: Shall conform to UL 5.

C. Conduit Fittings:

1. Rigid Steel and Intermediate Metallic Conduit Fittings:

- a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
- b. Standard threaded couplings, locknuts, bushings, conduit bodies, and elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.
- c. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
- d. Bushings: Metallic insulating type, consisting of an insulating insert, molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
- e. Erickson (Union-Type) and Set Screw Type Couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case-hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.
- f. Sealing Fittings: Threaded cast iron type. Use continuous drain-type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.

2. Electrical Metallic Tubing Fittings:

- a. Fittings and conduit bodies shall meet the requirements of UL 514B, ANSI C80.3, and NEMA FB1.
- b. Only steel or malleable iron materials are acceptable.
- c. Compression Couplings and Connectors: Concrete-tight and rain-tight, with connectors having insulated throats.
- d. Indent-type connectors or couplings are prohibited.
- e. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.

3. Flexible Metal Conduit Fittings:

- a. Conform to UL 514B. Only steel or malleable iron materials are acceptable.

- b. Clamp-type, with insulated throat.
- 4. Liquid-tight Flexible Metal Conduit Fittings:
  - a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
  - b. Only steel or malleable iron materials are acceptable.
  - c. Fittings shall incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
- 5. Surface Metal Raceway Fittings: As recommended by the raceway manufacturer. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, conduit entry fittings, accessories, and other fittings as required for complete system.
- 6. Expansion and Deflection Couplings:
  - a. Conform to UL 467 and UL 514B.
  - b. Accommodate a 19 mm (0.75-inch) deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
  - c. Include internal flexible metal braid, sized to guarantee conduit ground continuity and a low-impedance path for fault currents, in accordance with UL 467 and the NEC tables for equipment grounding conductors.
  - d. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat-resistant molded rubber material with stainless steel jacket clamps.
- D. Conduit Supports:
  - 1. Parts and Hardware: Zinc-coat or provide equivalent corrosion protection.
  - 2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
  - 3. Multiple Conduit (Trapeze) Hangers: Not less than 38 mm x 38 mm (1.5 x 1.5 inches), 12-gauge steel, cold-formed, lipped channels; with not less than 9 mm (0.375-inch) diameter steel hanger rods.
  - 4. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.
- E. Outlet, Junction, and Pull Boxes:
  - 1. UL-50 and UL-514A.
  - 2. Rustproof cast metal where required by the NEC or shown on drawings.



3. Sheet Metal Boxes: Galvanized steel, except where shown on drawings.

### **PART 3 - EXECUTION**

#### **3.1 PENETRATIONS**

##### **A. Cutting or Holes:**

1. Cut holes in advance where they shall be placed in the structural elements, such as ribs or beams. Obtain the approval of the COR prior to drilling through structural elements.
2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammers, impact electric, hand, or manual hammer-type drills are not allowed, except when permitted by the COR where working space is limited.

##### **B. Firestop: Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING.**

##### **C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal the gap around conduit to render it watertight, as specified in Section 07 92 00, JOINT SEALANTS.**

#### **3.2 INSTALLATION, GENERAL**

- A. In accordance with UL, NEC, NEMA, as shown on drawings, and as specified herein.
- B. Raceway systems used for Essential Electrical Systems (EES) shall be entirely independent of other raceway systems.
- C. Install conduit as follows:
  1. In complete mechanically and electrically continuous runs before pulling in cables or wires.
  2. Unless otherwise indicated on the drawings or specified herein, installation of all conduits shall be concealed within finished walls, floors, and ceilings.
  3. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new conduits.
  4. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
  5. Cut conduits square, ream, remove burrs, and draw up tight.

6. Independently support conduit at 2.4 M (8 feet) on centers with specified materials and as shown on drawings.
  7. Do not use suspended ceilings, suspended ceiling supporting members, lighting fixtures, other conduits, cable tray, boxes, piping, or ducts to support conduits and conduit runs.
  8. Support within 300 mm (12 inches) of changes of direction, and within 300 mm (12 inches) of each enclosure to which connected.
  9. Close ends of empty conduits with plugs or caps at the rough-in stage until wires are pulled in, to prevent entry of debris.
  10. Conduit installations under fume and vent hoods are prohibited.
  11. Secure conduits to cabinets, junction boxes, pull-boxes, and outlet boxes with bonding type locknuts. For rigid steel and IMC conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.
  12. Flashing of penetrations of the roof membrane is specified in Section 07 60 00, FLASHING AND SHEET METAL.
  13. Conduit bodies shall only be used for changes in direction, and shall not contain splices.
  14. Do not use aluminum conduits in wet locations.
- D. Conduit Bends:
1. Make bends with standard conduit bending machines.
  2. Conduit hickey shall be used for slight offsets and for straightening stubbed out conduits.
  3. Bending of conduits with a pipe tee or vise is prohibited.
- E. Layout and Homeruns:
1. Install conduit with wiring, including homeruns, as shown on drawings.
  2. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted and approved by the COR.

### **3.3 CONCEALED WORK INSTALLATION**

- A. In Concrete:
1. Conduit: Rigid steel, IMC, or EMT. Do not install EMT in concrete slabs that are in contact with soil, gravel, or vapor barriers.
  2. Align and run conduit in direct lines.
  3. Install conduit through concrete beams only:
    - a. Where shown on the structural drawings.

- b. As approved by the COR prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
- 4. Installation of conduit in concrete that is less than 75 mm (3 inches) thick is prohibited.
  - a. Conduit outside diameter larger than one-third of the slab thickness is prohibited.
  - b. Space between conduits in slabs: Approximately six conduit diameters apart, and one conduit diameter at conduit crossings.
  - c. Install conduits approximately in the center of the slab so that there shall be a minimum of 19 mm (0.75-inch) of concrete around the conduits.
- 5. Make couplings and connections watertight. Use thread compounds that are UL approved conductive type to ensure low resistance ground continuity through the conduits. Tightening setscrews with pliers is prohibited.
- B. Above Furred or Suspended Ceilings and in Walls:
  - 1. Conduit for Conductors 600 V and Below: Rigid steel, IMC, or EMT. Mixing different types of conduits in the same system is prohibited.
  - 2. Align and run conduit parallel or perpendicular to the building lines.
  - 3. Tightening set screws with pliers is prohibited.
  - 4. For conduits running through metal studs, limit field cut holes to no more than 70% of web depth. Spacing between holes shall be at least 457 mm (18 inches). Cuts or notches in flanges or return lips shall not be permitted.

### **3.4 EXPOSED WORK INSTALLATION**

- A. Unless otherwise indicated on drawings, exposed conduit is only permitted in mechanical and electrical rooms.
- B. Conduit for Conductors 600 V and Below: Rigid steel, IMC, or EMT. Mixing different types of conduits in the system is prohibited.
- C. Align and run conduit parallel or perpendicular to the building lines.
- D. Install horizontal runs close to the ceiling or beams and secure with conduit straps.
- E. Support horizontal or vertical runs at not over 2.4 M (8 feet) intervals.
- F. Surface Metal Raceways: Use only where shown on drawings.

G. Painting:

1. Paint exposed conduit as specified in Section 09 91 00, PAINTING.
2. Paint all conduits containing cables rated over 600 V safety orange.  
Refer to Section 09 91 00, PAINTING for preparation, paint type, and exact color. In addition, paint legends, using 50 mm (2 inch) high black numerals and letters, showing the cable voltage rating.  
Provide legends where conduits pass through walls and floors and at maximum 6 M (20 feet) intervals in between.

### 3.5 WET OR DAMP LOCATIONS

- A. Use rigid steel or IMC conduits unless as shown on drawings.
- B. Provide sealing fittings to prevent passage of water vapor where conduits pass from warm to cold locations, i.e., refrigerated spaces, constant-temperature rooms, air-conditioned spaces, building exterior walls, roofs, or similar spaces.
- C. Use rigid steel or IMC conduit within 1.5 M (5 feet) of the exterior and below concrete building slabs in contact with soil, gravel, or vapor barriers, unless as shown on drawings. Conduit shall be half-lapped with 10 mil PVC tape before installation. After installation, completely recoat or retape any damaged areas of coating.
- D. Conduits run on roof shall be supported with integral galvanized lipped steel channel, attached to UV-inhibited polycarbonate or polypropylene blocks every 2.4 M (8 feet) with 9 mm (3/8-inch) galvanized threaded rods, square washer and locknut. Conduits shall be attached to steel channel with conduit clamps.

### 3.6 MOTORS AND VIBRATING EQUIPMENT

- A. Use flexible metal conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission.
- B. Use liquid-tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, inside airstream of HVAC units, and locations subject to seepage or dripping of oil, grease, or water.
- C. Provide a green equipment grounding conductor with flexible and liquid-tight flexible metal conduit.

### 3.7 EXPANSION JOINTS

- A. Conduits 75 mm (3 inch) and larger that are secured to the building structure on opposite sides of a building expansion joint require

expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.

- B. Provide conduits smaller than 75 mm (3 inch) with junction boxes on both sides of the expansion joint. Connect flexible metal conduits to junction boxes with sufficient slack to produce a 125 mm (5 inch) vertical drop midway between the ends of the flexible metal conduit. Flexible metal conduit shall have a green insulated copper bonding jumper installed. In lieu of this flexible metal conduit, expansion and deflection couplings as specified above are acceptable.
- C. Install expansion and deflection couplings where shown.

### **3.8 CONDUIT SUPPORTS**

- A. Safe working load shall not exceed one-quarter of proof test load of fastening devices.
- B. Use pipe straps or individual conduit hangers for supporting individual conduits.
- C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and an additional 90 kg (200 lbs). Attach each conduit with U-bolts or other approved fasteners.
- D. Support conduit independently of junction boxes, pull-boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.
- E. Fasteners and Supports in Solid Masonry and Concrete:
  - 1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
  - 2. Existing Construction:
    - a. Steel expansion anchors not less than 6 mm (0.25-inch) bolt size and not less than 28 mm (1.125 inch) in embedment.
    - b. Power set fasteners not less than 6 mm (0.25-inch) diameter with depth of penetration not less than 75 mm (3 inch).
    - c. Use vibration and shock-resistant anchors and fasteners for attaching to concrete ceilings.
- F. Hollow Masonry: Toggle bolts.
- G. Bolts supported only by plaster or gypsum wallboard are not acceptable.
- H. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.

- I. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.
- J. Chain, wire, or perforated strap shall not be used to support or fasten conduit.
- K. Spring steel type supports or fasteners are prohibited for all uses except horizontal and vertical supports/fasteners within walls.
- L. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

### **3.9 BOX INSTALLATION**

- A. Boxes for Concealed Conduits:
  - 1. Flush-mounted.
  - 2. Provide raised covers for boxes to suit the wall or ceiling, construction, and finish.
- B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling-in operations or where more than the equivalent of 4-90 degree bends are necessary.
- C. Locate pullboxes so that covers are accessible and easily removed. Coordinate locations with piping and ductwork where installed above ceilings.
- D. Remove only knockouts as required. Plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.
- E. Outlet boxes mounted back-to-back in the same wall are prohibited. A minimum 600 mm (24 inch) center-to-center lateral spacing shall be maintained between boxes.
- F. Flush-mounted wall or ceiling boxes shall be installed with raised covers so that the front face of raised cover is flush with the wall. Surface-mounted wall or ceiling boxes shall be installed with surface-style flat or raised covers.
- G. Minimum size of outlet boxes for ground fault circuit interrupter (GFCI) receptacles is 100 mm (4 inches) square x 55 mm (2.125 inches) deep, with device covers for the wall material and thickness involved.
- H. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams; for example "SIG-FA JB No. 1."

- I. On all branch circuit junction box covers, identify the circuits with a white printed label.

- - - E N D - - -

**SECTION 26 27 26**  
**WIRING DEVICES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, connection, and testing of wiring devices.

**1.2 RELATED WORK**

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section of Division 26.
- B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Cables and wiring.
- C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit and boxes.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
1. Shop Drawings:
    - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
    - b. Include electrical ratings, dimensions, mounting details, construction materials, grade, and termination information.
  2. Manuals:
    - a. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals, including technical data sheets and information for ordering replacement parts.
    - b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
  3. Certifications: Two weeks prior to final inspection, submit the following.
    - a. Certification by the manufacturer that the wiring devices conform to the requirements of the drawings and specifications.



- b. Certification by the Contractor that the wiring devices have been properly installed and adjusted.

### **1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.
- B. National Fire Protection Association (NFPA):
- 70-14.....National Electrical Code (NEC)
- 99-15.....Health Care Facilities
- C. National Electrical Manufacturers Association (NEMA):
- WD 1-10.....General Color Requirements for Wiring Devices
- WD 6-12 .....Wiring Devices - Dimensional Specifications
- D. Underwriter's Laboratories, Inc. (UL):
- 5-11.....Surface Metal Raceways and Fittings
- 20-10.....General-Use Snap Switches
- 231-08.....Power Outlets
- 467-13.....Grounding and Bonding Equipment
- 498-12.....Attachment Plugs and Receptacles
- 943-15.....Ground-Fault Circuit-Interrupters
- 1449-14.....Surge Protective Devices
- 1472-15.....Solid State Dimming Controls

## **PART 2 - PRODUCTS**

### **2.1 RECEPTACLES**

- A. General: All receptacles shall comply with NEMA, NFPA, UL, and as shown on the drawings.
1. Mounting straps shall be nickel plated brass, brass, nickel plated steel or galvanize steel with break-off plaster ears, and shall include a self-grounding feature. Terminal screws shall be brass, brass plated or a copper alloy metal.
  2. Receptacles shall have provisions for back wiring with separate metal clamp type terminals (four minimum) and side wiring from four captively held binding screws.
- B. Duplex Receptacles - Hospital-grade: shall be listed for hospital grade, single phase, 20 ampere, 120 volts, 2-pole, 3-wire, NEMA 5-20R, with break-off feature for two-circuit operation.
1. Bodies shall match existing in color.

2. Switched duplex receptacles shall be wired so that only the top receptacle is switched. The lower receptacle shall be unswitched.
3. Duplex Receptacles on Emergency Circuit:
  - a. In rooms without emergency powered general lighting, the emergency receptacles shall be of the self-illuminated type.
4. Ground Fault Current Interrupter (GFCI) Duplex Receptacles: Shall be an integral unit, hospital-grade, suitable for mounting in a standard outlet box, with end-of-life indication and provisions to isolate the face due to improper wiring. GFCI receptacles shall be self-test receptacles in accordance with UL 943.
  - a. Ground fault interrupter shall consist of a differential current transformer, self-test, solid state sensing circuitry and a circuit interrupter switch. Device shall have nominal sensitivity to ground leakage current of 4-6 milliamperes and shall function to interrupt the current supply for any value of ground leakage current above five milliamperes (+ or - 1 milliampere) on the load side of the device. Device shall have a minimum nominal tripping time of 0.025 second.
  - b. Self-test function shall be automatically initiated within 5 seconds after power is activated to the receptacles. Self-test function shall be periodically and automatically performed every 3 hours or less.
  - c. End-of-life indicator light shall be a persistent flashing or blinking light to indicate that the GFCI receptacle is no longer in service.
5. Tamper-Resistant Duplex Receptacles:
  - a. Bodies shall match existing in color.
    - 1) Shall permit current to flow only while a standard plug is in the proper position in the receptacle.
    - 2) Screws exposed while the wall plates are in place shall be the tamperproof type.
- C. Duplex Receptacles - Non-hospital Grade: shall be the same as duplex receptacles - hospital grade in accordance with sections 2.1A and 2.1B of this specification, except for the hospital grade listing.
  - a. Bodies shall match existing in color.
- D. Receptacles - 20, 30, and 50 ampere, 250 Volts: Shall be complete with appropriate cord grip plug.

- E. Weatherproof Receptacles: Shall consist of a duplex receptacle, mounted in box with a gasketed, weatherproof, cast metal cover plate and cap over each receptacle opening. The cap shall be permanently attached to the cover plate by a spring-hinged flap. The weatherproof integrity shall not be affected when heavy duty specification or hospital grade attachment plug caps are inserted. Cover plates on outlet boxes mounted flush in the wall shall be gasketed to the wall in a watertight manner.
- F. Surge Protective (TVSS) Receptacles shall have integral surge suppression in line to ground, line to neutral, and neutral to ground modes.
  - 1. TVSS Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 Volts, and minimum single transient pulse energy dissipation of 210 Joules.
  - 2. Active TVSS Indication: LED, visible in face of device to indicate device is active or no longer in service.

## **2.2 TOGGLE SWITCHES**

- A. Toggle switches shall be totally enclosed tumbler type with nylon bodies. Handles shall match existing in color unless otherwise specified or shown on the drawings.
  - 1. Switches installed in hazardous areas shall be explosion-proof type in accordance with the NEC and as shown on the drawings.
  - 2. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self grounding mounting strap with break-off plaster ears and provisions for back wiring with separate metal wiring clamps and side wiring with captively held binding screws.
  - 3. Switches shall be rated 20 amperes at 120-277 Volts AC.

## **2.3 WALL PLATES**

- A. Wall plates for switches and receptacles shall be type 302 stainless steel, match existing in finish and color. Oversize plates are not acceptable.
- B. For receptacles or switches mounted adjacent to each other, wall plates shall be common for each group of receptacles or switches.
- C. In areas requiring tamperproof wiring devices, wall plates shall be type 302 stainless steel, and shall have tamperproof screws and beveled edges.

- D. Duplex Receptacles on Emergency Circuit: Wall plates shall be type 302 stainless steel, with the word "EMERGENCY" engraved in 6 mm (1/4 inch) red letters.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Installation shall be in accordance with the NEC and as shown as on the drawings.
- B. Install wiring devices after wall construction and painting is complete.
- C. The ground terminal of each wiring device shall be bonded to the outlet box with an approved green bonding jumper, and also connected to the branch circuit equipment grounding conductor.
- D. Outlet boxes for toggle switches and manual dimming controls shall be mounted on the strike side of doors.
- E. Provide barriers in multi-gang outlet boxes to comply with the NEC.
- F. Coordinate the electrical work with the work of other trades to ensure that wiring device flush outlets are positioned with box openings aligned with the face of the surrounding finish material. Pay special attention to installations in cabinet work, and in connection with laboratory equipment.
- G. Exact field locations of floors, walls, partitions, doors, windows, and equipment shall vary from locations shown on the drawings. Prior to locating sleeves, boxes and chases for roughing-in of conduit and equipment, the Contractor shall coordinate exact field location of the above items with other trades.
- H. Install center of wall switches 1.2 M (48 inches) above floor, with the toggle OFF position down.
- I. Install center of wall dimmers 1.2 M (48 inches) above floor.
- J. Install center of receptacles 450 mm (18 inches) above floor, and 152 mm (6 inches) above counter backsplash or workbenches. Install specific-use receptacles at heights shown on the drawings.
- K. Install horizontally mounted receptacles with the ground pin to the right.
- L. When required or recommended by the manufacturer, use a torque screwdriver. Tighten unused terminal screws.
- M. Label device plates with a permanent adhesive label listing panel and circuit feeding the wiring device.

**3.2 ACCEPTANCE CHECKS AND TESTS**

A. Perform manufacturer's required field checks in accordance with the manufacturer's recommendations, and the latest NFPA 99. In addition, include the following:

1. Visual Inspection and Tests:

- a. Inspect physical and electrical conditions.
  - b. Vacuum-clean surface metal raceway interior. Clean metal raceway exterior.
  - c. Test wiring devices for damaged conductors, high circuit resistance, poor connections, inadequate fault current path, defective devices, or similar problems using a portable receptacle tester. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.
  - d. Test GFCI receptacles.
2. Receptacle testing in the Patient Care Spaces, such as retention force of the grounding blade of each receptacle, shall comply with the latest NFPA 99.

---END---

**SECTION 32 90 00  
PLANTING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Plants, soils, turf, and landscape materials.

**1.2 RELATED WORK**

- A. Section 01 00 00, GENERAL REQUIREMENTS, Protection of Existing Vegetation.

**1.3 DEFINITIONS**

- A. Pesticide: Any substance or mixture of substances, including biological control agents, that shall prevent, destroy, repel, or mitigate pests and is specifically labeled for use by U.S. Environmental Protection Agency (EPA). Also, any substance used as plant regulator, defoliant, disinfectant, or biocide.
- B. Planter Bed: An area containing one or combination of following plant types: shrubs, vines, wildflowers, annuals, perennials, ground cover, and mulch topdressing excluding turf. Trees may also be found in planter beds.
- C. Stand of Turf: 95 percent of established species.

**1.4 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. American National Standards Institute (ANSI):
1. Z60.1-2014 - Nursery Stock.
- C. American Society for Testing And Materials (ASTM):
1. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  2. B221M-13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  3. C33/C33M-16-Concrete Aggregates.
  4. C136/C136M-14 - Sieve Analysis of Fine and Coarse Aggregates.
  5. C602-13a - Agricultural Liming Materials.
  6. D977-13e1 - Emulsified Asphalt.
  7. D5268-13 - Topsoil Used for Landscaping Purposes.
- D. Hortus Third: Concise Dictionary of Plants Cultivated in United States and Canada.
- E. Tree Care Industry Association (TCIA):

1. A300P1-2008 - Tree Care Operations - Trees, Shrubs and Other Woody Plant Maintenance Standard Practices (Pruning).
  2. Z133.1-2012 - Arboricultural Operations - Safety Requirements.
- F. Turfgrass Producers International (TPI):
1. 2006 Guideline Specifications to Turfgrass Sodding.
- G. United States Department of Agriculture (USDA):
1. DOA SSIR 42-2014 - Soil Survey Laboratory Methods Manual.
  2. Handbook No. 60 - Diagnosis and Improvement of Saline and Alkali Soils.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
1. Regularly installs specified products.
  2. Installed specified products with satisfactory service on five similar installations for minimum five years.
    - a. Project Experience List: Provide contact names and addresses for completed projects.
  3. Member in good standing of either Professional Landcare Network or American Nursery and Landscape Association.
  4. Field supervisor certified in all categories from Professional Landcare Network and submit one copy of certificate to COR:
    - a. Certified Landscape Technician (CLT) - Exterior, with installation, maintenance, and specialty areas, designated CLT-Exterior.
    - b. Certified Landscape Technician (CLT) - Interior, designated CLT-Interior.
    - c. Certified Ornamental Landscape Professional, designated COLP.
- B. Independent or university laboratory, recognized by State Department of Agriculture, with experience and capability to conduct testing indicated and that specializes in types of tests to be performed.
- C. Measure plants according to ANSI Z60.1. Pruning to obtain required sizes shall not be permitted.
- D. COR may review plant materials either at place of growth or project site before planting for compliance with requirements. COR retains right to inspect trees and shrubs to determine if any unacceptable conditions exist and to reject any trees or shrubs at any time during Project. All rejected trees and shrubs shall be immediately removed from Project site.

1. Submit plant material source information to COR seven (7) days in advance of delivery to Project site.

#### **1.6 DELIVERY**

- A. Deliver packaged products in manufacturer's original sealed packaging.
- B. Bulk Products:
  1. Deliver bulk products away from buildings, utilities, pavement, and existing turf and planted areas. Maintain dry bulk product storage away from contaminants.
- C. Apply antidesiccant to trees and shrubs according to manufacturer's instructions to protect during digging, handling, and transportation.
  1. For deciduous trees or shrubs in full leaf, spray with antidesiccant at nursery before transporting and again two weeks after planting.
- D. Deliver branched plants with branches tied and exposed branches covered with material that allows air circulation. Prevent damage to branches, trunks, root systems, and root balls and desiccation of leaves.

#### **1.7 STORAGE AND HANDLING**

- A. Store bulbs, corms, and tubers in dry location at 16 to 18 degrees C (60 to 65 degrees F) until planting.
- B. Store seeds and other packaged materials in dry locations away from contaminants.
- C. Plant Storage and Protection: Store and protect plants not planted on day of arrival at Project site as follows:
  1. Shade and protect plants in outdoor storage areas from wind and direct sunlight until planted.
  2. Keep plants in moist condition until planted by watering with fine mist spray.
  3. Do not store plant materials directly on concrete or bituminous surfaces.
- D. Topsoil: Before stockpiling topsoil, eradicate on site undesirable growing vegetation. Clear and grub existing vegetation three to four weeks before stockpiling existing topsoil.
- E. Weed Control Fabric: Store materials in site in enclosures or under protective covering in dry location out of direct sunlight. Do not store materials directly on ground.
- F. Handling: Do not drop or dump plants from vehicles. Avoid damaging plants being moved from nursery or storage area to planting site. Handle balled and burlapped container plants carefully to avoid



damaging or breaking earth ball or root structure. Do not handle plants by trunk or stem. Remove damaged plants from Project site.

#### **1.8 FIELD CONDITIONS**

A. Environment:

1. Coordinate installation of planting materials during optimal planting seasons for each type of plant material required.
2. Planting Dates:
  - a. Deciduous Material: From April 1 to October 31 for planting times.
  - b. Evergreen Material: April 1 to October 31 for planting times.
3. Restrictions: Do not plant when ground is frozen, snow covered, muddy, or when air temperature exceed 32 degrees C (90 degrees F).

B. Weather Limitations: Install plantings only during current and forecasted weather conditions that are comply with plant requirements. Apply associated products in compliance with manufacturers' instructions.

#### **1.9 WARRANTY**

A. Manufacturer's Warranty: Warrant plantings and against material defects.

1. Warranty Period: Two years.
2. Plant and Turf Warranty Period shall begin from date of Substantial Completion.
3. COR will reinspect plants and turf at end of Warranty Period. Replace any dead, missing, or defective plant material and turf immediately. Warranty Period will end on date of this inspection provided Contractor has complied with warranty work required by this specification. Comply with following requirements:
  - a. Replace any plants more than 25 percent dead, missing or defective plant material before final inspection.
  - b. Only one replacement of each plant will be required except when losses or replacements are due to failure to comply with these requirements.
  - c. Complete remedial measures directed by COR to ensure plant and turf survival.
  - d. Repair damage caused while making plant or turf replacements.

**PART 2 - PRODUCTS****2.1 PRODUCTS - GENERAL**

- A. Provide each product from one source or manufacturer.
- B. Replace vegetation removed during construction with vegetation of same type and size with approval of COR.
- C. Sustainable Construction Requirements:
  - 1. Select products with recycled content to achieve overall Project recycled content requirement.
    - a. Fertilizer.
    - b. Weed control fabric.
  - 2. Biobased Content:
    - a. Organic Mulch: 100 percent.
    - b. Peat: 100 percent.

**2.2 PLANT MATERIALS**

- A. Plant Materials: ANSI Z60.1, conforming to varieties specified and be true to scientific name as listed in Hortus Third. Well-branched, well-formed, sound, vigorous, healthy planting stock free from disease, sunscald, windburn, abrasion, and harmful insects or insect eggs and having healthy, normal, and undamaged root system.
  - 1. Provide plants of sizes indicated, measured before pruning with branches in normal position. Plants larger in size than specified is acceptable with approval of COR, with no change in contract price. When larger plants are used, increase ball of earth or spread of roots according to ANSI Z60.1.
  - 2. Provide nursery grown plant material conforming to requirements and recommendations of ANSI Z60.1. Dig and prepare plants for shipment in manner that will not cause damage to branches, shape, and future development after planting.
  - 3. Container grown plants to have sufficient root growth to hold earth intact when removed from containers, but not be root bound.
  - 4. Make substitutions only when plant (or alternates as specified) is not obtainable and COR authorizes change order providing for use of nearest equivalent obtainable size or variety of plant with same essential characteristics and an equitable adjustment of contract price.
  - 5. Only plants grown in nursery are permitted.

- B. Label plants with durable, waterproof labels in weather-resistant ink. Provide labels stating correct botanical and common plant name and variety and size as specified in list of required plants. Groups of plants may be labeled by tagging one plant. Labels to be legible for minimum 60 days after delivery to planting site.

### **2.3 PLANT FERTILIZERS**

- A. Soil Test: Evaluate existing soil conditions and requirements before fertilizer selection and application to minimize use of all fertilizers and chemical products. Obtain approval of Contracting Officer's Representative for allowable products, product alternatives, scheduling and application procedures. Evaluate existing weather and site conditions before application. Apply products during favorable weather and site conditions according to manufacturer's instructions and warranty requirements. Fertilizers to be registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer applicable to specific areas as required for Project conditions and application. Provide commercial grade plant and turf fertilizers, free flowing, uniform in composition and conforms to applicable state and federal regulations.
- B. Fertilizer for groundcover, wildflowers, and grasses is not acceptable. Provide fertilizer for trees, plants, and shrubs as recommended by plant supplier, except synthetic chemical fertilizers are not acceptable. Fertilizers containing petrochemical additives or that have been treated with pesticides or herbicides are not acceptable.
- C. Granular Fertilizer: Organic, granular controlled release fertilizer containing minimum percentages, by weight, of plant food nutrients.
  - 1. Composition: Nitrogen, phosphorous, potassium, sulfur, and iron in amounts recommended in soil reports from qualified soil-testing laboratory.
- D. Fertilizer Tablets: Organic plant tablets composed of tightly compressed fertilizer chips, insoluble in water, to provide continuous release of nutrients for minimum 24 months and containing following minimum percentages, by weight, of plant food nutrients:
  - 1. Nutrient Composition: 20 percent available nitrogen, 20 percent available phosphorous, and 5 percent available potassium.

## **2.4 WEED CONTROL FABRIC**

- A. Roll Type Polypropylene or Polyester Mats: Woven, needle punched, or non-woven fabric treated for protection against deterioration due to ultraviolet radiation. Minimum 99 percent opaque to prevent photosynthesis and seed germination, fabric allows air, water, and nutrients to pass through to plant roots.
1. Minimum weight: 0.11 kg per square meter (5 ounces per square yard).
  2. Minimum thickness: 0.50 mm (20 mils).

## **2.5 MULCH**

- A. Organic Mulch:
1. Wood cellulose fiber for project site when available. Biobased content minimum 100 percent. Wood cellulose fiber processed to contain no growth or germination-inhibiting factors, dyed with non-toxic, biodegradable dye to an appropriate color to facilitate visual metering of application.
    - a. Straw for Lawn Seed Bed Mulch: Stalks from oats, wheat, rye, barley, or rice free of noxious weeds, mold or other objectionable material. Air dried and suitable for placing with blower equipment.
    - b. Wood cellulose fiber for hydraulic application of grass seed and fertilizer: Specially prepared wood cellulose fiber, processed to contain no growth or germination inhibiting factors, and dyed an appropriate color to facilitate visual metering of application of materials. Maximum 12 percent moisture dry weight, plus or minus 3 percent at time of manufacture. pH range from 3.5 to 5.0. Manufacturer wood cellulose fiber for application as follows:
      - 1) After addition and agitation in slurry tanks with fertilizers, grass seeds, water, and other approved additives, fibers will become uniformly suspended to form a homogeneous slurry.
      - 2) When hydraulically sprayed, material will form blotter-like cover impregnated uniformly with grass seed.
      - 3) Cover will allow absorption of moisture and allow rainfall or applied water to percolate to underlying soil.
  2. Color: Natural.
- B. Compost Mulch: Decomposed organic matter with low carbon to nitrogen ratio.

C. Mineral Mulch: Coarse, clean stone of following type, size, and color:

1. Type: River rock mulch (1/2" to 3/4" in size).
2. Color: Acceptable to Contracting Officer's Representative.

## **2.6 ANTIDESICCANT**

A. Antidesiccant: An emulsion specifically manufactured for agricultural use that will provide protective film over plant surfaces permeable enough to permit transpiration.

## **2.7 BIOSTIMULANTS**

A. Biostimulants: Formulation containing soil conditioners, VAM fungi, and endomycorrhizal and ectomycorrhizal fungi spores and soil bacteria appropriate for existing soil conditions.

## **2.8 WATER**

A. Water: Source approved by Contracting Officer's Representative and suitable quality for irrigation, containing no elements toxic to plant life, including acids, alkalis, salts, chemical pollutants, and organic matter. Use collected storm water or graywater when available.

## **2.9 PESTICIDES**

A. Consider IPM (Integrated Pest Management) practices to minimize use of all pesticides and chemical products. Obtain Contracting Officer's Representative's approval for allowable products, product alternatives, scheduling and application procedures. Evaluate existing weather and site conditions before application. Apply products during favorable weather and site conditions according to manufacturer's instructions and warranty requirements.

# **PART 3 - EXECUTION**

## **3.1 EXAMINATION**

- A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
1. Verify that no materials that would inhibit plant growth are present in planting area. If such materials are present, remove soil and contaminants as directed by Contracting Officer's Representative and provide new planting soil.
  2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

3. Suspend soil spreading, grading, and tilling operations if soil moisture becomes excessive. Resume soil preparations when moisture content returns to acceptable level.
  4. If soil is excessively dry, not workable, and too dusty, moisten uniformly.
  5. Special conditions may exist that warrant variance in specified planting dates or conditions. Submit written request to Contracting Officer's Representative stating special conditions and proposed variance.
- B. Proceed with planting operations only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Protect existing and proposed landscape features, elements, and site construction and completed work from damage. Protect trees, vegetation, and other designated features by erecting high-visibility, reusable construction fencing. Locate fence no closer to trees than drip line. Plan equipment and vehicle access to minimize and confine soil disturbance and compaction to areas indicated on drawings.
- B. Stake out approved plant material locations and planter bed outlines on project site before digging plant pits or beds. Contracting Officer's Representative reserves right to adjust plant material locations to meet field conditions. Do not plant closer than 12 inches to building wall, pavement edge, fence or wall edge, and other similar structures. Provide on-site locations for excavated rock, soil, and vegetation.

### **3.3 PLANT BED PREPARATION**

- A. Verify location of underground utilities before excavation. Protect existing adjacent turf before excavations are made. Do not disturb topsoil and vegetation in areas outside of work site. Where planting beds occur in existing turf areas, remove turf to depth that will ensure removal of entire root system. Measure depth of plant pits from finished grade. Provide depth of plant pit excavation and relation of top of root ball and finish grade as indicated on drawings. Install plant materials as specified in Article 3.8. Do not plant trees within 3 m (10 feet) of any utility lines or building walls.
- B. For newly graded subgrades, loosen subgrade to minimum 100 mm (4 inches) in any dimension and sticks, roots, rubbish, and other

extraneous matter and legally dispose of them off Government's property.

1. Apply fertilizer and soil amendments directly to subgrade before loosening, at rates recommended by soils analysis.
2. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
3. Spread planting soil 100 mm (4 inches) for lawn areas and 200 mm (8 inches) to 430 mm (17 inches) deep for shrub planting areas to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
  - a. Spread approximately 1/2 thickness of planting soil over loosened subgrade. Mix thoroughly into top 50 mm (2 inches) of subgrade. Spread remainder of planting soil.
- C. Finish grade planting areas to smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 13 mm (1/2 inch) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in immediate future.

### **3.4 PLANT INSTALLATION**

- A. Place plants, not including trees and shrubs, in even rows and with triangular spacing.
- B. Use prepared soil mixture for backfill.
- C. Place so roots are in natural position.
- D. Do not remove plants from flats or containers until immediately before planting. Plant at depth to sufficiently cover all roots. Start watering areas planted as required by temperature and wind conditions. Water plants at sufficient rate to ensure thorough wetting of soil to 150 mm (6 inches) deep without runoff or puddling. Smooth planting areas after planting to provide even, smooth finish.

### **3.5 TREE and SHRUB PLANTING**

- A. Move plant materials only by supporting container. Set plants on hand compacted layer of prepared backfill soil mixture 150 mm (6 inches) thick and hold plumb in center of pit until soil has been tamped firmly around root ball.
- B. Set plant materials in relation to surrounding finish grade 25 to 50 mm (1 to 2 inches) above depth at which they were grown in nursery,

collecting field, or container. Replace plant material whose root balls are cracked or damaged either before or during planting process.

- C. Place backfill soil mixture on previously scarified subsoil to completely surround root balls and bring to smooth and even surface, blending into existing areas.

### **3.6 TREE AND SHRUB PRUNING**

- A. Pruning: Performed by trained and experience personnel according to TCIA A300P1.
- B. Remove dead and broken branches. Prune only to correct structural defects or if branches are interfering with the work required under this contract.
- C. Retain typical growth shape of individual plants with as much height and spread as practical. Do not central leader on trees. Make cuts with sharp instruments. Do not flush cut with trunk or adjacent branches. Collars to remain in place. Contractor shall trim those limbs and branches with a clean cut and paint the cut with a tree-pruning compound as directed by the COR.

### **3.7 MULCH INSTALLATION**

- A. Provide specified mulch over entire planting bed surfaces and individual plant surfaces. Do not place mulch in crowns of shrubs. Place mulch minimum 50 to 75 mm (2 to 3 inches) away from tree or shrub trunks. Place mulch on all weed control fabric.

### **3.8 PLANT MAINTENANCE**

- A. Frequency: Begin maintenance immediately after plants have been installed. Inspect plants at least once a week and perform required maintenance promptly.
- B. Promotion of Plant Growth and Vigor: Water, prune, fertilize, mulch, eradicate weeds, and perform other operations necessary to promote plant growth and vigor.
- C. Shrubs: Selectively prune and shape shrubs for health and safety when following conditions exist:
  - 1. Remove growth in front of windows.
  - 2. Remove dead, damaged, or diseased branches or limbs where shrub growth is growing against or over structures where work is being performed under this contract.
  - 3. Properly dispose of all pruning debris.
- D. Trees: Prune for health and safety.



1. Selectively prune all trees within project boundaries, regardless of caliper, for safety and health reasons, including, but not to, removal of dead and broken branches and correction of structural defects. Prune trees according to their natural growth characteristics leaving trees well shaped and balanced.
2. All pruning, including palm tree pruning, must be by or in presence of certified member of International Society of Arboriculture and according to TCIA Z133.1.
3. Properly dispose of all pruning debris.

### **3.9 REMOVAL OF DYING OR DEAD PLANTS**

- A. Remove dead and dying plants and provide new plants immediately upon commencement of specified planting season and replace mulch. No additional correction period shall be required for replacement plants beyond original warranty period. Plants will be considered dead or dying as follows:
  1. Tree: Main leader died back or minimum 20 percent of crown died.
  2. Shrub and Ground Cover: Minimum 20 percent of plant died.
  3. Determination: Scrape on maximum 2 mm (1/16 inch) square branch area to determine dying plant material cause and provide recommendations for replacement.

### **3.10 CLEANING**

- A. Remove and legally dispose of all excess soil and planting debris.

### **3.11 PROTECTION**

- A. Protect all vegetation from traffic and construction operations.
- B. Provide temporary fences or enclosures and signage, at planted areas. Maintain fences and enclosures during maintenance period.
- C. Remove protective materials immediately before acceptance.
- D. Repair damage.

- - - E N D - - -

December 16, 2016

Mr. Terry Thornsby, AIA  
Viridian Architectural Design, Inc.  
2020 East Washington Street Boulevard  
Suite 200  
Fort Wayne, Indiana 46803

**RE: ASBESTOS INSPECTION  
BATTLE CREEK VETERANS AFFAIRS MEDICAL CENTER  
ALLIANCE ENVIRONMENTAL GROUP PROJECT NUMBER 16-0151-A**

Dear Mr. Thornsby:

Pursuant to your request, on November 14 through November 17, 2016, Alliance Environmental Group (Alliance) conducted a pre-renovation asbestos inspection at Battle Creek Veterans Affairs Medical Center in Battle Creek, Michigan. Asbestos bulk samples were collected from interior and exterior caulking and glazing from buildings 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 24, 25, 26, 27, 28, 30, 85, 101, 109, 134, 136 and 138. Samples were analyzed by EMSL Analytical, Inc. utilizing polarized light microscopy (PLM) by EPA 600/R-93/116 Method and friable samples containing less than 1% asbestos were verified by EPA 600/R-93/116 with 400 Point Count. The following serves to summarize results of the inspection performed and a copy of the bulk sampling data sheet (16-0151-A) from the inspection is attached for your review.

In accordance with federal and state regulations, Alliance conducted an asbestos inspection of the aforementioned locations. Specifically, 280 samples of window caulking and glazing were collected.

Federal, state, and local regulations define asbestos-containing material (ACM) as any material containing greater than 1% asbestos.

The following materials are determined by the inspector to be **friable** and reported by the laboratory to be **asbestos containing**:

- Dark Gray Exterior Caulking on Building 27/28 Metal Frame
- Gray Exterior Caulking on Building 30 Glass Block Wall
- White Interior Caulking on Building 134 Galvanized Frame with Flat Mullions
- Dark Gray Exterior Glazing on Building 136 Aluminum Frame with 3' x 2' Panes
- Gray Exterior Caulking on Building 136 Aluminum Frame with 3' x 2' Panes

The following materials are determined by the inspector to be **non-friable** and reported by the laboratory to be **asbestos containing**:

- Gray Exterior Caulking on Building 1 Aluminum Frame
- Gray Exterior Caulking on Building 5 Aluminum Frame
- Gray Interior Caulking on Building 5 Aluminum Frame
- Gray Exterior Caulking on Building 6 Aluminum Frame
- Gray Interior Caulking on Building 6 Aluminum Frame
- Gray Exterior Caulking on Building 8 Aluminum Frame
- Gray Interior Caulking on Building 8 Aluminum Frame
- Gray Exterior Caulking on Building 11 Aluminum Frame

- Gray Interior Caulking on Building 11 Aluminum Frame
- Gray Exterior Caulking on Building 13 Aluminum Frame
- Gray Exterior Caulking on Building 14 Aluminum Frame
- Gray Exterior Caulking on Building 14 Off White Vent in Opening
- White Exterior Caulking on Building 14 Off White Vent in Opening
- Gray Exterior Caulking on Building 24 Aluminum Frame
- Gray Interior Caulking on Building 24 Aluminum Frame
- Gray Interior Caulking on Building 136 Aluminum Frame with 1' x 3'
- Light Gray Interior Caulking on Building 136 Aluminum Frame with 2' x 3'
- Gray Interior Caulking on Building 136 Aluminum Frame with 4' x 5'

The following materials are determined by the inspector to be **friable** by the inspector and reported by the laboratory to contain **less than 1% asbestos**:

- White Exterior Glazing on Building 6 Wood Frame
- Gray Exterior Glazing on Building 8 Wood Frame
- Gray Exterior Caulking on Building 9 Wood Frame
- White Exterior Caulking on Building 10 Aluminum Frame
- Cream Interior Caulking on Building 13 Wood Frame
- White Exterior Glazing on Building 14 Attic Wood Frame
- Translucent Interior Caulking on Building 26 Metal Frame
- Gray Exterior Caulk on Building 26 3' x 5' Window Opening Cover
- White Exterior Caulking on Building 26 Metal Frame
- Light Gray Interior Glazing on Building 27/28 Metal Frame
- Light Gray Interior Caulking on Building 27/28 Metal Frame
- Light Gray Exterior Glazing on Building 27/28 Metal Frame
- White Exterior Caulking on Building 134 Galvanized Frame with Rounded Mullions
- White Exterior Glazing on Building 134 Galvanized Frame with Rounded Mullions
- White Interior Glazing on Building 134 Galvanized Frame with Rounded Mullions
- White Exterior Glazing on Building 136 Aluminum Frame 2' x 3' Panes
- Gray Interior Glazing on Building 138 Thin Aluminum Frame
- Gray Interior Glazing on Building 138 Thick Aluminum Frame

The following materials are determined by the inspector to be **non-friable** and reported by the laboratory to contain less than 1% **asbestos**:

- White Exterior Glazing on Building 4 Aluminum Frame
- Gray Exterior Caulking on Building 4 Aluminum Frame
- White Exterior Caulking on Building 6 Wood Frame
- Off White Exterior Caulking on Building 8 Aluminum Frame
- White Interior Caulking on Building 14 Aluminum Frame
- Off White Exterior Caulking on Building 26 Aluminum Frame
- Light Gray Interior Caulking on Building 27/28 Metal Frame

All other materials sampled did not contain asbestos.

The state of Michigan licensed inspector for this project was Mike Ardis; license number A49064, expiration date 06/07/2017.

Contact with materials containing less than one percent asbestos, according to OSHA, still require some limited safe work practices, prohibitions, and provisions including:

- Wet methods, or wetting agents, to control employee exposures during asbestos handling, mixing, removal, cutting, application, and cleanup except where employers demonstrate that the use of wet methods is infeasible due to, for example the creation of electrical hazards.
- Prompt clean-up and disposal of wastes and debris contaminated with asbestos in leak-tight containers.
- High-speed abrasive disc saws that are not equipped with point-of-cut ventilator or enclosures with HEPA filtered exhaust air are prohibited.
- Compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air is prohibited.
- Employee rotation as a means of reducing employee exposure to asbestos is prohibited.
- A "competent person" should conduct an exposure assessment immediately before or at the initiation of the operation to ascertain expected exposures during the operation. The assessment must be completed in time to comply with requirements which are triggered by exposure data or the lack of a "negative exposure assessment", and to provide information necessary to assure that all control systems planned are appropriate for that operation and will work properly. The permissible exposure limit is an eight-hour time-weighted average of 0.1 fiber per cubic centimeter of air and an excursion limit of 1.0 fiber per cubic centimeter of air as averaged over a sampling period of 30 minutes.
- The employer should provide the affected employees and their designated representatives an opportunity to observe any monitoring of employee exposure to asbestos.
- The employer shall notify affected employees of the monitoring results that represent that employee's exposure as soon as possible following receipt of monitoring results in writing individually or by posting in a central location which is accessible to all affected employees.

The employer shall notify affected employees of the results of monitoring representing the employee's exposure in writing either individually or by posting at a centrally located place that is accessible to affected employees

Mr. Thornsby, Alliance appreciates the opportunity to have been of service to you and Viridian Architectural Design, Inc. and Battle Creek Veterans Affairs Medical Center. Please contact the undersigned if you require any additional information.

Sincerely,

Alliance Environmental Group



Mike Ardis  
Environmental Project Specialist

Attachments

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                                    | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location   | Asbestos Content |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|-------------------|------------------|
| 11/14/2016     | 001    | Metal Frame Light Gray Exterior Caulking          | MISC                      | N/A                                       | No                | M                             | 001        | Building 30 North | None Detected    |
| 11/14/2016     | 002    | Metal Frame Light Gray Exterior Glazing           | MISC                      | N/A                                       | No                | M                             | 002        | Building 30 North | None Detected    |
| 11/14/2016     | 003    | Plastic Frame Light Gray Exterior Caulking        | MISC                      | N/A                                       | No                | L                             | 003        | Building 30 West  | None Detected    |
| 11/14/2016     | 003    | Plastic Frame Light Gray Exterior Caulking        | MISC                      | N/A                                       | No                | L                             | 004        | Building 30 South | None Detected    |
| 11/14/2016     | 003    | Plastic Frame Light Gray Exterior Caulking        | MISC                      | N/A                                       | No                | L                             | 005        | Building 30 West  | None Detected    |
| 11/14/2016     | 004    | Plastic Plastic Frame Dark Gray Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 006        | Building 30 West  | None Detected    |
| 11/14/2016     | 005    | Glass Block Wall Light Gray Exterior Caulking     | MISC                      | 1 Unit                                    | Yes               | L                             | 007        | Building 30 North | 1.1 % Chrysotile |
| 11/14/2016     | 006    | Plastic Frame Light Gray Interior Caulking        | MISC                      | N/A                                       | No                | L                             | 008        | Building 30 North | None Detected    |
| 11/14/2016     | 006    | Plastic Frame Light Gray Interior Caulking        | MISC                      | N/A                                       | No                | L                             | 009        | Building 30 West  | None Detected    |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                             | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location      | Asbestos Content   |
|----------------|--------|--|---------------------------|---|-------------------|-------------------------------|------------|----------------------|--------------------|
| 11/14/2016     | 007    | Plastic Frame Light Gray Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 010        | Building 27/28 North | None Detected      |
| 11/14/2016     | 007    | Plastic Frame Light Gray Exterior Caulking | MISC                      | N/A                                       | Yes               | H                             | 016        | Building 27/28 South | None Detected      |
| 11/14/2016     | 007    | Plastic Frame Light Gray Exterior Caulking | MISC                      | N/A                                       | No                | H                             | 017        | Building 27/28 South | None Detected      |
| 11/14/2016     | 008    | Metal Frame Light Gray Interior Glazing    | MISC                      | 22 Units                                  | Yes               | M                             | 011        | Building 27/28 South | 0.25 % Chrysotile  |
| 11/14/2016     | 008    | Metal Frame Light Gray Interior Glazing    | MISC                      | N/A                                       | No                | L                             | 026        | Building 27/28 South | None Detected      |
| 11/14/2016     | 008    | Metal Frame Light Gray Interior Glazing    | MISC                      | N/A                                       | Yes               | M                             | 028        | Building 27/28 South | None Detected      |
| 11/14/2016     | 008    | Metal Frame Light Gray Interior Glazing    | MISC                      | N/A                                       | No                | L                             | 031        | Building 27/28 South | None Detected      |
| 11/14/2016     | 009    | Metal Frame Light Gray Interior Caulking   | MISC                      | 22 Units                                  | Yes               | M                             | 012        | Building 27/28 South | <0.25 % Chrysotile |
| 11/14/2016     | 009    | Metal Frame Light Gray Interior Caulking   | MISC                      | N/A                                       | No                | L                             | 025        | Building 27/28 South | None Detected      |
| 11/14/2016     | 009    | Metal Frame Light Gray Interior Caulking   | MISC                      | N/A                                       | No                | M                             | 027        | Building 27/28 South | None Detected      |
| 11/14/2016     | 009    | Metal Frame Light Gray Interior Caulking   | MISC                      | 22 Units                                  | Yes               | H                             | 030        | Building 27/28 South | 0.50 % Chrysotile  |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description   | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location         | Asbestos Content  |
|----------------|--------|--|---------------------------|---|-------------------|-------------------------------|------------|-------------------------|-------------------|
| 11/14/2016     | 010    | Metal Frame Light Gray Exterior Caulking               | MISC                      | N/A                                       | No                | L                             | 013        | Building 27/28 South    | None Detected     |
| 11/14/2016     | 010    | Metal Frame Light Gray Exterior Caulking               | MISC                      | N/A                                       | No                | L                             | 018        | Building 27/28 West     | None Detected     |
| 11/14/2016     | 010    | Metal Frame Light Gray Exterior Caulking               | MISC                      | 22 Units                                  | No                | L                             | 023        | Building 27/28 West     | <1 % Chrysotile   |
| 11/14/2016     | 011    | Metal Frame Light Gray Exterior Glazing                | MISC                      | 22 Units                                  | Yes               | M                             | 014        | Building 27/28 South    | 0.25 % Chrysotile |
| 11/14/2016     | 012    | Metal Frame Dark Gray Exterior Caulking                | MISC                      | 22 Units                                  | Yes               | M                             | 015        | Building 27/28 South    | 1.8 % Chrysotile  |
| 11/14/2016     | 013    | Metal Frame White Exterior Caulking                    | MISC                      | N/A                                       | No                | L                             | 019        | Building 27/28 South    | None Detected     |
| 11/14/2016     | 014    | Metal Frame Black Exterior Caulking                    | MISC                      | N/A                                       | No                | L                             | 020        | Building 27/28 South    | None Detected     |
| 11/14/2016     | 015    | Metal Frame Black Exterior Glazing                     | MISC                      | N/A                                       | No                | L                             | 021        | Building 27/28 South    | None Detected     |
| 11/14/2016     | 016    | Basement Window Covering Lightn Gray Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 022        | Building 27/28 South    | None Detected     |
| 11/14/2016     | 017    | White Plastic Frame Translucent Exterior Caulking      | MISC                      | N/A                                       | No                | L                             | 024        | Building 27/28 Entrance | None Detected     |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                                      | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location      | Asbestos Content |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|----------------------|------------------|
| 11/14/2016     | 018    | Metal Frame Light Gray Interior Caulking            | MISC                      | N/A                                       | No                | H                             | 029        | Building 27/28 South | None Detected    |
| 11/14/2016     | 020    | Plastic Frame Light Gray Exterior Caulking          | MISC                      | N/A                                       | No                | L                             | 032        | Building 26 South    | None Detected    |
| 11/14/2016     | 021    | Plastic Frame Light Gray Exterior Glazing           | MISC                      | N/A                                       | No                | L                             | 033        | Building 26 South    | None Detected    |
| 11/14/2016     | 022    | Metal Frame Light Gray Exterior Glazing             | MISC                      | N/A                                       | Yes               | L                             | 034        | Building 26 South    | None Detected    |
| 11/14/2016     | 023    | Metal Frame Light Gray Interior Glazing             | MISC                      | N/A                                       | Yes               | L                             | 035        | Building 26 South    | None Detected    |
| 11/14/2016     | 024    | Metal Frame Over Door Gray Exterior Caulking        | MISC                      | N/A                                       | No                | L                             | 036        | Building 26 South    | None Detected    |
| 11/14/2016     | 025    | Metal Frame Over Door Translucent Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 037        | Building 26 South    | None Detected    |
| 11/14/2016     | 026    | Metal Frame Over Door Black Exterior Glazing        | MISC                      | N/A                                       | No                | L                             | 038        | Building 26 South    | None Detected    |
| 11/14/2016     | 027    | Plastic Frame Light Gray Exterior Caulking          | MISC                      | N/A                                       | No                | L                             | 039        | Building 26 South    | None Detected    |
| 11/14/2016     | 028    | Plastic Frame Light Gray Exterior Glazing           | MISC                      | N/A                                       | No                | L                             | 040        | Building 26 South    | None Detected    |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High



# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                                     | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location   | Asbestos Content   |
|----------------|--------|--|---------------------------|---|-------------------|-------------------------------|------------|-------------------|--------------------|
| 11/14/2016     | 029    | Metal Frame Translucent Exterior Caulking          | MISC                      | 20 Units                                  | Yes               | H                             | 041        | Building 26 East  | <0.25 % Chrysotile |
| 11/14/2016     | 030    | Metal Frame Translucent Exterior Glazing           | MISC                      | N/A                                       | Yes               | H                             | 042        | Building 26 East  | None Detected      |
| 11/14/2016     | 031    | Window Opening Cover Gray Exterior Caulking        | MISC                      | 7 Units                                   | Yes               | M                             | 043        | Building 26 North | 0.75 % Chrysotile  |
| 11/14/2016     | 032    | Window Opening Cover Translucent Exterior Caulking | MISC                      | N/A                                       | No                | M                             | 044        | Building 26 North | None Detected      |
| 11/14/2016     | 033    | Metal Frame White Interior Caulking                | MISC                      | 20 Units                                  | Yes               | M                             | 045        | Building 26 West  | <0.25 % Chrysotile |
| 11/14/2016     | 033    | Metal Frame White Interior Caulking                | MISC                      | N/A                                       | Yes               | M                             | 046        | Building 26 West  | None Detected      |
| 11/14/2016     | 034    | Plastic Frame Light Gray Interior Caulking         | MISC                      | N/A                                       | No                | L                             | 047        | Building 26 South | None Detected      |
| 11/14/2016     | 035    | Aluminum Frame Gray Exterior Caulking              | MISC                      | N/A                                       | No                | L                             | 048        | Building 26 South | None Detected      |
| 11/14/2016     | 035    | Aluminum Frame Gray Exterior Caulking              | MISC                      | 95 Units                                  | No                | L                             | 054        | Building 24 East  | 2 % Chrysotile     |
| 11/14/2016     | 036    | Aluminum Frame Off White Exterior Caulking         | MISC                      | 12 Units                                  | No                | L                             | 049        | Building 26 South | <1 % Chrysotile    |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                              | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location   | Asbestos Content |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|-------------------|------------------|
| 11/14/2016     | 037    | Aluminum Frame Cream Exterior Caulking      | MISC                      | N/A                                       | No                | L                             | 050        | Building 26 South | None Detected    |
| 11/14/2016     | 038    | Aluminum Frame Gray Exterior Glazing        | MISC                      | N/A                                       | No                | L                             | 051        | Building 26 South | None Detected    |
| 11/14/2016     | 038    | Aluminum Frame Gray Exterior Glazing        | MISC                      | N/A                                       | No                | L                             | 055        | Building 24 East  | None Detected    |
| 11/14/2016     | 039    | Aluminum Frame Dark Gray Interior Caulking  | MISC                      | N/A                                       | No                | L                             | 052        | Building 25 South | None Detected    |
| 11/14/2016     | 040    | Aluminum Frame Light Gray Interior Caulking | MISC                      | N/A                                       | No                | L                             | 053        | Building 25 South | None Detected    |
| 11/14/2016     | 041    | Aluminum Frame Gray Exterior Caulking       | MISC                      | N/A                                       | Yes               | M                             | 056        | Building 24 East  | None Detected    |
| 11/14/2016     | 041    | Aluminum Frame Gray Exterior Caulking       | MISC                      | 90 Units                                  | No                | L                             | 058        | Building 24 East  | 2 % Chrysotile   |
| 11/14/2016     | 042    | Aluminum Frame Gray Exterior Glazing        | MISC                      | N/A                                       | Yes               | M                             | 057        | Building 24 East  | None Detected    |
| 11/14/2016     | 042    | Aluminum Frame Gray Exterior Glazing        | MISC                      | N/A                                       | No                | L                             | 060        | Building 24 East  | None Detected    |
| 11/14/2016     | 043    | Aluminum Frame Clear Exterior Caulking      | MISC                      | N/A                                       | No                | L                             | 059        | Building 24 East  | None Detected    |
| 11/14/2016     | 044    | Aluminum Frame Gray Interior Caulking       | MISC                      | 90 Units                                  | No                | L                             | 061        | Building 24 North | 2 % Chrysotile   |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inpection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                         | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location   | Asbestos Content |
|----------------|--------|--|---------------------------|---|-------------------|-------------------------------|------------|-------------------|------------------|
| 11/14/2016     | 044    | Aluminum Frame Gray Interior Caulking  | MISC                      | 90 Units                                  | No                | L                             | 064        | Building 24 North | 2 % Chrysotile   |
| 11/14/2016     | 045    | Aluminum Frame Gray Interior Glazing   | MISC                      | N/A                                       | No                | L                             | 062        | Building 24 North | None Detected    |
| 11/14/2016     | 045    | Aluminum Frame Gray Interior Glazing   | MISC                      | N/A                                       | No                | L                             | 063        | Building 24 South | None Detected    |
| 11/14/2016     | 045    | Aluminum Frame Gray Interior Glazing   | MISC                      | N/A                                       | No                | L                             | 065        | Building 24 North | None Detected    |
| 11/14/2016     | 046    | Aluminum Frame White Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 066        | Building 10 South | None Detected    |
| 11/14/2016     | 046    | Aluminum Frame White Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 071        | Building 10 East  | None Detected    |
| 11/14/2016     | 046    | Aluminum Frame White Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 074        | Building 10 East  | None Detected    |
| 11/14/2016     | 046    | Aluminum Frame White Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 077        | Building 10 West  | None Detected    |
| 11/14/2016     | 047    | Aluminum Frame Gray Exterior Caulking  | MISC                      | N/A                                       | No                | L                             | 067        | Building 10 South | None Detected    |
| 11/14/2016     | 047    | Aluminum Frame Gray Exterior Caulking  | MISC                      | N/A                                       | No                | L                             | 069        | Building 10 East  | None Detected    |
| 11/14/2016     | 047    | Aluminum Frame Gray Exterior Caulking  | MISC                      | N/A                                       | No                | L                             | 075        | Building 10 East  | None Detected    |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                             | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location   | Asbestos Content |
|----------------|--------|--|---------------------------|---|-------------------|-------------------------------|------------|-------------------|------------------|
| 11/14/2016     | 047    | Aluminum Frame Gray Exterior Caulking      | MISC                      | N/A                                       | No                | L                             | 078        | Building 10 West  | None Detected    |
| 11/14/2016     | 048    | Aluminum Frame Gray Exterior Glazing       | MISC                      | N/A                                       | No                | L                             | 068        | Building 10 South | None Detected    |
| 11/14/2016     | 048    | Aluminum Frame Gray Exterior Glazing       | MISC                      | N/A                                       | No                | L                             | 076        | Building 10 East  | None Detected    |
| 11/14/2016     | 048    | Aluminum Frame Gray Exterior Glazing       | MISC                      | N/A                                       | No                | L                             | 079        | Building 10 West  | None Detected    |
| 11/14/2016     | 049    | Aluminum Frame Light Gray Exterior Glazing | MISC                      | N/A                                       | No                | L                             | 070        | Building 10 East  | None Detected    |
| 11/14/2016     | 051    | Aluminum Frame Gray Interior Caulking      | MISC                      | N/A                                       | No                | L                             | 080        | Building 10 West  | None Detected    |
| 11/14/2016     | 051    | Aluminum Frame Gray Interior Caulking      | MISC                      | N/A                                       | No                | L                             | 081        | Building 10 South | None Detected    |
| 11/14/2016     | 051    | Aluminum Frame Gray Interior Caulking      | MISC                      | N/A                                       | No                | L                             | 082        | Building 10 North | None Detected    |
| 11/14/2016     | 051    | Aluminum Frame Gray Interior Caulking      | MISC                      | N/A                                       | No                | L                             | 083        | Building 10 South | None Detected    |
| 11/14/2016     | 052    | Metal Frame White Interior Glazing         | MISC                      | N/A                                       | Yes               | H                             | 084        | Building 30 South | None Detected    |
| 11/14/2016     | 053    | Metal Frame Gray Exterior Caulking         | MISC                      | N/A                                       | No                | L                             | 085        | Building 9 West   | None Detected    |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                              | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location      | Asbestos Content  |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|----------------------|-------------------|
| 11/14/2016     | 053    | Metal Frame Gray Exterior Caulking          | MISC                      | N/A                                       | No                | L                             | 087        | Building 9 West      | None Detected     |
| 11/14/2016     | 054    | Metal Frame LG White Exterior Caulking      | MISC                      | N/A                                       | No                | L                             | 086        | Building 9 West      | None Detected     |
| 11/14/2016     | 054    | Metal Frame LG White Exterior Caulking      | MISC                      | N/A                                       | No                | L                             | 088        | Building 9 West      | None Detected     |
| 11/14/2016     | 055    | Wood Frame Gray Exterior Caulking           | MISC                      | 11 Units                                  | Yes               | H                             | 089        | Building 9 North (B) | 0.25 % Chrysotile |
| 11/14/2016     | 056    | Aluminum Frame Gray Interior Caulking       | MISC                      | N/A                                       | No                | L                             | 090        | Building 9 South     | None Detected     |
| 11/14/2016     | 056    | Aluminum Frame Gray Interior Caulking       | MISC                      | N/A                                       | No                | L                             | 092        | Building 9 East      | None Detected     |
| 11/14/2016     | 057    | Aluminum Frame Light Gray Interior Caulking | MISC                      | N/A                                       | No                | L                             | 091        | Building 9 South     | None Detected     |
| 11/14/2016     | 058    | Aluminum Frame Gray Exterior Caulking       | MISC                      | 91 Units                                  | No                | L                             | 093        | Building 8 South     | 2 % Chrysotile    |
| 11/14/2016     | 058    | Aluminum Frame Gray Exterior Caulking       | MISC                      | 91 Units                                  | No                | L                             | 098        | Building 8 North     | 2 % Chrysotile    |
| 11/14/2016     | 059    | Aluminum Frame Gray Exterior Glazing        | MISC                      | N/A                                       | No                | L                             | 094        | Building 8 South     | None Detected     |
| 11/14/2016     | 059    | Aluminum Frame Gray Exterior Glazing        | MISC                      | N/A                                       | No                | L                             | 096        | Building 8 West      | None Detected     |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                             | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location      | Asbestos Content   |
|----------------|--------|--|---------------------------|---|-------------------|-------------------------------|------------|----------------------|--------------------|
| 11/14/2016     | 059    | Aluminum Frame Gray Exterior Glazing       | MISC                      | N/A                                       | No                | L                             | 099        | Building 8 North     | None Detected      |
| 11/14/2016     | 060    | Aluminum Frame Off White Exterior Caulking | MISC                      | 91 Units                                  | No                | L                             | 095        | Building 8 West      | <1 % Chrysotile    |
| 11/14/2016     | 061    | Wood Frame Gray Exterior Glazing           | MISC                      | 20 Units                                  | Yes               | M                             | 097        | Building 8 North (B) | <0.25 % Chrysotile |
| 11/14/2016     | 062    | Aluminum Frame Gray Interior Caulking      | MISC                      | 84 Units                                  | No                | L                             | 100        | Building 8 East      | 2 % Chrysotile     |
| 11/14/2016     | 062    | Aluminum Frame Gray Interior Caulking      | MISC                      | 84 Units                                  | No                | L                             | 102        | Building 8 North     | 2 % Chrysotile     |
| 11/14/2016     | 062    | Aluminum Frame Gray Interior Caulking      | MISC                      | 84 Units                                  | No                | L                             | 104        | Building 8 East      | 2 % Chrysotile     |
| 11/14/2016     | 063    | Aluminum Frame Gray Interior Glazing       | MISC                      | N/A                                       | No                | L                             | 101        | Building 8 East      | None Detected      |
| 11/14/2016     | 063    | Aluminum Frame Gray Interior Glazing       | MISC                      | N/A                                       | No                | L                             | 103        | Building 8 North     | None Detected      |
| 11/14/2016     | 063    | Aluminum Frame Gray Interior Glazing       | MISC                      | N/A                                       | No                | L                             | 105        | Building 8 East      | None Detected      |
| 11/14/2016     | 064    | Aluminum Frame Gray Exterior Caulking      | MISC                      | 51 Units                                  | No                | L                             | 106        | Building 13 West (B) | 2 % Chrysotile     |
| 11/14/2016     | 064    | Aluminum Frame Gray Exterior Caulking      | MISC                      | N/A                                       | No                | L                             | 108        | Building 13 South    | None Detected      |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                        | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location   | Asbestos Content |
|----------------|--------|---------------------------------------|---------------------------|---|-------------------|-------------------------------|------------|-------------------|------------------|
| 11/14/2016     | 064    | Aluminum Frame Gray Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 110        | Building 13 South | None Detected    |
| 11/14/2016     | 064    | Aluminum Frame Gray Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 112        | Building 13 West  | None Detected    |
| 11/14/2016     | 064    | Aluminum Frame Gray Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 114        | Building 13 South | None Detected    |
| 11/14/2016     | 064    | Aluminum Frame Gray Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 118        | Building 13 West  | None Detected    |
| 11/14/2016     | 064    | Aluminum Frame Gray Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 129        | Building 13 South | None Detected    |
| 11/14/2016     | 065    | Aluminum Frame Gray Exterior Glazing  | MISC                      | N/A                                       | No                | L                             | 107        | Building 13 West  | None Detected    |
| 11/14/2016     | 065    | Aluminum Frame Gray Exterior Glazing  | MISC                      | N/A                                       | No                | L                             | 109        | Building 13 South | None Detected    |
| 11/14/2016     | 065    | Aluminum Frame Gray Exterior Glazing  | MISC                      | N/A                                       | No                | L                             | 111        | Building 13 South | None Detected    |
| 11/14/2016     | 065    | Aluminum Frame Gray Exterior Glazing  | MISC                      | N/A                                       | No                | L                             | 113        | Building 13 West  | None Detected    |
| 11/14/2016     | 066    | Aluminum Frame Black Exterior Glazing | MISC                      | N/A                                       | No                | L                             | 115        | Building 13 South | None Detected    |
| 11/14/2016     | 066    | Aluminum Frame Black Exterior Glazing | MISC                      | N/A                                       | No                | L                             | 119        | Building 13 West  | None Detected    |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description  | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location   | Asbestos Content |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|-------------------|------------------|
| 11/14/2016     | 066    | Aluminum Frame Black Exterior Glazing                     | MISC                      | N/A                                       | No                | L                             | 130        | Building 13 South | None Detected    |
| 11/14/2016     | 067    | Aluminum Frame with AC Unit Translucent Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 116        | Building 13 South | None Detected    |
| 11/14/2016     | 068    | Aluminum Frame with AC Unit Gray Exterior Caulking        | MISC                      | 20 Units                                  | No                | L                             | 117        | Building 13 South | 2 % Chrysotile   |
| 11/14/2016     | 069    | Plastic Frame White Interior Caulking                     | MISC                      | N/A                                       | No                | L                             | 120        | Building 13 North | None Detected    |
| 11/14/2016     | 069    | Plastic Frame White Interior Caulking                     | MISC                      | N/A                                       | No                | L                             | 131        | Building 13 East  | None Detected    |
| 11/14/2016     | 070    | Plastic Frame Black Interior Glazing                      | MISC                      | N/A                                       | No                | L                             | 121        | Building 13 North | None Detected    |
| 11/14/2016     | 070    | Plastic Frame Black Interior Glazing                      | MISC                      | N/A                                       | No                | L                             | 132        | Building 13 East  | None Detected    |
| 11/14/2016     | 071    | Plastic Frame Black Exterior Glazing                      | MISC                      | N/A                                       | No                | L                             | 122        | Building 13 North | None Detected    |
| 11/14/2016     | 072    | Round Window Outer Frame Cream Exterior Caulk             | MISC                      | N/A                                       | No                | L                             | 123        | Building 13 South | None Detected    |
| 11/14/2016     | 072    | Round Window Inner Frame Cream Exterior Caulk             | MISC                      | N/A                                       | No                | L                             | 124        | Building 13 South | None Detected    |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High



# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                            | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location        | Asbestos Content  |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|------------------------|-------------------|
| 11/14/2016     | 073    | Round Window Inner Frame Exterior Glazing | MISC                      | 8 Units                                   | Yes               | H                             | 125        | Building 13 South      | 0.25 % Chrysotile |
| 11/14/2016     | 074    | Aluminum Frame Gray Interior Caulking     | MISC                      | N/A                                       | No                | L                             | 126        | Building 13 South      | None Detected     |
| 11/14/2016     | 074    | Aluminum Frame Gray Interior Caulking     | MISC                      | N/A                                       | No                | L                             | 128        | Building 13 South      | None Detected     |
| 11/14/2016     | 074    | Aluminum Frame Gray Interior Caulking     | MISC                      | N/A                                       | No                | L                             | 135        | Building 13 Room 133   | None Detected     |
| 11/14/2016     | 075    | Aluminum Frame Dark Gray Interior Glazing | MISC                      | N/A                                       | Yes               | M                             | 127        | Building 13 South      | None Detected     |
| 11/14/2016     | 076    | Aluminum Frame Gray Interior Glazing      | MISC                      | N/A                                       | No                | L                             | 133        | Building 13 Room 025   | None Detected     |
| 11/14/2016     | 077    | Aluminum Frame White Interior Caulking    | MISC                      | N/A                                       | No                | H                             | 134        | Building 13 Room 133   | None Detected     |
| 11/14/2016     | 078    | Wood Frame White Exterior Glazing         | MISC                      | N/A                                       | Yes               | M                             | 136        | Building 5 NW Corner   | None Detected     |
| 11/14/2016     | 079    | Wood Frame White Exterior Glazing         | MISC                      | N/A                                       | Yes               | M                             | 137        | Building 5 NW Corner   | None Detected     |
| 11/14/2016     | 080    | Wood Frame Gray Exterior Caulking         | MISC                      | N/A                                       | No                | M                             | 138        | Building 5 NW Corner   | None Detected     |
| 11/14/2016     | 081    | Aluminum Frame Gray Exterior Caulking     | MISC                      | N/A                                       | No                | L                             | 139        | Building 5 NW Basement | None Detected     |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                        | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location             | Asbestos Content |
|----------------|--------|---------------------------------------|---------------------------|---|-------------------|-------------------------------|------------|-----------------------------|------------------|
| 11/14/2016     | 081    | Aluminum Frame Gray Exterior Caulking | MISC                      | 48 Units                                  | No                | L                             | 141        | Building 5 Load Dock        | 2 % Chrysotile   |
| 11/14/2016     | 082    | Aluminum Frame White Exterior Glazing | MISC                      | N/A                                       | Yes               | M                             | 140        | Building 5 NW Basement      | None Detected    |
| 11/14/2016     | 083    | Aluminum Frame Gray Exterior Glazing  | MISC                      | N/A                                       | No                | L                             | 142        | Building 5 Load Dock        | None Detected    |
| 11/14/2016     | 084    | Aluminum Frame Gray Interior Caulking | MISC                      | 58 Units                                  | No                | L                             | 143        | Building 5 History Museum   | 2 % Chrysotile   |
| 11/14/2016     | 085    | Aluminum Frame Gray Interior Glazing  | MISC                      | N/A                                       | No                | L                             | 144        | Building 5 Covered Walkway  | None Detected    |
| 11/14/2016     | 086    | Plastic Frame White Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 145        | Building 5 Northeast Dormer | None Detected    |
| 11/14/2016     | 087    | Plastic Frame White Exterior Glazing  | MISC                      | N/A                                       | No                | L                             | 146        | Building 5 Northwest Dormer | None Detected    |
| 11/14/2016     | 088    | Wood Frame White Exterior Caulking    | MISC                      | N/A                                       | No                | L                             | 147        | Building 85 Northwest       | None Detected    |
| 11/14/2016     | 089    | Wood Frame Gray Exterior Glazing      | MISC                      | N/A                                       | Yes               | M                             | 148        | Building 85 Northwest       | None Detected    |
| 11/14/2016     | 090    | Metal Frame Gray Exterior Caulking    | MISC                      | N/A                                       | No                | L                             | 149        | Building 85 Northwest       | None Detected    |
| 11/14/2016     | 091    | Metal Frame White Exterior Glazing    | MISC                      | N/A                                       | Yes               | L                             | 150        | Building 85 Northwest       | None Detected    |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inpection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                                      | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location       | Asbestos Content |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|-----------------------|------------------|
| 11/14/2016     | 092    | Plastic Frame White Exterior Caulking               | MISC                      | N/A                                       | No                | L                             | 151        | Building 85 Southwest | None Detected    |
| 11/14/2016     | 093    | Vent Metal Frame Gray Exterior Caulking             | MISC                      | N/A                                       | No                | L                             | 152        | Building 85 Southeast | None Detected    |
| 11/14/2016     | 094    | Metal Frame White Interior Glazing                  | MISC                      | N/A                                       | Yes               | L                             | 153        | Building 85 North     | None Detected    |
| 11/14/2016     | 095    | Metal Frame White Interior Glazing                  | MISC                      | N/A                                       | No                | L                             | 154        | Building 85 North     | None Detected    |
| 11/14/2016     | 096    | Plastic Frame White Interior Caulking               | MISC                      | N/A                                       | No                | L                             | 155        | Building 85 Southwest | None Detected    |
| 11/14/2016     | 097    | Plastic Frame White Interior Glazing                | MISC                      | N/A                                       | No                | L                             | 156        | Building 85 Southwest | None Detected    |
| 11/14/2016     | 098    | Plastic Frame Gray Exterior Caulking                | MISC                      | N/A                                       | No                | L                             | 157        | Building 109 South    | None Detected    |
| 11/14/2016     | 099    | Plastic Frame White Exterior Caulking               | MISC                      | N/A                                       | No                | L                             | 158        | Building 109 South    | None Detected    |
| 11/14/2016     | 100    | Plastic Frame White Exterior Glazing                | MISC                      | N/A                                       | No                | L                             | 159        | Building 109 South    | None Detected    |
| 11/14/2016     | 101    | Aluminium Frame 1' x 3' Panes Gray Exterior Glazing | MISC                      | 15 Units                                  | No                | L                             | 160        | Building 136 North    | 2 % Chrysotile   |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description   | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location    | Asbestos Content  |
|----------------|--------|--|---------------------------|---|-------------------|-------------------------------|------------|--------------------|-------------------|
| 11/14/2016     | 102    | Aluminium Frame 1' x 3' Panes Gray Exterior Glazing        | MISC                      | N/A                                       | No                | L                             | 161        | Building 136 North | None Detected     |
| 11/14/2016     | 103    | Aluminium Frame 2' x 3' Panes Light Gray Exterior Caulking | MISC                      | 15 Units                                  | No                | L                             | 162        | Building 136 North | 2 % Chrysotile    |
| 11/14/2016     | 104    | Aluminium Frame 2' x 3' Panes Dark Gray Exterior Glazing   | MISC                      | 15 Units                                  | Yes               | L                             | 163        | Building 136 North | 2 % Chrysotile    |
| 11/14/2016     | 105    | Aluminium Frame 2' x 3' Black Exterior Glazing             | MISC                      | N/A                                       | Yes               | L                             | 164        | Building 136 North | None Detected     |
| 11/14/2016     | 106    | Aluminium Frame 2' x 3' Thick Gray Exterior Caulking       | MISC                      | 15 Units                                  | Yes               | L                             | 165        | Building 136 North | 2 % Chrysotile    |
| 11/14/2016     | 107    | Aluminium Frame 2' x 3' White Exterior Glazing             | MISC                      | 5 Units                                   | Yes               | L                             | 166        | Building 136 North | 0.50 % Chrysotile |
| 11/14/2016     | 108    | Aluminium Frame 4' x 5' Gray Exterior Caulking             | MISC                      | 5 Units                                   | No                | L                             | 167        | Building 136 North | 2 % Chrysotile    |
| 11/14/2016     | 109    | Aluminium Frame 4' x 5' Black Exterior Glazing             | MISC                      | N/A                                       | No                | L                             | 168        | Building 136 North | None Detected     |
| 11/14/2016     | 110    | Aluminium Frame 1.5' x 3' Gray Exterior Caulking           | MISC                      | N/A                                       | No                | L                             | 169        | Building 136 East  | None Detected     |
| 11/14/2016     | 111    | Aluminium Frame 1.5' x 3' Gray Exterior Caulking           | MISC                      | N/A                                       | No                | L                             | 170        | Building 136 East  | None Detected     |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                                   | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location         | Asbestos Content   |
|----------------|--------|--|---------------------------|---|-------------------|-------------------------------|------------|-------------------------|--------------------|
| 11/14/2016     | 112    | Aluminium Frame 1.5' x 3' Black Exterior Glazing | MISC                      | N/A                                       | No                | L                             | 171        | Building 136 East       | None Detected      |
| 11/14/2016     | 113    | Aluminium Frame 2' x 3' Black Interior Glazing   | MISC                      | N/A                                       | No                | L                             | 172        | Building 136 Library NW | None Detected      |
| 11/14/2016     | 114    | Aluminium Frame 4' x 5' Black Interior Glazing   | MISC                      | N/A                                       | No                | L                             | 173        | Building 136 Med Supply | None Detected      |
| 11/14/2016     | 114    | Aluminium Frame 4' x 5' Black Interior Glazing   | MISC                      | N/A                                       | No                | L                             | 174        | Building 136 Library    | None Detected      |
| 11/14/2016     | 115    | Aluminum Frame BG Gray Exterior Caulking         | MISC                      | N/A                                       | No                | L                             | 175        | Building 138 North      | None Detected      |
| 11/14/2016     | 116    | Aluminum Frame BG Gray Exterior Glazing          | MISC                      | N/A                                       | Yes               | L                             | 176        | Building 138 North      | None Detected      |
| 11/14/2016     | 117    | Aluminium Thick Frame Gray Interior Glazing      | MISC                      | N/A                                       | Yes               | M                             | 177        | Building 138 South      | None Detected      |
| 11/14/2016     | 118    | Aluminium Thick Frame Gray Exterior Caulking     | MISC                      | N/A                                       | Yes               | L                             | 178        | Building 138 South      | None Detected      |
| 11/14/2016     | 119    | Aluminium Thick Frame Gray Exterior Glazing      | MISC                      | N/A                                       | Yes               | L                             | 179        | Building 138 South      | None Detected      |
| 11/14/2016     | 120    | Aluminium Thin Frame Gray Interior Glazing       | MISC                      | 11 Units                                  | Yes               | H                             | 180        | Building 138 South      | 0.50 % Chrysotile  |
| 11/14/2016     | 121    | Aluminium Thick Frame Gray Interior Glazing      | MISC                      | 9 Units                                   | Yes               | H                             | 181        | Building 138 South      | <0.25 % Chrysotile |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inpection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                                      | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location    | Asbestos Content   |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|--------------------|--------------------|
| 11/14/2016     | 122    | Aluminum Frame BG Gray Interior Caulking            | MISC                      | N/A                                       | No                | L                             | 182        | Building 138 North | None Detected      |
| 11/14/2016     | 123    | Aluminum Frame BG Black Interior Glazing            | MISC                      | N/A                                       | No                | L                             | 183        | Building 138 North | None Detected      |
| 11/14/2016     | 124    | Galvanized Rounded Mullions White Exterior Caulking | MISC                      | 47 Units                                  | Yes               | M                             | 184        | Building 134 East  | <0.25 % Chrysotile |
| 11/14/2016     | 125    | Galvanized Rounded Mullions White Exterior Glazing  | MISC                      | 47 Units                                  | Yes               | M                             | 185        | Building 134 East  | 0.25 % Chrysotile  |
| 11/14/2016     | 126    | Galvanized Rounded Mullions White Interior Glazing  | MISC                      | 15 Units                                  | Yes               | L                             | 186        | Building 134 West  | <0.25 % Chrysotile |
| 11/14/2016     | 127    | Galvanized Flat Mullions White Interior Caulking    | MISC                      | N/A                                       | No                | L                             | 187        | Building 134 West  | None Detected      |
| 11/14/2016     | 128    | Galvanized Flat Mullions White Exterior Caulking    | MISC                      | 15 Units                                  | Yes               | L                             | 188        | Building 134 West  | 2 % Chrysotile     |
| 11/14/2016     | 129    | Galvanized Flat Mullions Gray Exterior Glazing      | MISC                      | N/A                                       | Yes               | L                             | 189        | Building 134 West  | None Detected      |
| 11/14/2016     | 130    | Aluminum Frame Outer Gray Exterior Caulking         | MISC                      | N/A                                       | No                | L                             | 190        | Building 101 North | None Detected      |
| 11/14/2016     | 131    | Aluminum Frame Inner Gray Exterior Caulking         | MISC                      | N/A                                       | No                | L                             | 191        | Building 101 North | None Detected      |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                                  | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location          | Asbestos Content |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|--------------------------|------------------|
| 11/14/2016     | 132    | Aluminum Frame Black Exterior Glazing           | MISC                      | N/A                                       | No                | L                             | 192        | Building 101 North       | None Detected    |
| 11/14/2016     | 133    | Aluminum Frame Black Interior Glazing           | MISC                      | N/A                                       | No                | L                             | 193        | Building 101 South       | None Detected    |
| 11/14/2016     | 134    | Aluminum Frame Gray Exterior Caulking           | MISC                      | 58 Units                                  | No                | L                             | 194        | Building 6 W NW Entrance | 2 % Chrysotile   |
| 11/14/2016     | 134    | Aluminum Frame Gray Exterior Caulking           | MISC                      | N/A                                       | No                | L                             | 195        | Building 6 W NW Entrance | None Detected    |
| 11/14/2016     | 134    | Aluminum Frame Gray Exterior Caulking           | MISC                      | 58 Units                                  | No                | L                             | 197        | Building 6 North         | 2 % Chrysotile   |
| 11/14/2016     | 134    | Aluminum Frame Gray Exterior Caulking           | MISC                      | N/A                                       | No                | L                             | 200        | Building 6 South         | None Detected    |
| 11/14/2016     | 135    | Aluminum Frame Black Exterior Glazing           | MISC                      | N/A                                       | No                | L                             | 196        | Building 6 W NW Entrance | None Detected    |
| 11/14/2016     | 136    | Aluminum Frame Gray Exterior Glazing            | MISC                      | N/A                                       | No                | L                             | 198        | Building 6 South         | None Detected    |
| 11/14/2016     | 137    | Aluminum Frame with Vent Black Exterior Glazing | MISC                      | 1 Unit                                    | Yes               | M                             | 199        | Building 6 South         | 2 % Chrysotile   |
| 11/14/2016     | 138    | Wood Frame Inner White Exterior Caulking        | MISC                      | N/A                                       | Yes               | M                             | 201        | Building 6 South         | None Detected    |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                                   | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location   | Asbestos Content  |
|----------------|--------|--|---------------------------|---|-------------------|-------------------------------|------------|-------------------|-------------------|
| 11/14/2016     | 139    | Wood Frame Inner White Exterior Caulking         | MISC                      | 2 Units                                   | No                | H                             | 202        | Building 6 South  | <1 % Chrysotile   |
| 11/14/2016     | 140    | Wood Frame White Exterior Glazing                | MISC                      | 2 Units                                   | Yes               | M                             | 203        | Building 6 South  | 0.25 % Chrysotile |
| 11/14/2016     | 141    | Aluminum Frame Gray Interior Glazing             | MISC                      | N/A                                       | No                | L                             | 204        | Building 6 North  | None Detected     |
| 11/14/2016     | 142    | Aluminum Frame Gray Interior Caulking            | MISC                      | 58 Units                                  | No                | L                             | 205        | Building 6 East   | 2 % Chrysotile    |
| 11/14/2016     | 142    | Aluminum Frame Gray Interior Caulking            | MISC                      | N/A                                       | No                | L                             | 206        | Building 6 East   | None Detected     |
| 11/14/2016     | 143    | Aluminum Frame Black Interior Glazing            | MISC                      | N/A                                       | No                | L                             | 207        | Building 6 East   | None Detected     |
| 11/14/2016     | 144    | Aluminum Frame with Vent Black Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 208        | Building 14 North | None Detected     |
| 11/14/2016     | 145    | Aluminum Frame with Vent Black Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 209        | Building 14 North | None Detected     |
| 11/14/2016     | 146    | Aluminum Frame Gray Exterior Caulking            | MISC                      | 240 Units                                 | No                | L                             | 210        | Building 14 North | 2 % Chrysotile    |
| 11/14/2016     | 146    | Aluminum Frame Gray Exterior Caulking            | MISC                      | N/A                                       | No                | L                             | 212        | Building 14 South | None Detected     |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High



# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                              | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location      | Asbestos Content |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|----------------------|------------------|
| 11/14/2016     | 146    | Aluminum Frame Gray Exterior Caulking       | MISC                      | N/A                                       | No                | L                             | 213        | Building 14 South    | None Detected    |
| 11/14/2016     | 147    | Aluminum Frame Black Exterior Glazing       | MISC                      | N/A                                       | No                | L                             | 211        | Building 14 North    | None Detected    |
| 11/14/2016     | 147    | Aluminum Frame Black Exterior Glazing       | MISC                      | N/A                                       | No                | L                             | 214        | Building 14 South    | None Detected    |
| 11/14/2016     | 148    | Off White Vent Light Gray Exterior Caulking | MISC                      | 12 Units                                  | Yes               | L                             | 215        | Building 14 South    | 2 % Chrysotile   |
| 11/14/2016     | 149    | Off White Vent White Exterior Caulking      | MISC                      | 12 Units                                  | Yes               | L                             | 216        | Building 14 South    | 2 % Chrysotile   |
| 11/14/2016     | 150    | Aluminum Frame White Exterior Caulking      | MISC                      | N/A                                       | No                | L                             | 217        | Building 14 East     | None Detected    |
| 11/14/2016     | 151    | Aluminum Frame Gray Interior Caulking       | MISC                      | N/A                                       | No                | L                             | 218        | Building 14 South    | None Detected    |
| 11/14/2016     | 151    | Aluminum Frame Gray Interior Caulking       | MISC                      | N/A                                       | No                | L                             | 222        | Building 14 Laundry  | None Detected    |
| 11/14/2016     | 152    | Aluminum Frame White Interior Caulking      | MISC                      | 240 Units                                 | No                | L                             | 219        | Building 14 NW       | <1 % Chrysotile  |
| 11/14/2016     | 152    | Aluminum Frame White Interior Caulking      | MISC                      | N/A                                       | No                | L                             | 224        | Building 14 Room 247 | None Detected    |
| 11/14/2016     | 153    | Wood Frame Red Interior Caulking            | MISC                      | N/A                                       | No                | L                             | 220        | Building 14 Attic    | None Detected    |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                              | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location            | Asbestos Content   |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|----------------------------|--------------------|
| 11/14/2016     | 154    | Wood Frame White Exterior Glazing           | MISC                      | N/A                                       | Yes               | L                             | 221        | Building 14 Attic          | <0.25 % Chrysotile |
| 11/14/2016     | 155    | Aluminum Frame Blue Green Interior Caulking | MISC                      | N/A                                       | No                | L                             | 223        | Building 14 Men's Restroom | None Detected      |
| 11/14/2016     | 156    | Aluminum Frame Gray Exterior Caulking       | MISC                      | N/A                                       | No                | L                             | 225        | Building 3 South           | None Detected      |
| 11/14/2016     | 156    | Aluminum Frame Gray Exterior Caulking       | MISC                      | N/A                                       | No                | L                             | 228        | Building 3 South           | None Detected      |
| 11/14/2016     | 156    | Aluminum Frame Gray Exterior Caulking       | MISC                      | N/A                                       | No                | L                             | 229        | Building 3 South           | None Detected      |
| 11/14/2016     | 157    | Aluminum Frame Black Exterior Glazing       | MISC                      | N/A                                       | No                | L                             | 226        | Building 3 South           | None Detected      |
| 11/14/2016     | 157    | Aluminum Frame Black Exterior Glazing       | MISC                      | N/A                                       | No                | L                             | 227        | Building 3 South           | None Detected      |
| 11/14/2016     | 158    | Aluminum Frame Gray Exterior Glazing        | MISC                      | N/A                                       | No                | L                             | 230        | Building 3 North           | None Detected      |
| 11/14/2016     | 159    | Aluminum Frame Gray Interior Caulking       | MISC                      | N/A                                       | No                | L                             | 231        | Building 3 North           | None Detected      |
| 11/14/2016     | 159    | Aluminum Frame Gray Interior Caulking       | MISC                      | N/A                                       | No                | L                             | 233        | Building 3 South           | None Detected      |
| 11/14/2016     | 160    | Aluminum Frame Gray Interior Glazing        | MISC                      | N/A                                       | No                | L                             | 232        | Building 3 North           | None Detected      |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                                  | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location   | Asbestos Content |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|-------------------|------------------|
| 11/14/2016     | 161    | Aluminum Frame Gray Exterior Caulking           | MISC                      | N/A                                       | No                | L                             | 234        | Building 12 West  | None Detected    |
| 11/14/2016     | 161    | 3' x 5' Pane Aluminum Inner Exterior Gray Caulk | MISC                      | N/A                                       | No                | L                             | 235        | Building 12 West  | None Detected    |
| 11/14/2016     | 161    | Aluminum Frame Gray Exterior Caulking           | MISC                      | N/A                                       | No                | L                             | 237        | Building 12 East  | None Detected    |
| 11/14/2016     | 161    | Aluminum Frame Gray Exterior Caulking           | MISC                      | N/A                                       | No                | L                             | 238        | Building 12 East  | None Detected    |
| 11/14/2016     | 162    | Wood Frame White Exterior Glazing               | MISC                      | N/A                                       | Yes               | H                             | 236        | Building 12 West  | None Detected    |
| 11/14/2016     | 163    | Aluminum Frame Gray Exterior Caulking           | MISC                      | 102 Units                                 | No                | L                             | 239        | Building 11 East  | 2 % Chrysotile   |
| 11/14/2016     | 163    | Aluminum Frame Gray Exterior Caulking           | MISC                      | 102 Units                                 | No                | L                             | 242        | Building 11 North | 2 % Chrysotile   |
| 11/14/2016     | 164    | Aluminum Frame Gray Exterior Glazing            | MISC                      | N/A                                       | No                | L                             | 240        | Building 11 East  | None Detected    |
| 11/14/2016     | 164    | Aluminum Frame Gray Exterior Glazing            | MISC                      | N/A                                       | No                | L                             | 244        | Building 11 North | None Detected    |
| 11/14/2016     | 165    | Wood Frame White Exterior Glazing               | MISC                      | N/A                                       | Yes               | M                             | 241        | Building 11 North | None Detected    |
| 11/14/2016     | 166    | Aluminum Frame Cream Exterior Caulking          | MISC                      | N/A                                       | No                | L                             | 243        | Building 11 North | None Detected    |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                                   | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location   | Asbestos Content |
|----------------|--------|--|---------------------------|---|-------------------|-------------------------------|------------|-------------------|------------------|
| 11/14/2016     | 167    | Aluminum Frame Weathered Black Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 245        | Building 11 Porch | None Detected    |
| 11/14/2016     | 168    | Aluminum Frame Dark Black Exterior Caulking      | MISC                      | N/A                                       | No                | L                             | 246        | Building 11 Porch | None Detected    |
| 11/14/2016     | 169    | Aluminum Frame Dark Gray Interior Caulking       | MISC                      | N/A                                       | No                | L                             | 247        | Building 12 West  | None Detected    |
| 11/14/2016     | 169    | Aluminum Frame Dark Gray Interior Caulking       | MISC                      | N/A                                       | No                | L                             | 250        | Building 12 South | None Detected    |
| 11/14/2016     | 170    | Aluminum Frame Light Gray Interior Caulking      | MISC                      | N/A                                       | No                | L                             | 248        | Building 12 West  | None Detected    |
| 11/14/2016     | 170    | Aluminum Frame Light Gray Interior Caulking      | MISC                      | N/A                                       | No                | L                             | 251        | Building 12 South | None Detected    |
| 11/14/2016     | 171    | Aluminum Frame Gray Interior Glazing             | MISC                      | N/A                                       | No                | L                             | 249        | Building 12 West  | None Detected    |
| 11/14/2016     | 171    | Aluminum Frame Gray Interior Glazing             | MISC                      | N/A                                       | No                | L                             | 252        | Building 12 South | None Detected    |
| 11/14/2016     | 171    | Aluminum Frame Gray Interior Glazing             | MISC                      | N/A                                       | No                | L                             | 254        | Building 11 South | None Detected    |
| 11/14/2016     | 171    | Aluminum Frame Gray Interior Glazing             | MISC                      | N/A                                       | No                | L                             | 257        | Building 11 West  | None Detected    |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                            | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location   | Asbestos Content |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|-------------------|------------------|
| 11/14/2016     | 172    | Aluminum Frame Gray Interior Caulking     | MISC                      | 102 Units                                 | No                | L                             | 253        | Building 11 South | 2 % Chrysotile   |
| 11/14/2016     | 172    | Aluminum Frame Gray Interior Caulking     | MISC                      | 102 Units                                 | No                | L                             | 256        | Building 11 West  | 2 % Chrysotile   |
| 11/14/2016     | 173    | Aluminum Frame Cream Interior Caulking    | MISC                      | 102 Units                                 | No                | L                             | 255        | Building 11 South | 2 % Chrysotile   |
| 11/14/2016     | 174    | Aluminum Frame Cream Exterior Caulking    | MISC                      | N/A                                       | No                | L                             | 258        | Building 4 North  | None Detected    |
| 11/14/2016     | 174    | Aluminum Frame Cream Exterior Caulking    | MISC                      | N/A                                       | No                | L                             | 261        | Building 4 North  | None Detected    |
| 11/14/2016     | 175    | Aluminum Frame Gray Exterior Caulking     | MISC                      | N/A                                       | No                | L                             | 259        | Building 4 North  | None Detected    |
| 11/14/2016     | 175    | Aluminum Frame Gray Exterior Caulking     | MISC                      | 2 Units                                   | No                | L                             | 262        | Building 4 North  | <1 % Chrysotile  |
| 11/14/2016     | 175    | Aluminum Frame Gray Exterior Caulking     | MISC                      | N/A                                       | No                | L                             | 265        | Building 4 South  | None Detected    |
| 11/14/2016     | 175    | 3' x 4' Double Pane Gray Exterior Glazing | MISC                      | N/A                                       | Yes               | M                             | 266        | Building 4 East   | None Detected    |
| 11/14/2016     | 176    | Aluminum Frame Gray Exterior Glazing      | MISC                      | N/A                                       | No                | L                             | 260        | Building 4 North  | None Detected    |
| 11/14/2016     | 177    | Aluminum Frame White Exterior Glazing     | MISC                      | 2 Units                                   | No                | L                             | 263        | Building 4 North  | <1 % Chrysotile  |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                         | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location      | Asbestos Content |
|----------------|--------|--|---------------------------|---|-------------------|-------------------------------|------------|----------------------|------------------|
| 11/14/2016     | 178    | Wood Frame White Exterior Glazing      | MISC                      | N/A                                       | Yes               | H                             | 264        | Building 4 West      | None Detected    |
| 11/14/2016     | 179    | Aluminum Frame Gray Interior Glazing   | MISC                      | N/A                                       | No                | L                             | 267        | Building 4 East      | None Detected    |
| 11/14/2016     | 179    | Aluminum Frame Gray Interior Glazing   | MISC                      | N/A                                       | No                | L                             | 269        | Building 4 West      | None Detected    |
| 11/14/2016     | 180    | Aluminum Frame White Interior Caulking | MISC                      | N/A                                       | No                | L                             | 268        | Building 4 Room 118  | None Detected    |
| 11/14/2016     | 181    | Wood Frame White Interior Caulking     | MISC                      | N/A                                       | No                | L                             | 270        | Building 4 South     | None Detected    |
| 11/14/2016     | 182    | Wood Frame White Interior Glazing      | MISC                      | N/A                                       | No                | L                             | 271        | Building 4 South     | None Detected    |
| 11/14/2016     | 183    | Aluminum Frame Gray Exterior Caulking  | MISC                      | N/A                                       | No                | L                             | 272        | Building 1 Northwest | None Detected    |
| 11/14/2016     | 183    | Aluminum Frame Gray Exterior Caulking  | MISC                      | 90 Units                                  | No                | L                             | 273        | Building 1 Northwest | 2 % Chrysotile   |
| 11/14/2016     | 184    | Aluminum Frame Gray Exterior Glazing   | MISC                      | N/A                                       | No                | L                             | 274        | Building 1 Northwest | None Detected    |
| 11/14/2016     | 185    | Aluminum Frame Cream Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 275        | Building 1 Northwest | None Detected    |
| 11/14/2016     | 186    | Aluminum Frame White Exterior Caulking | MISC                      | N/A                                       | No                | L                             | 276        | Building 1 Northwest | None Detected    |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High

# Asbestos Homogeneous Area (HA) and Sampling Summary

(via Method EPA 600/R-93/116)



**Alliance Project Number:** 16-0151-A

**Project:** Window Caulking/Glazing Inspection

**Location:** Battle Creek VA Hospital, Battle Creek, Michigan

**Samples Collected By:** Mike Ardis

**Date Collected:** 11/14/2016 - 11/17/2016

| Date Collected | HA No. | HA Description                              | Type of ACBM <sup>1</sup> | Approx. Quantity (Entire HA) <sup>2</sup> | Friable? (Yes/No) | Damage (N,L,M,H) <sup>3</sup> | Sample No. | Sample Location        | Asbestos Content   |
|----------------|--------|---|---------------------------|---|-------------------|-------------------------------|------------|------------------------|--------------------|
| 11/14/2016     | 187    | Aluminum Frame Gray Interior Glazing        | MISC                      | N/A                                       | No                | L                             | 277        | Building 1 East        | None Detected      |
| 11/14/2016     | 187    | Aluminum Frame Gray Interior Glazing        | MISC                      | N/A                                       | No                | L                             | 280        | Building 1 Basement    | None Detected      |
| 11/14/2016     | 188    | Aluminum Frame Black Interior Glazing       | MISC                      | N/A                                       | No                | L                             | 278        | Building 1 Front Porch | None Detected      |
| 11/14/2016     | 189    | Aluminum Frame Light Gray Interior Caulking | MISC                      | N/A                                       | No                | L                             | 279        | Building 1 Northwest   | None Detected      |
| 11/14/2016     | 190    | Aluminum Frame White Exterior Caulking      | MISC                      | 11 Units                                  | Yes               | H                             | 072        | Building 10 East (B)   | <0.25 % Chrysotile |
| 11/14/2016     | 191    | Aluminum Frame White Exterior Glazing       | MISC                      | N/A                                       | No                | M                             | 073        | Building 10 East (B)   | None Detected      |

<sup>1</sup> SM = Surfacing Material; TSI = Thermal System Insulation; Misc. = Miscellaneous Material

<sup>2</sup> SF = Square Feet; LF = Linear Feet; FTG = Fitting

<sup>3</sup> N = None; L = Low; M = Medium; H = High



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislabs@emsl.com](mailto:indianapolislabs@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

Attention: Michael Ardis

Alliance Environmental Group, Inc.

5153 Commerce Square Drive

Suite E

Indianapolis, IN 46237

Project: 16-0151-A

Phone: (317) 865-3400

Fax: (317) 865-3401

Received Date: 11/21/2016 10:25 AM

Analysis Date: 11/28/2016 - 11/29/2016

Collected Date: 11/14/2016

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample  | Description                  | Appearance                               | Non-Asbestos |                          | Asbestos<br>% Type |
|---|------------------------------|--|--------------|--------------------------|--------------------|
|   |                              |  | % Fibrous    | % Non-Fibrous            |                    |
| 001<br><i>161621806-0001</i>  | 30N1 - 12x18 panes<br>caulk  | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected      |
| 002<br><i>161621806-0002</i><br><i>Inseparable paint / coating layer included in analysis</i> | 30N1 - 12x18 panes<br>glz    | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected      |
| 003<br><i>161621806-0003</i>  | 30W5 - 6x6 caulk             | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected      |
| 004<br><i>161621806-0004</i>  | 30S6 - wdw caulk             | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected      |
| 005<br><i>161621806-0005</i>  | 30W1 - 6x6 caulk             | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected      |
| 006<br><i>161621806-0006</i>  | 30W1 - 6x6 caulk             | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected      |
| 007<br><i>161621806-0007</i>  | 30N4 - gls blk wall<br>caulk | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | <1% Chrysotile     |
| 008<br><i>161621806-0008</i>  | 30N5 - 6x6 caulk             | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected      |
| 009<br><i>161621806-0009</i>  | 30W1 - caulk                 | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected      |
| 010<br><i>161621806-0010</i>  | 28/27N15 - caulk             | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected      |
| 011<br><i>161621806-0011</i><br><i>Inseparable paint / coating layer included in analysis</i> | 28/27S19 - 12x24<br>pane glz | White/Red<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | <1% Chrysotile     |
| 012<br><i>161621806-0012</i>  | 28/27S19 - 12x24<br>caulk    | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | <1% Chrysotile     |
| 013<br><i>161621806-0013</i>  | 28/27S19 - 12x24<br>caulk    | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected      |
| 014<br><i>161621806-0014</i>  | 28/27S19 - 12x24 glz         | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | <1% Chrysotile     |
| 015<br><i>161621806-0015</i>  | 28/27S19 - 12x24<br>caulk    | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | <1% Chrysotile     |

Initial report from: 11/29/2016 10:48:48





# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislabs@emsl.com](mailto:indianapolislabs@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample                | Description                 | Appearance                          | Non-Asbestos |                          | Asbestos       |
|-----------------------|-----------------------------|-------------------------------------|--------------|--------------------------|----------------|
|                       |                             |                                     | % Fibrous    | % Non-Fibrous            | % Type         |
| 016<br>161621806-0016 | 28/27S13 - 4 pane wdw caulk | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 017<br>161621806-0017 | 28/27S13 - 4 pane wdw caulk | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 018<br>161621806-0018 | 28/27W1 - caulk             | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 019<br>161621806-0019 | 28/27S5 - caulk             | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 020<br>161621806-0020 | 28/27S5 - caulk             | Black<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 021<br>161621806-0021 | 28/27S5 - glz               | Black<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 022<br>161621806-0022 | 28/27S4(L) - caulk          | Clear<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 023<br>161621806-0023 | 28/S7W3 - glz               | Black<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 024<br>161621806-0024 | 28/S7(Entrance) - silicone  | Clear<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 025<br>161621806-0025 | 28/27S4 - caulk             | Gray<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |
| 026<br>161621806-0026 | 28/27S4 - glz               | Black<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 027<br>161621806-0027 | 28/S7S1(L) - caulk          | Clear<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 028<br>161621806-0028 | 28/27S1(L) - glz            | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 029<br>161621806-0029 | 28/S7S13 - caulk            | Clear<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 030<br>161621806-0030 | 28/S7S13 - caulk            | Gray<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 031<br>161621806-0031 | 28/27S13 - glz              | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 032<br>161621806-0032 | 26S10 - caulk               | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 033<br>161621806-0033 | 26S10 - glz                 | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 034<br>161621806-0034 | 26S9 - glz                  | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |

Initial report from: 11/29/2016 10:48:48



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislabs@emsl.com](mailto:indianapolislabs@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample                | Description  | Appearance                          | Non-Asbestos |                          | Asbestos       |
|-----------------------|--------------|-------------------------------------|--------------|--------------------------|----------------|
|                       |              |                                     | % Fibrous    | % Non-Fibrous            | % Type         |
| 035<br>161621806-0035 | 26S9 - caulk | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 036<br>161621806-0036 | 26S8 - caulk | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 037<br>161621806-0037 | 26S8 - caulk | Clear<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 038<br>161621806-0038 | 26S8 - glz   | Black<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 039<br>161621806-0039 | 26S7 - caulk | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 040<br>161621806-0040 | 26S7 - glz   | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 041<br>161621806-0041 | 26E1 - caulk | Tan<br>Non-Fibrous<br>Homogeneous   |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 042<br>161621806-0042 | 26E1 - glz   | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 043<br>161621806-0043 | 26N1 - caulk | Gray<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 044<br>161621806-0044 | 26N1 - caulk | Clear<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 045<br>161621806-0045 | 26W2 - caulk | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 046<br>161621806-0046 | 26W3 - caulk | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 047<br>161621806-0047 | 26S7 - caulk | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 048<br>161621806-0048 | 25S7 - caulk | Gray<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |
| 049<br>161621806-0049 | 25S7 - caulk | Gray<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 050<br>161621806-0050 | 25S7 - caulk | White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 051<br>161621806-0051 | 25S7 - caulk | Gray<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |
| 052<br>161621806-0052 | 25S5 - caulk | Gray<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |
| 053<br>161621806-0053 | 25S5 - caulk | Gray<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |

Initial report from: 11/29/2016 10:48:48



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislabs@emsl.com](mailto:indianapolislabs@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample                               | Description        | Appearance                                | Non-Asbestos |                          | Asbestos       |
|--------------------------------------|--------------------|---|--------------|--------------------------|----------------|
|                                      |                    |   | % Fibrous    | % Non-Fibrous            | % Type         |
| 054<br><small>161621806-0054</small> | 24E2(B) - caulk    | Gray<br>Non-Fibrous<br>Homogeneous        |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 055<br><small>161621806-0055</small> | 24E2(B) - glz      | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 056<br><small>161621806-0056</small> | 24E2(B) - caulk    | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 057<br><small>161621806-0057</small> | 24E2(B) - glz      | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 058<br><small>161621806-0058</small> | 24N2(1ST) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous        |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 059<br><small>161621806-0059</small> | 24N2(1ST) - glz    | Clear<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 060<br><small>161621806-0060</small> | 24N2(1ST) - glz    | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 061<br><small>161621806-0061</small> | 24N10(1ST) - caulk | Gray<br>Non-Fibrous<br>Homogeneous        |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 062<br><small>161621806-0062</small> | 24110(1ST) - glz   | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 063<br><small>161621806-0063</small> | 24S1(B) - glz      | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 064<br><small>161621806-0064</small> | 24N6(2ND) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous        | 5% Synthetic | 93% Non-fibrous (Other)  | 2% Chrysotile  |
| 065<br><small>161621806-0065</small> | 24N6(2ND) - glz    | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 066<br><small>161621806-0066</small> | 10S1(2ND) - caulk  | White<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 067<br><small>161621806-0067</small> | 10S1(2ND) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 068<br><small>161621806-0068</small> | 10S1(2ND) - glz    | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 069<br><small>161621806-0069</small> | 10E1(1ST) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 070<br><small>161621806-0070</small> | 10E1(1ST) - glz    | Gray/Silver<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 071<br><small>161621806-0071</small> | 10E1(1ST) - caulk  | White<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 072<br><small>161621806-0072</small> | 10E1(B) - caulk    | White<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | <1% Chrysotile |

Initial report from: 11/29/2016 10:48:48



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislab@emsl.com](mailto:indianapolislab@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample                | Description        | Appearance                                | Non-Asbestos |                          | Asbestos       |
|-----------------------|--------------------|---|--------------|--------------------------|----------------|
|                       |                    |   | % Fibrous    | % Non-Fibrous            | % Type         |
| 073<br>161621806-0073 | 10E1(B) - glz      | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 074<br>161621806-0074 | 10N2(2ND) - caulk  | White<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 075<br>161621806-0075 | 10N2(2ND) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 076<br>161621806-0076 | 10N2(2ND) - glz    | Gray/Silver<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 077<br>161621806-0077 | 10W4(1ST) - caulk  | White<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 078<br>161621806-0078 | 10W4(1ST) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 079<br>161621806-0079 | 10W4(1ST) - glz    | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 080<br>161621806-0080 | 10W1(1ST) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 081<br>161621806-0081 | 10S1(1ST) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 082<br>161621806-0082 | 10N3(2ND) - caulk  | Silver<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 083<br>161621806-0083 | 10S2(2ND) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 084<br>161621806-0084 | 30S1 - glz         | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 085<br>161621806-0085 | 9W3(1ST) - caulk   | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 086<br>161621806-0086 | 9W3(1ST) - caulk   | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 087<br>161621806-0087 | 9W1(1ST) - caulk   | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 088<br>161621806-0088 | 9W1(1ST) - caulk   | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 089<br>161621806-0089 | 9N3(B) - caulk/glz | White<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 090<br>161621806-0090 | 9S10(1ST) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 091<br>161621806-0091 | 9S10(1ST) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |

Initial report from: 11/29/2016 10:48:48



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislabs@emsl.com](mailto:indianapolislabs@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample  | Description       | Appearance                               | Non-Asbestos |                          | Asbestos       |
|---|-------------------|--|--------------|--------------------------|----------------|
|   |                   |  | % Fibrous    | % Non-Fibrous            | % Type         |
| 092<br><i>161621806-0092</i>  | 9E1(2ND) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 093<br><i>161621806-0093</i>  | 8S11(2ND) - caulk | Gray<br>Non-Fibrous<br>Homogeneous       |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 094<br><i>161621806-0094</i>  | 8S11(2ND) - glz   | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 095<br><i>161621806-0095</i>  | 8W3(1ST) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 096<br><i>161621806-0096</i>  | 8W4(1ST) - glz    | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 097<br><i>161621806-0097</i>  | 8N1(B) - glz      | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 098<br><i>161621806-0098</i>  | 8N3(2ND) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous       |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 099<br><i>161621806-0099</i>  | 8N2(2ND) - glz    | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 100<br><i>161621806-0100</i>  | 8E1(1ST) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous       |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 101<br><i>161621806-0101</i>  | 8E1(1ST) - glz    | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 102<br><i>161621806-0102</i><br><i>Inseparable paint / coating layer included in analysis</i> | 8N14(1ST) - caulk | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 103<br><i>161621806-0103</i>  | 8N14(1ST) - glz   | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 104<br><i>161621806-0104</i>  | 8E3(2ND) - caulk  | Gray<br>Non-Fibrous<br>Homogeneous       |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 105<br><i>161621806-0105</i>  | 8E3(2ND) - glz    | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 106<br><i>161621806-0106</i>  | 13W3(B) - caulk   | Gray<br>Non-Fibrous<br>Homogeneous       | 5% Synthetic | 93% Non-fibrous (Other)  | 2% Chrysotile  |
| 107<br><i>161621806-0107</i>  | 13W3(B) - glz     | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 108<br><i>161621806-0108</i>  | 13S9(1ST) - caulk | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 109<br><i>161621806-0109</i>  | 13S9(1ST) - glz   | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |

Initial report from: 11/29/2016 10:48:48



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislab@emsl.com](mailto:indianapolislab@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample   | Description          | Appearance                               | Non-Asbestos |                          | Asbestos       |
|--|----------------------|--|--------------|--------------------------|----------------|
|  |                      |  | % Fibrous    | % Non-Fibrous            | % Type         |
| 110  | 13S4(1ST) - caulk    | Gray/White<br>Non-Fibrous<br>Homogeneous | 2% Glass     | 98% Non-fibrous (Other)  | None Detected  |
| 161621806-0110<br>Inseparable paint / coating layer included in analysis |                      |  |              |                          |                |
| 111  | 13S4(1ST) - glz      | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0111   |                      |  |              |                          |                |
| 112  | 13W(3)3(1ST) - caulk | Gray/White<br>Non-Fibrous<br>Homogeneous | 5% Glass     | 95% Non-fibrous (Other)  | None Detected  |
| 161621806-0112<br>Inseparable paint / coating layer included in analysis |                      |  |              |                          |                |
| 113  | 13W(3)3(1ST) - glz   | Black<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0113   |                      |  |              |                          |                |
| 114  | 13S19(1ST) - caulk   | Gray/White<br>Non-Fibrous<br>Homogeneous | 5% Glass     | 95% Non-fibrous (Other)  | None Detected  |
| 161621806-0114<br>Inseparable paint / coating layer included in analysis |                      |  |              |                          |                |
| 115  | 13S19(1ST) - glz     | Black<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0115   |                      |  |              |                          |                |
| 116  | 13S14(1ST) - caulk   | Clear<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0116   |                      |  |              |                          |                |
| 117  | 13S14(1ST) - caulk   | Gray<br>Non-Fibrous<br>Homogeneous       | 6% Synthetic | 92% Non-fibrous (Other)  | 2% Chrysotile  |
| 161621806-0117   |                      |  |              |                          |                |
| 118  | 13W(2)2 - caulk      | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0118   |                      |  |              |                          |                |
| 119  | 13W(2)2 - glz        | Black<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0119   |                      |  |              |                          |                |
| 120  | 13N2(UPPER) - caulk  | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0120   |                      |  |              |                          |                |
| 121  | 13N2(UPPER) - glz    | Black<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0121   |                      |  |              |                          |                |
| 122  | 13N2(UPPER) - glz    | Black<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0122   |                      |  |              |                          |                |
| 123  | 13S2(A) - caulk      | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0123   |                      |  |              |                          |                |
| 124  | 13S2(A) - caulk      | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0124   |                      |  |              |                          |                |
| 125  | 13S2(A) - glz        | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 161621806-0125   |                      |  |              |                          |                |
| 126  | 13S(CS)OUTER - caulk | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0126   |                      |  |              |                          |                |
| 127  | 13S(CS)OUTER - glz   | Black<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0127   |                      |  |              |                          |                |

Initial report from: 11/29/2016 10:48:48



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislabs@emsl.com](mailto:indianapolislabs@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample  | Description                      | Appearance                               | Non-Asbestos |                          | Asbestos      |
|---|----------------------------------|--|--------------|--------------------------|---------------|
|   |                                  |  | % Fibrous    | % Non-Fibrous            | % Type        |
| 128<br><i>161621806-0128</i>  | 13S(CS)INNER -<br>caulk          | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected |
| 129<br><i>161621806-0129</i><br><i>Inseparable paint / coating layer included in analysis</i> | 13S(CS)INNER -<br>caulk          | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected |
| 130<br><i>161621806-0130</i>  | 13S(CS)INNER - glz               | Black<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 131<br><i>161621806-0131</i>  | 13E3(B) - caulk                  | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 132<br><i>161621806-0132</i>  | 13E3(B) - glz                    | Black<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 133<br><i>161621806-0133</i>  | ROOM 025(B) - glz                | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected |
| 134<br><i>161621806-0134</i>  | ROOM 133(1ST)<br>INNER - caulk   | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 135<br><i>161621806-0135</i>  | ROOM<br>133(1ST)OUTER -<br>caulk | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected |
| 136<br><i>161621806-0136</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 5 NW<br>CORNER - glz        | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 137<br><i>161621806-0137</i>  | BLDG 5 NW<br>CORNER - glz        | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 138<br><i>161621806-0138</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 5 NW<br>CORNER - caulk      | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected |
| 139<br><i>161621806-0139</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 5 NW<br>BASEMENT - caulk    | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected |
| 140<br><i>161621806-0140</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 5 NW<br>BASEMENT - caulk    | Tan/White<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected |
| 141<br><i>161621806-0141</i>  | BLDG 5 LOAD DOCK<br>- caulk      | Gray<br>Non-Fibrous<br>Homogeneous       |              | 98% Non-fibrous (Other)  | 2% Chrysotile |
| 142<br><i>161621806-0142</i>  | BLDG 5 LOAD DOCK<br>- glz        | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected |
| 143<br><i>161621806-0143</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 5 HISTORY<br>MUSEUM - caulk | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 98% Non-fibrous (Other)  | 2% Chrysotile |
| 144<br><i>161621806-0144</i>  | BLDG 5 COVERED<br>WALKWAY - glz  | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected |

Initial report from: 11/29/2016 10:48:48





# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislabs@emsl.com](mailto:indianapolislabs@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample   | Description                  | Appearance                               | Non-Asbestos |                          | Asbestos      |
|--|------------------------------|--|--------------|--------------------------|---------------|
|  |                              |  | % Fibrous    | % Non-Fibrous            | % Type        |
| 145  | BLDG 5 NW DORMER - caulk     | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0145   |                              |  |              |                          |               |
| 146  | BLDG 5 NW DORMER - glz       | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0146   |                              |  |              |                          |               |
| 147  | BLDG 85 NW 2ND FLOOR - caulk | Tan/White<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0147   |                              |  |              |                          |               |
| Inseparable paint / coating layer included in analysis |                              |  |              |                          |               |
| 148  | BLDG 85 NW 2ND FL - glz      | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0148   |                              |  |              |                          |               |
| Inseparable paint / coating layer included in analysis |                              |  |              |                          |               |
| 149  | BLDG 85 NW 2ND FLOOR - caulk | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0149   |                              |  |              |                          |               |
| Inseparable paint / coating layer included in analysis |                              |  |              |                          |               |
| 150  | BLDG 85 NW 2ND FLOOR - glz   | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0150   |                              |  |              |                          |               |
| 151  | BLDG 85 SW - caulk           | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0151   |                              |  |              |                          |               |
| 152  | BLDG 85 SE - caulk           | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0152   |                              |  |              |                          |               |
| 153  | BLDG 85 N - glz              | Tan/White<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0153   |                              |  |              |                          |               |
| Inseparable paint / coating layer included in analysis |                              |  |              |                          |               |
| 154  | BLDG 85 N - glz              | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0154   |                              |  |              |                          |               |
| 155  | BLDG 85 SW - caulk           | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0155   |                              |  |              |                          |               |
| 156  | BLDG 85 SW - glz             | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0156   |                              |  |              |                          |               |
| 157  | BLDG 109S - caulk            | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0157   |                              |  |              |                          |               |
| Inseparable paint / coating layer included in analysis |                              |  |              |                          |               |
| 158  | BLDG 109S - caulk            | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0158   |                              |  |              |                          |               |
| 159  | BLDG 109S - glz              | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0159   |                              |  |              |                          |               |
| 160  | BLDG 135N - caulk            | Gray<br>Non-Fibrous<br>Homogeneous       |              | 98% Non-fibrous (Other)  | 2% Chrysotile |
| 161621806-0160   |                              |  |              |                          |               |
| 161  | BLDG 136N - glz              | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected |
| 161621806-0161   |                              |  |              |                          |               |

Initial report from: 11/29/2016 10:48:48





# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislabs@emsl.com](mailto:indianapolislabs@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample                | Description                  | Appearance                           | Non-Asbestos |                          | Asbestos       |
|-----------------------|------------------------------|--------------------------------------|--------------|--------------------------|----------------|
|                       |                              |                                      | % Fibrous    | % Non-Fibrous            | % Type         |
| 162<br>161621806-0162 | BLDG 136N - caulk            | Gray<br>Non-Fibrous<br>Homogeneous   |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 163<br>161621806-0163 | BLDG 136N - glz              | Gray<br>Non-Fibrous<br>Homogeneous   | 6% Synthetic | 92% Non-fibrous (Other)  | 2% Chrysotile  |
| 164<br>161621806-0164 | BLDG 136N - glz              | Black<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |
| 165<br>161621806-0165 | BLDG 136N - caulk            | Gray<br>Non-Fibrous<br>Homogeneous   |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 166<br>161621806-0166 | BLDG 136N - glz              | White<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 167<br>161621806-0167 | BLDG 136N - caulk            | Gray<br>Non-Fibrous<br>Homogeneous   | 6% Synthetic | 92% Non-fibrous (Other)  | 2% Chrysotile  |
| 168<br>161621806-0168 | BLDG 136N - glz              | Black<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |
| 169<br>161621806-0169 | BLDG 136E - caulk            | Gray<br>Non-Fibrous<br>Homogeneous   |              | 100% Non-fibrous (Other) | None Detected  |
| 170<br>161621806-0170 | BLDG 136E - caulk            | Gray<br>Non-Fibrous<br>Homogeneous   |              | 100% Non-fibrous (Other) | None Detected  |
| 171<br>161621806-0171 | BLDG 136E - glz              | Black<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |
| 172<br>161621806-0172 | BLDG 136 LIBRARY<br>NW - glz | Silver<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 173<br>161621806-0173 | BLDG 136 MED<br>SUPPLY - glz | Black<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |
| 174<br>161621806-0174 | BLDG 136 LIBRARY -<br>glz    | Black<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |
| 175<br>161621806-0175 | BLDG 138N - caulk            | Gray<br>Non-Fibrous<br>Homogeneous   |              | 100% Non-fibrous (Other) | None Detected  |
| 176<br>161621806-0176 | BLDG 138N - glz              | Black<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |
| 177<br>161621806-0177 | BLDG 138S - caulk            | White<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |
| 178<br>161621806-0178 | BLDG 138S - caulk            | White<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |
| 179<br>161621806-0179 | BLDG 138S - glz              | White<br>Non-Fibrous<br>Homogeneous  |              | 100% Non-fibrous (Other) | None Detected  |
| 180<br>161621806-0180 | BLDG 138S - glz              | Gray<br>Non-Fibrous<br>Homogeneous   |              | 100% Non-fibrous (Other) | <1% Chrysotile |

Initial report from: 11/29/2016 10:48:48



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislab@emsl.com](mailto:indianapolislab@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample  | Description                    | Appearance                               | Non-Asbestos |                          | Asbestos       |
|---|--------------------------------|--|--------------|--------------------------|----------------|
|   |                                |  | % Fibrous    | % Non-Fibrous            | % Type         |
| 181<br><i>161621806-0181</i>  | BLDG 138S - glz                | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 182<br><i>161621806-0182</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 138N - caulk              | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 183<br><i>161621806-0183</i>  | BLDG 138N - glz                | Black<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 184<br><i>161621806-0184</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 134E - caulk              | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 185<br><i>161621806-0185</i>  | BLDG 134E - glz                | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 186<br><i>161621806-0186</i>  | BLDG 134W - glz                | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 187<br><i>161621806-0187</i>  | BLDG 134W - caulk              | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 188<br><i>161621806-0188</i>  | BLDG 134W - caulk              | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 189<br><i>161621806-0189</i>  | BLDG 134W - glz                | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 190<br><i>161621806-0190</i>  | BLDG 101N - caulk              | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 191<br><i>161621806-0191</i>  | BLDG 101N - caulk              | Black<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 192<br><i>161621806-0192</i>  | BLDG 101N - glz                | Black<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 193<br><i>161621806-0193</i>  | BLDG 101S - glz                | Black<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 194<br><i>161621806-0194</i>  | BLDG 6W NW<br>ENTRANCE - caulk | Gray<br>Non-Fibrous<br>Homogeneous       |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 195<br><i>161621806-0195</i>  | BLDG 6W NW<br>ENTRANCE - caulk | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 196<br><i>161621806-0196</i>  | BLDG 6W NW<br>ENTRANCE - glz   | Black<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 197<br><i>161621806-0197</i>  | BLDG 6N - caulk                | Gray<br>Non-Fibrous<br>Homogeneous       | 6% Synthetic | 92% Non-fibrous (Other)  | 2% Chrysotile  |
| 198<br><i>161621806-0198</i>  | BLDG 6 - glz                   | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |

Initial report from: 11/29/2016 10:48:48



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislabs@emsl.com](mailto:indianapolislabs@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample   | Description             | Appearance                                | Non-Asbestos |                          | Asbestos       |
|--|-------------------------|---|--------------|--------------------------|----------------|
|  |                         |   | % Fibrous    | % Non-Fibrous            | % Type         |
| 199  | BLDG 6 - caulk          | Gray/White<br>Non-Fibrous<br>Homogeneous  |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 161621806-0199<br>Inseparable paint / coating layer included in analysis |                         |   |              |                          |                |
| 200  | BLDG 6 SOUTH -<br>caulk | White/Clear<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0200<br>Inseparable paint / coating layer included in analysis |                         |   |              |                          |                |
| 201  | BLDG 6 SOUTH -<br>caulk | White<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0201   |                         |   |              |                          |                |
| 202  | BLDG 6 SOUTH -<br>caulk | White<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 161621806-0202<br>Inseparable paint / coating layer included in analysis |                         |   |              |                          |                |
| 203  | BLDG 6 SOUTH - glz      | White<br>Non-Fibrous<br>Heterogeneous     |              | 100% Non-fibrous (Other) | <1% Chrysotile |
| 161621806-0203   |                         |   |              |                          |                |
| 204  | BLDG 6 N - glz          | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0204   |                         |   |              |                          |                |
| 205  | BLDG 6E - caulk         | Gray<br>Non-Fibrous<br>Homogeneous        | 6% Synthetic | 92% Non-fibrous (Other)  | 2% Chrysotile  |
| 161621806-0205   |                         |   |              |                          |                |
| 206  | BLDG 6E - caulk         | Silver<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0206   |                         |   |              |                          |                |
| 207  | BLDG 6E - glz           | Black<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0207   |                         |   |              |                          |                |
| 208  | BLDG 14N - caulk        | Gray<br>Non-Fibrous<br>Homogeneous        | 2% Glass     | 98% Non-fibrous (Other)  | None Detected  |
| 161621806-0208   |                         |   |              |                          |                |
| 209  | BLDG 14N - glz          | Black<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0209   |                         |   |              |                          |                |
| 210  | BLDG 14N - caulk        | Gray<br>Non-Fibrous<br>Homogeneous        |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 161621806-0210   |                         |   |              |                          |                |
| 211  | BLDG 14N - gz           | Black<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0211   |                         |   |              |                          |                |
| 212  | BLDG 14S - caulk        | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0212   |                         |   |              |                          |                |
| 213  | BLDG 14S - caulk        | Gray<br>Non-Fibrous<br>Homogeneous        | 2% Glass     | 98% Non-fibrous (Other)  | None Detected  |
| 161621806-0213   |                         |   |              |                          |                |
| 214  | BLDG 14S - glz          | Black<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected  |
| 161621806-0214   |                         |   |              |                          |                |
| 215  | BLDG 14S - caulk        | Gray<br>Non-Fibrous<br>Homogeneous        |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 161621806-0215   |                         |   |              |                          |                |
| 216  | BLDG 14S - caulk        | Gray/White<br>Non-Fibrous<br>Homogeneous  |              | 98% Non-fibrous (Other)  | 2% Chrysotile  |
| 161621806-0216<br>Inseparable paint / coating layer included in analysis |                         |   |              |                          |                |

Initial report from: 11/29/2016 10:48:48



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislab@emsl.com](mailto:indianapolislab@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample  | Description                    | Appearance                               | Non-Asbestos  |                          | Asbestos       |
|---|--------------------------------|--|---------------|--------------------------|----------------|
|   |                                |  | % Fibrous     | % Non-Fibrous            | % Type         |
| 217<br><i>161621806-0217</i>  | BLDG 14E - caulk               | White<br>Non-Fibrous<br>Homogeneous      |               | 100% Non-fibrous (Other) | None Detected  |
| 218<br><i>161621806-0218</i>  | BLDG 14S - caulk               | Gray<br>Non-Fibrous<br>Homogeneous       |               | 100% Non-fibrous (Other) | None Detected  |
| 219<br><i>161621806-0219</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 14NW - caulk              | White<br>Non-Fibrous<br>Homogeneous      | 10% Synthetic | 90% Non-fibrous (Other)  | <1% Chrysotile |
| 220<br><i>161621806-0220</i>  | BLDG 14 ATTIC W -<br>firesstop | Red<br>Non-Fibrous<br>Homogeneous        |               | 100% Non-fibrous (Other) | None Detected  |
| 221<br><i>161621806-0221</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 14 ATTIC W -<br>glz       | White<br>Non-Fibrous<br>Homogeneous      |               | 100% Non-fibrous (Other) | <1% Chrysotile |
| 222<br><i>161621806-0222</i>  | BLDG 14 LAUNDRY -<br>caulk     | Gray<br>Non-Fibrous<br>Homogeneous       |               | 100% Non-fibrous (Other) | None Detected  |
| 223<br><i>161621806-0223</i>  | BLDG 14 MENS<br>RSTRM - caulk  | Blue<br>Non-Fibrous<br>Homogeneous       |               | 100% Non-fibrous (Other) | None Detected  |
| 224<br><i>161621806-0224</i>  | BLDG 14 RM 247 -<br>caulk      | White<br>Non-Fibrous<br>Homogeneous      |               | 100% Non-fibrous (Other) | None Detected  |
| 225<br><i>161621806-0225</i>  | BLDG 3S - caulk                | Gray<br>Non-Fibrous<br>Homogeneous       |               | 100% Non-fibrous (Other) | None Detected  |
| 226<br><i>161621806-0226</i>  | BLDG 3S - glz                  | Black<br>Non-Fibrous<br>Homogeneous      |               | 100% Non-fibrous (Other) | None Detected  |
| 227<br><i>161621806-0227</i>  | BLDG 3S - glz                  | Gray<br>Non-Fibrous<br>Homogeneous       |               | 100% Non-fibrous (Other) | None Detected  |
| 228<br><i>161621806-0228</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 3S - caulk                | Gray/White<br>Non-Fibrous<br>Homogeneous |               | 100% Non-fibrous (Other) | None Detected  |
| 229<br><i>161621806-0229</i>  | BLDG 3S - caulk                | White<br>Non-Fibrous<br>Homogeneous      |               | 100% Non-fibrous (Other) | None Detected  |
| 230<br><i>161621806-0230</i>  | BLDG 3N - glz                  | Gray<br>Non-Fibrous<br>Homogeneous       |               | 100% Non-fibrous (Other) | None Detected  |
| 231<br><i>161621806-0231</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 3N - caulk                | Gray/White<br>Non-Fibrous<br>Homogeneous |               | 100% Non-fibrous (Other) | None Detected  |
| 232<br><i>161621806-0232</i>  | BLDG 3N - glz                  | Gray<br>Non-Fibrous<br>Homogeneous       |               | 100% Non-fibrous (Other) | None Detected  |
| 233<br><i>161621806-0233</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 3S - caulk                | Gray/Tan<br>Non-Fibrous<br>Homogeneous   |               | 100% Non-fibrous (Other) | None Detected  |

Initial report from: 11/29/2016 10:48:48



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislab@emsl.com](mailto:indianapolislab@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample  | Description           | Appearance                                | Non-Asbestos |                          | Asbestos      |
|---|-----------------------|---|--------------|--------------------------|---------------|
|   |                       |   | % Fibrous    | % Non-Fibrous            | % Type        |
| 234<br><i>161621806-0234</i>  | BLDG 12W - caulk      | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected |
| 235<br><i>161621806-0235</i>  | BLDG 12W - caulk      | Silver<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 236<br><i>161621806-0236</i>  | BLDG 12W - glz        | White<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected |
| 237<br><i>161621806-0237</i>  | BLDG 12E - caulk      | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected |
| 238<br><i>161621806-0238</i>  | BLDG 12E - caulk      | White<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected |
| 239<br><i>161621806-0239</i>  | BLDG 11E - caulk      | Gray<br>Non-Fibrous<br>Homogeneous        |              | 98% Non-fibrous (Other)  | 2% Chrysotile |
| 240<br><i>161621806-0240</i>  | BLDG 11 E - glz       | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected |
| 241<br><i>161621806-0241</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 11N - glz        | Beige<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected |
| 242<br><i>161621806-0242</i>  | BLDG 11N - caulk      | Gray<br>Non-Fibrous<br>Homogeneous        |              | 98% Non-fibrous (Other)  | 2% Chrysotile |
| 243<br><i>161621806-0243</i>  | BLDG 11N - caulk      | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected |
| 244<br><i>161621806-0244</i>  | BLDG 11N - glz        | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected |
| 245<br><i>161621806-0245</i><br><i>Inseparable paint / coating layer included in analysis</i> | BLDG 11 PORCH - caulk | White/Black<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected |
| 246<br><i>161621806-0246</i>  | BLDG 11 PORCH - caulk | Black<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected |
| 247<br><i>161621806-0247</i>  | BLDG 12W - caulk      | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected |
| 248<br><i>161621806-0248</i>  | BLDG 12W - caulk      | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected |
| 249<br><i>161621806-0249</i>  | BLDG 12W - glz        | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected |
| 250<br><i>161621806-0250</i>  | BLDG 12S - caulk      | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected |
| 251<br><i>161621806-0251</i>  | BLDG 12S - caulk      | Gray<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected |

Initial report from: 11/29/2016 10:48:48



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislaboratory@emsl.com](mailto:indianapolislaboratory@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample                | Description              | Appearance                               | Non-Asbestos |                          | Asbestos<br>% Type |
|-----------------------|--------------------------|--|--------------|--------------------------|--------------------|
|                       |                          |  | % Fibrous    | % Non-Fibrous            |                    |
| 252<br>161621806-0252 | BLDG 12S - glz           | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected      |
| 253<br>161621806-0253 | BLDG 11S - caulk         | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 98% Non-fibrous (Other)  | 2% Chrysotile      |
| 254<br>161621806-0254 | BLDG 11S - glz           | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected      |
| 255<br>161621806-0255 | BLDG 11S - caulk         | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 98% Non-fibrous (Other)  | 2% Chrysotile      |
| 256<br>161621806-0256 | BLDG 11 W - caulk        | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 98% Non-fibrous (Other)  | 2% Chrysotile      |
| 257<br>161621806-0257 | BLDG 11W - glz           | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected      |
| 258<br>161621806-0258 | BLDG 4N - caulk          | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected      |
| 259<br>161621806-0259 | BLDG 4N - caulk          | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected      |
| 260<br>161621806-0260 | BLDG 4N - glz            | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected      |
| 261<br>161621806-0261 | BLDG 4N - caulk          | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected      |
| 262<br>161621806-0262 | BLDG 4N - caulk          | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | <1% Chrysotile     |
| 263<br>161621806-0263 | BLDG 4N - glz            | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | <1% Chrysotile     |
| 264<br>161621806-0264 | BLDG 4W - glz            | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected      |
| 265<br>161621806-0265 | BLDG 4S - caulk          | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected      |
| 266<br>161621806-0266 | BLDG 4E - glz            | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected      |
| 267<br>161621806-0267 | BLDG 4E - glz            | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected      |
| 268<br>161621806-0268 | BLDG 4 RM 118 -<br>caulk | Tan<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other) | None Detected      |
| 269<br>161621806-0269 | BLDG 4W - glz            | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other) | None Detected      |
| 270<br>161621806-0270 | BLDG 4S - caulk          | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected      |

Initial report from: 11/29/2016 10:48:48



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Tel/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislaboratory@emsl.com](mailto:indianapolislaboratory@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample                | Description                 | Appearance                              | Non-Asbestos |                          | Asbestos      |
|-----------------------|-----------------------------|---|--------------|--------------------------|---------------|
|                       |                             |   | % Fibrous    | % Non-Fibrous            | % Type        |
| 271<br>161621806-0271 | BLDG 4S - glz               | White<br>Non-Fibrous<br>Homogeneous     |              | 100% Non-fibrous (Other) | None Detected |
| 272<br>161621806-0272 | BLDG 1NW - caulk            | Gray<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 273<br>161621806-0273 | BLDG 1NW - caulk            | Gray/Tan<br>Non-Fibrous<br>Homogeneous  |              | 98% Non-fibrous (Other)  | 2% Chrysotile |
| 274<br>161621806-0274 | BLDG 1NW - glz              | Gray<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 275<br>161621806-0275 | BLDG 1NW - caulk            | White<br>Non-Fibrous<br>Homogeneous     |              | 100% Non-fibrous (Other) | None Detected |
| 276<br>161621806-0276 | BLDG 1NW - caulk            | Tan/White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other) | None Detected |
| 277<br>161621806-0277 | BLDG 1 RM 105 - glz         | Gray<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 278<br>161621806-0278 | BLDG 1 FRONT<br>PORCH - glz | Black<br>Non-Fibrous<br>Homogeneous     |              | 100% Non-fibrous (Other) | None Detected |
| 279<br>161621806-0279 | BLDG 1 NW - caulk           | Gray<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |
| 280<br>161621806-0280 | BLDG 1 BASEMENT<br>- glz    | Gray<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other) | None Detected |

Analyst(s)

Craig Nixon (150)

Jadda Moffett (100)

Ross Matlock (30)

Richard Harding, Laboratory Manager  
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Samples received in good condition unless otherwise noted. Estimated accuracy, precision and uncertainty data available upon request. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Reporting limit is 1%

Samples analyzed by EMSL Analytical, Inc. Indianapolis, IN NVLAP Lab Code 200188-0, AZ0939, CA 2575, CO AL-15132, TX 300262

Initial report from: 11/29/2016 10:48:48





# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Phone/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislabs@emsl.com](mailto:indianapolislabs@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

**Attention:** Michael Ardis  
Alliance Environmental Group, Inc.  
5153 Commerce Square Drive  
Suite E  
Indianapolis, IN 46237

**Project:** 16-0151-A

**Phone:** (317) 865-3400  
**Fax:** (317) 865-3401  
**Received:** 11/21/2016 10:25 AM  
**Analysis Date:** 12/06/2016  
**Collected:** 11/14/2016

## Test Report: Asbestos Analysis of Bulk Materials by PLM via EPA 600/R-93/116 Method using Polarized Light Microscopy. Quantitation using 400 Point Count Procedure

| Sample                | Description               | Appearance                               | Non-Asbestos |                            | Asbestos          |
|-----------------------|---------------------------|--|--------------|----------------------------|-------------------|
|                       |                           |  | % Fibrous    | % Non-Fibrous              | % Type            |
| 011<br>161621806-0011 | 28/27S19 - 12x24 pane glz | White/Red<br>Non-Fibrous<br>Homogeneous  |              | 99.75% Non-fibrous (Other) | 0.25% Chrysotile  |
| 012<br>161621806-0012 | 28/27S19 - 12x24 caulk    | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other)   | <0.25% Chrysotile |
| 014<br>161621806-0014 | 28/27S19 - 12x24 glz      | White<br>Non-Fibrous<br>Homogeneous      |              | 99.75% Non-fibrous (Other) | 0.25% Chrysotile  |
| 030<br>161621806-0030 | 28/S7S13 - caulk          | Gray<br>Non-Fibrous<br>Homogeneous       |              | 99.50% Non-fibrous (Other) | 0.50% Chrysotile  |
| 041<br>161621806-0041 | 26E1 - caulk              | Tan<br>Non-Fibrous<br>Homogeneous        |              | 100% Non-fibrous (Other)   | <0.25% Chrysotile |
| 043<br>161621806-0043 | 26N1 - caulk              | Gray<br>Non-Fibrous<br>Homogeneous       |              | 99.25% Non-fibrous (Other) | 0.75% Chrysotile  |
| 045<br>161621806-0045 | 26W2 - caulk              | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other)   | <0.25% Chrysotile |
| 072<br>161621806-0072 | 10E1(B) - caulk           | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other)   | <0.25% Chrysotile |
| 089<br>161621806-0089 | 9N3(B) - caulk/glz        | White<br>Non-Fibrous<br>Homogeneous      |              | 99.75% Non-fibrous (Other) | 0.25% Chrysotile  |
| 097<br>161621806-0097 | 8N1(B) - glz              | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other)   | <0.25% Chrysotile |
| 125<br>161621806-0125 | 13S2(A) - glz             | White<br>Non-Fibrous<br>Homogeneous      |              | 99.75% Non-fibrous (Other) | 0.25% Chrysotile  |

Disclaimer: Some samples may contain asbestos fibers present in dimensions below PLM resolution limits. The limit of detection as stated in the method is 0.25%. EMSL Analytical Inc suggests that samples reported as <0.25% or none detected undergo additional analysis via TEM. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval of EMSL Analytical Inc. This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the United States Government. EMSL Analytical Inc., bears no responsibility for sample collection activities, analytical method limitations, or the accuracy of results when requested to separate layered samples. EMSL Analytical Inc., liability is limited to the cost of sample analysis. The test results contained within this report meet the requirements of NELAC unless otherwise noted. Samples received in good condition unless otherwise noted. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.

Samples analyzed by EMSL Analytical, Inc. Indianapolis, IN

Initial report from: 12/06/2016 12:07:30





# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Phone/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislab@emsl.com](mailto:indianapolislab@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

**Attention:** Michael Ardis  
Alliance Environmental Group, Inc.  
5153 Commerce Square Drive  
Suite E  
Indianapolis, IN 46237

**Project:** 16-0151-A

**Phone:** (317) 865-3400  
**Fax:** (317) 865-3401  
**Received:** 11/21/2016 10:25 AM  
**Analysis Date:** 12/06/2016  
**Collected:** 11/14/2016

## Test Report: Asbestos Analysis of Bulk Materials by PLM via EPA 600/R-93/116 Method using Polarized Light Microscopy. Quantitation using 400 Point Count Procedure

| Sample                | Description       | Appearance                               | Non-Asbestos |                            | Asbestos          |
|-----------------------|-------------------|--|--------------|----------------------------|-------------------|
|                       |                   |  | % Fibrous    | % Non-Fibrous              | % Type            |
| 166<br>161621806-0166 | BLDG 136N - glz   | White<br>Non-Fibrous<br>Homogeneous      |              | 99.50% Non-fibrous (Other) | 0.50% Chrysotile  |
| 180<br>161621806-0180 | BLDG 138S - glz   | Gray<br>Non-Fibrous<br>Homogeneous       |              | 99.50% Non-fibrous (Other) | 0.50% Chrysotile  |
| 181<br>161621806-0181 | BLDG 138S - glz   | Gray<br>Non-Fibrous<br>Homogeneous       |              | 100% Non-fibrous (Other)   | <0.25% Chrysotile |
| 184<br>161621806-0184 | BLDG 134E - caulk | Gray/White<br>Non-Fibrous<br>Homogeneous |              | 100% Non-fibrous (Other)   | <0.25% Chrysotile |
| 185<br>161621806-0185 | BLDG 134E - glz   | White<br>Non-Fibrous<br>Homogeneous      |              | 99.75% Non-fibrous (Other) | 0.25% Chrysotile  |
| 186<br>161621806-0186 | BLDG 134W - glz   | White<br>Non-Fibrous<br>Homogeneous      |              | 100% Non-fibrous (Other)   | <0.25% Chrysotile |

Analyst(s)

Ross Matlock (17)

Richard Harding, Laboratory Manager  
or other approved signatory

Disclaimer: Some samples may contain asbestos fibers present in dimensions below PLM resolution limits. The limit of detection as stated in the method is 0.25%. EMSL Analytical Inc suggests that samples reported as <0.25% or none detected undergo additional analysis via TEM. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval of EMSL Analytical Inc. This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the United States Government. EMSL Analytical Inc., bears no responsibility for sample collection activities, analytical method limitations, or the accuracy of results when requested to separate layered samples. EMSL Analytical Inc., liability is limited to the cost of sample analysis. The test results contained within this report meet the requirements of NELAC unless otherwise noted. Samples received in good condition unless otherwise noted. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.

Samples analyzed by EMSL Analytical, Inc. Indianapolis, IN

Initial report from: 12/06/2016 12:07:30



# EMSL Analytical, Inc.

2001 East 52nd St. Indianapolis, IN 46205

Phone/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com> / [indianapolislabs@emsl.com](mailto:indianapolislabs@emsl.com)

EMSL Order: 161621806

Customer ID: ALLI65

Customer PO:

Project ID:

**Attention:** Michael Ardis  
Alliance Environmental Group, Inc.  
5153 Commerce Square Drive  
Suite E  
Indianapolis, IN 46237

**Project:** 16-0151-A

**Phone:** (317) 865-3400

**Fax:** (317) 865-3401

**Received:** 11/21/2016 10:25 AM

**Analysis Date:** 12/06/2016 - 12/16/2016

**Collected:** 11/14/2016

## Test Report: Asbestos Analysis of Bulk Materials by PLM via EPA 600/R-93/116 Method using Polarized Light Microscopy. Quantitation using 400 Point Count Procedure

| Sample                | Description           | Appearance                               | <u>Non-Asbestos</u> |                            | <u>Asbestos</u>             |
|-----------------------|-----------------------|--|---------------------|----------------------------|-----------------------------|
|                       |                       |  | % Fibrous           | % Non-Fibrous              | % Type                      |
| 125<br>161621806-0125 | 13S2(A) - glz         | White<br>Non-Fibrous<br>Homogeneous      |                     | 99.75% Non-fibrous (Other) | <b>0.25% Chrysotile</b>     |
| 166<br>161621806-0166 | BLDG 136N - glz       | White<br>Non-Fibrous<br>Homogeneous      |                     | 99.50% Non-fibrous (Other) | <b>0.50% Chrysotile</b>     |
| 180<br>161621806-0180 | BLDG 138S - glz       | Gray<br>Non-Fibrous<br>Homogeneous       |                     | 99.50% Non-fibrous (Other) | <b>0.50% Chrysotile</b>     |
| 181<br>161621806-0181 | BLDG 138S - glz       | Gray<br>Non-Fibrous<br>Homogeneous       |                     | 100% Non-fibrous (Other)   | <b>&lt;0.25% Chrysotile</b> |
| 184<br>161621806-0184 | BLDG 134E - caulk     | Gray/White<br>Non-Fibrous<br>Homogeneous |                     | 100% Non-fibrous (Other)   | <b>&lt;0.25% Chrysotile</b> |
| 185<br>161621806-0185 | BLDG 134E - glz       | White<br>Non-Fibrous<br>Homogeneous      |                     | 99.75% Non-fibrous (Other) | <b>0.25% Chrysotile</b>     |
| 186<br>161621806-0186 | BLDG 134W - glz       | White<br>Non-Fibrous<br>Homogeneous      |                     | 100% Non-fibrous (Other)   | <b>&lt;0.25% Chrysotile</b> |
| 203<br>161621806-0203 | BLDG 6 SOUTH - glz    | White<br>Non-Fibrous<br>Homogeneous      |                     | 99.75% Non-fibrous (Other) | <b>0.25% Chrysotile</b>     |
| 221<br>161621806-0221 | B;DG 14 ATTIC W - glz | White<br>Non-Fibrous<br>Homogeneous      |                     | 100% Non-fibrous (Other)   | <b>&lt;0.25% Chrysotile</b> |

Disclaimer: Some samples may contain asbestos fibers present in dimensions below PLM resolution limits. The limit of detection as stated in the method is 0.25%. EMSL Analytical Inc suggests that samples reported as <0.25% or none detected undergo additional analysis via TEM. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval of EMSL Analytical Inc. This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the United States Government. EMSL Analytical Inc., bears no responsibility for sample collection activities, analytical method limitations, or the accuracy of results when requested to separate layered samples. EMSL Analytical Inc., liability is limited to the cost of sample analysis. The test results contained within this report meet the requirements of NELAC unless otherwise noted. Samples received in good condition unless otherwise noted. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.

Samples analyzed by EMSL Analytical, Inc. Indianapolis, IN

Report amended: 12/16/2016 09:19:27 Replaces initial report from: 12/06/2016 12:07:33 Reason Code: Client-Samples Added

**EMSL Analytical, Inc.**

2001 East 52nd St., Indianapolis, IN 46205

Phone/Fax: (317) 803-2997 / (317) 803-3047

<http://www.EMSL.com>[indianapolislabs@emsl.com](mailto:indianapolislabs@emsl.com)

EMSL Order: 161621806

CustomerID: ALLI65

CustomerPO:

ProjectID:

Attn: **Michael Ardis**  
**Alliance Environmental Group, Inc.**  
**5153 Commerce Square Drive**  
**Suite E**  
**Indianapolis, IN 46237**

Phone: (317) 865-3400  
Fax: (317) 865-3401  
Received: 11/21/16 10:25 AM  
Analysis Date: 12/6/2016  
Collected: 11/14/2016

Project: 16-0151-A

**Test Report: Polarized Light Microscopy (PLM) - Point Count Performed by EPA 600/R-93/116 Method with Gravimetric Reduction and 400 Point Count**

| SAMPLE ID             | DESCRIPTIO                   | APPEARANCE                         | (% Matrix<br>Organic Acid |     | NON- ASBESTOS<br>% Fibrous | NON- ASBESTOS<br>% NON-FIBROUS | ASBESTOS<br>% TYPES |
|-----------------------|------------------------------|------------------------------------|---------------------------|-----|----------------------------|--------------------------------|---------------------|
| 007<br>161621806-0007 | 30N4 - gls blk<br>wall caulk | Gray<br>Non-Fibrous<br>Homogeneous | 35.9                      | 0.0 |                            | 63.0 Non-fibrous (other)       | 1.1 Chrysotile      |
| 015<br>161621806-0015 | 28/27S19 -<br>12x24 caulk    | White<br>Fibrous<br>Homogeneous    | 11.9                      | 0.0 |                            | 86.3 Non-fibrous (other)       | 1.8 Chrysotile      |

Analyst(s)

Ross Matlock (2)

Richard Harding, Laboratory Manager  
or other approved signatory

Disclaimers: Some samples may contain asbestos fibers present in dimensions below PLM resolution limits. The limit of detection as stated in the method is 0.25%. EMSL Analytical Inc. suggests that samples reported as <0.25% or none detected undergo additional analysis via TEM. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL Analytical Inc.. This report must not be used to claim product endorsement by NVLAP or any agency of the United States Government. EMSL Analytical Inc. bears no responsibility for sample collection activities, analytical method limitations, or the accuracy of results when requested to separate layer samples. EMSL Analytical Inc. liability is limited to the cost of sample analysis. The test results contained within this report meet the requirements of NELAC unless otherwise noted. Samples received in good condition unless otherwise noted. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.

Samples analyzed by EMSL Analytical, Inc. Indianapolis, IN

Initial report from 12/08/2016 08:02:28