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# Asbestos Abatement Specifications

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Evans Redevelopment  
Agency  
1100 37<sup>th</sup> St  
Evans, CO 80620

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Weecycle Environmental  
Consulting, Inc.  
1208 Commerce Ct, 5B  
Lafayette, CO 80026

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*August 8, 2019*

## **SECTION 00 11 16 – INVITATION TO BID**

The Evans Redevelopment Agency and Weecycle Environmental invites qualified Contractors to bid on the Project entitled "The Junction Buildings Abatement and Demolition" as detailed below.

### **PROJECT SCOPE:**

The Work include includes providing labor, materials and equipment for the Abatement of the Junctions Buildings Evans Colorado.

### **BIDDING INSTRUCTIONS:**

All Bids must be submitted on the Bid Form provided in the documents  
Submit digital copies to all of the following: (You must reference Bid "The Junction" in the subject line of your email).

1. Weecycle Environmental Consulting, Inc, at [Weecycle@weecycle-env.com](mailto:Weecycle@weecycle-env.com),
2. Project Manager, Brian Stone, at [Bstone@evanscolorado.gov](mailto:Bstone@evanscolorado.gov)

**BID DUE DATE: Tuesday, September 3, 2019**

**TIME: 4:00 pm, MST (Time stamped)**

**BID Name: "The Junction"**

**PROJECT: The Junction Asbestos Abatement  
Evans Colorado**

**ASBESTOS CONSULTANT: Weecycle Environmental Consulting, Inc.  
1208 Commerce Ct, 5B, Lafayette, CO 80026**

**OWNER: Evans Redevelopment Agency 1100 37<sup>th</sup> St., Evans CO 80620**

Environmental Questions Must be directed to Judith Sawitsky at [weecycle@weecycle-env.com](mailto:weecycle@weecycle-env.com)  
by **August 28, 2019 at 12:00 PM.**

## **Invitation to Bid**

Company Name:

Bid Name: The Junction

Project Name: The Junction Evans Colorado Abatement and Demolition

Due Date & Time: **September 3, 2019 at 4:00 PM**

Late bids WILL NOT be accepted. Bids received after the closing time will be returned unopened. Immediately after said closing time, all bids received will be NOT publicly opened and read aloud in the presence of all interested parties.

Bids must show total cost to the Evans Redevelopment Agency.

Liquidated damages may apply in the amount of 500.00 per day for delay of project and a Bonding is required.

The Evans Redevelopment Agency reserves the right to reject any or all bids, to waive all irregularities and to accept any bid deemed to be in the best interest of The Evans Redevelopment Agency. Before award of a contract, the Evans Redevelopment Agency may make such investigations as it deems necessary to determine the ability of the bidder to meet the required needs, and the bidder shall furnish to the Evans Redevelopment Agency all such information and data for this purpose as the Evans Redevelopment Agency may request. The Evans Redevelopment Agency is an Equal Opportunity Employer.

**A MANDATORY PRE-BID CONFERENCE will be held on Friday, August 23, 2019 at 10:00am. The Mandatory Pre-Bid Conference will be beginning at 818 31<sup>st</sup> St, Evans CO 80620. Bidders will meet at the parking lot in front of Esh's. Non-attendance will result in disqualification.**

## 1.0 - GENERAL

### 0.1 RELATED DOCUMENTS

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

### 0.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. **The Project consists of 6 Buildings identified as “The Junction,” in Evans Colorado.**

- 1. **Project Location:**
  - Building 1 3231 W Service Rd**
  - Building 2, 3, 4 & 5 3201 W Service Rd**
  - Building 6 818 31<sup>st</sup> St**
  - Building 7 708 31<sup>st</sup> St**
  - Building 8 3108 State St**

**Evans, CO 80620**

- 2. **Owner:**
  - Evans Redevelopment Agency**
  - 1100 37<sup>th</sup> St**
  - Evans, CO 80620**

**Contact Person: Brian Stone**

- B. **Contract Documents**, dated **August 8, 2019** were prepared for the project for The Evans Redevelopment Agency, by Judith Sawitsky, Asbestos Inspector/Management Planner, Certification #672, Weecycle Environmental Consulting, Inc.
- C. **The Work** consists of asbestos abatement activities at The Junction. The contractor shall provide all labor, materials, equipment, insurance, bonds, and permits to complete the Project as specified in the Contract Documents. **The Contractor shall be responsible to verify the accuracy of material quantities to be included in the bid. Refer to report and floor plans for locations and approximate areas of ACM.**

**D. The Work will be conducted in the Fall of 2019**

**1. Base Bid – Building 1 located at 3231 W Service Rd Evans CO 80620**

<b>HOMO #</b>	<b>Homogeneous Material</b>	<b>Location of Material</b>	<b>Percentage of Asbestos</b>	<b>Total Square Feet</b>
DT4	Drywall Texture and Joint Compound	Room 9, Cutout for Room 8, Bath 2, Walls and Ceilings, Closet Walls and Ceiling	2% Chrysotile	3,200
Assume any overspray on structural components, wall, ceilings and floors				

**2. Base Bid – Building 3 located at 3201 W Service Rd Evans CO 80620**

<b>HOMO #</b>	<b>Homogeneous Material</b>	<b>Location of Material</b>	<b>Percentage of Asbestos</b>	<b>Total Square Feet</b>
<b>West Side of Building 3</b>				
DT2	Drywall Texture and Joint Compound	Rooms 26,27,28- Walls Room 29 Under Paneling Room 27 Ceiling	2% Chrysotile	840
DT3	Drywall Texture and Joint Compound	Room 2	2% Chrysotile	552
FT2	Floor Tile	Room 26,28,29 & 32	FT - 3% Chrysotile Mastic is ND	342
WSF	Wall Sheet Flooring	½ Wall Rooms 26,28, 32	25% Chrysotile Mastic is 3% Chrysotile	260
VS	Roof Vent	Roof Vent	5% Chrysotile	20 Linear Feet
Assume any overspray on structural components, wall, ceilings and floors				
<b>East Side of Building 3</b>				
DT1	Drywall with Texture and Joint Compound	Room 1 N, E Section & E Wall, Rooms 2,3,4,5,7,8,10,13,14,15,17,18,19,20,21,22,24,25 Walls and Ceilings Rooms 26,27,28,29,-Wall	2% Chrysotile	8600

HOMO #	Homogeneous Material	Location of Material	Percentage of Asbestos	Total Square Feet
DT2	Drywall with Texture and Joint Compound	Room West and SW Section Walls Room 6 Walls Room 11 & 12 Walls and Ceiling Room 16	2% Chrysotile	2800
DT3	Drywall with Texture and Joint Compound	Room 2	2% Chrysotile	552
FT3	Floor Tile	Room 14,15,16	3% Chrysotile	987
Assume any overspray on structural components, wall, ceilings and floors				

3. **Base Bid – Building 4 located at 3201 W Service Rd Evans CO 80620**

HOMO #	Homogeneous Material	Location of Material	Percentage of Asbestos	Total Square Feet
FT1	Floor Tile Not the Mastic	Rooms 1-10 under carpet	3% Chrysotile	4,000

4. **Base Bid – Building 6 located at 818 31<sup>st</sup> St. Evans CO 80620**

HOMO #	Homogeneous Material	Location of Material	Percentage of Asbestos	Total Square Feet
FT1	Floor Tile (white/grey)	Market: Store front	Black Mastic: 3% Chrysotile	100
FT3	Floor Tile (white)	Market: Store front	Black Mastic: 3% Chrysotile	3,000

**Hazardous Materials encountered during abatement:**

Collection and DOT packaging of Hazardous Materials for Disposal:

1. Fluorescent light tubes.
2. Thermostats with mercury switches.
3. Lead acid batteries
4. Exit Signs

**Note: If clearance conditions are not met** then decontamination is incomplete. Contractor shall repeat the cleaning process per Section 01711 Project Decontamination. The Owner shall pay for the first set of PCM sample collection and analysis. The Contractor shall be required to pay all costs for the sample collection and analysis of subsequent TEM or PCM samples if the first set fails to meet the clearance requirements specified in each Work Area.

**5. The work includes the requirements of the following specification sections:**

- 01013-Summary of Work
- 01043-Project Coordination
- 01098-Codes, Regulations, and Standards
- 01513-Temporary Pressure Differential & Air Circulation System
- 01526-Temporary Enclosures
- 01560-Worker Protection
- 01562-Respirator Protection
- 01563-Decontamination Units
- 01711-Project Decontamination
- 02062-Non-Asbestos Demolition
- 02081-Removal of Asbestos Containing Waste Materials
- 02084-Disposal of Asbestos Containing Waste Materials
- 09805-Encapsulation of Abated Surfaces

- D. **The Work** will be constructed under a single prime contract with The Evans Redevelopment Agency under the direction of Weecycle Environmental Consulting, Inc., and The Evans Redevelopment Agency.

#### **0.5 ASBESTOS-CONTAINING MATERIALS:**

- D. **The Work** of this contract involves activities that will disturb asbestos-containing materials (ACM) or presumed asbestos-containing materials (PACM). The location and type of ACM known to be present at the worksite is set forth in the drawings. If any other ACM or PACM is found, notify the Consultant, Weecycle Environmental Consulting, Inc and the Evans Redevelopment Agency, about the location and quantity of the ACM or PACM within 24 hours of the discovery.

#### **0.6 ASBESTOS HEALTH RISK:**

- A. The disturbance or dislocation of ACM may cause asbestos fibers to be released into the building's atmosphere, thereby creating a potential health risk to workers and building occupants. Apprise all workers, supervisory personnel, subcontractors and consultants who will be at the job site of the seriousness of the risk and of proper work procedures which must be followed.
- B. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified ACM, take appropriate continuous measures as necessary to protect all building occupants from the risk of exposure to airborne asbestos. Such measures shall include the procedures and methods described herein, and compliance with regulations of applicable federal, state and local agencies.

## 0.9 AIR MONITORING BY THE OWNER:

- A. The Owner has contracted for air monitoring.** Air monitoring may be conducted both outside and inside of the work area during the work, and for clearance sampling at the end of the project.
1. **Outside of the Work Area:** The Owner's air monitoring firm may sample air outside of the work area to detect faults in the work area isolation such as:
    - a. Contamination of the building outside of the work area with airborne asbestos fibers
    - b. Failure of filtration or rupture in the differential pressure system
    - c. Contamination of air outside the building envelop with airborne asbestos fibers.
  2. **Inside the Work Area:** The Owner air monitoring firm may monitor airborne fiber counts in the Work Area. The purpose of this air monitoring is to detect airborne asbestos concentrations which may challenge the ability of the Work Area isolation procedures to protect the balance of the building or outside of the building from contamination by airborne fibers.
- B. Work area clearance:** Clearance air sampling will be provided by the Owner upon completion of asbestos abatement work is described in **Section 01711** Project Decontamination.
- C. Air monitoring** required by OSHA, is work of the Contractor and is not covered in this section.

## 0.10 SCHEDULE OF AIR SAMPLES BY OWNER:

**A. Sample cassettes:** Samples will be collected on 25 mm. cassettes as follows:

- 1 **PCM:** 0.8 micrometer mixed cellulose ester.
- 2 **TEM:** 0.45 micrometer mixed cellulose ester or 0.40 micrometer polycarbonate, with 5.0 micron mixed cellulose ester backing filter.

**B. Number and Volume of Samples:** The number and volume of air samples given in the schedules is approximate. The exact number and volume of samples collected by the Owner may vary depending upon job conditions and the analytical method used.

**C. Sample Volume and Sensitivity:**

1. **PCM:** The sample volumes collected by the Owner air monitor will be determined by the following formula:

$$C( f/cc) = \frac{E( f/ mm^2) \times 385 mm^2}{\text{Volume (L) x 1000 cc /L}}$$

$$\text{Volume (L) x 1000 cc /L}$$

Where:

- Number of fibers = 5 fibers/100 fields, based on a limit of detection (LOD) of 7 fibers/mm<sup>2</sup> on the filter
- Area of 100 fields = 0.785mm<sup>2</sup>
- Total Filter Area = 385mm<sup>2</sup>
- Limit Value = as specified in the schedules of samples below

- a. For purposes of this specification, the sample volume calculated above will be considered to be of sufficient size so that there is a 95% level of confidence that the value measured by each individual sample at the limit of detection (LOD) is less than or equal to the limit values specified below.
- b. For purposes of this specification, the Limit of Detection (LOD) is defined as 7 fibers/mm<sup>2</sup> on the filter or 5 fibers/100 fields.
- c. For purposes of this specification, overloaded samples will be considered as exceeding the applicable limit value.

**D Daily:**

- 1.c **From start of work** of Section 01526 Temporary Enclosures, through the work of Section 01711 Project Decontamination, the Owner may take samples.
- 2.c **Sample volume and sensitivity:** inside the work area may vary depending upon conditions in the work area. If samples are overloaded at the sample volume required for a limit value equal to the Stop Action Levels or A Immediate Stop

Action Levels given later in this section, the level is considered to have been exceeded.

**3.c PCM Samples:**

Location Sampled	Number of Samples	Limit Value (Fibers/cc)	Approx. Volume (Liters)	Rate (LPM)
Each Work Area	2	<0.1	<100	
Outside Each	1	0.01	<1,000	1-10
Work Area at Critical Barrier				1-10
Clean Room	1	0.01	<1,000	1-10
Equipment Decon	1	0.01	<1,000	1-10
Outside Building	1	0.01	<1,000	1-10
Output of Pressure Differential System	1	0.01	<1,000	1-10

**D. Additional samples** may be taken at Owner's or Designer discretion. If airborne fiber counts exceed allowed limits, additional samples may be taken as necessary to monitor fiber levels.

## 0.11 ANALYTICAL METHODS USED BY THE OWNER:

- A. The following methods will be used by The Owner in analyzing filters used to collect air samples. Sampling rates may vary from printed standards to allow for high volume sampling.
  - 1.c Phase Contrast Microscopy (PCM) will be performed using the NIOSH 7400 method.
  - 2.c Phase Contrast Microscopy (PCM) will be performed using the OSHA Reference Method (ORM).
  - 3.c Transmission Electron Microscopy (TEM) will be performed using the analysis method set forth in the AHERA regulation 40 CFR Part 763 Appendix A.
  - 4.c Transmission Electron Microscopy (TEM) will be performed using the Level II analysis per EPA Provisional Method and Update (USEPA 1977, Yamate 1984), with either polycarbonate or mixed cellulose ester filters.

## 0.12 LABORATORY TESTING BY OWNER:

- A. **The services of a testing laboratory** may be employed by the Owner to perform laboratory analyses of the air samples. A microscope and technician will be setup at the job site, so that verbal reports on air samples can be obtained immediately.
- B. **The Contractor will have access** to all air monitoring tests and results upon request.
- C. **Written Reports** of all air monitoring tests will be posted at the job site on a daily basis.

## 0.13 FIBERS AND STRUCTURES

- A. **Fibers Counted:** The following procedure will be used to resolve any disputes regarding fiber types when a project has been stopped due to excessive airborne fiber counts.
  - 1.c **Large Fibers:** "Airborne Fibers" referred to above include all fibers regardless of composition as counted by phase contrast microscopy (PCM), unless additional analysis by transmission or scanning electron microscopy demonstrates to the satisfaction of the Designer that non-asbestos fibers are being counted. "Airborne Fibers" counted in samples analyzed by transmission electron microscopy shall be asbestos fibers, greater than 5 microns in length. For purposes of stop action levels, subsequent to analysis by electron microscopy, the number of "Airborne Fibers" shall be determined by multiplying the number of fibers, regardless of composition, counted by PCM by the proportion of fibers that are asbestos as determined by TEM (a number equal to, asbestos fibers counted, divided by all fibers counted in the electron microscopy analysis).
  - 2.c **Small Structures:** "Airborne Fibers" referred to above include asbestos structures (fibers, bundles, clusters or matrices) of any diameter and any length greater than 0.5 microns.

#### **0.14 ADDITIONAL TESTING:**

- A. The Contractor may conduct** air monitoring and laboratory testing. If he elects to do this the cost of such air monitoring and laboratory testing shall be at no additional cost to the Owner.

#### **0.15 PERSONAL MONITORING:**

- A. Owner will not perform** air monitoring for the Contractor to meet Contractor's OSHA requirements for personal sampling or any other purpose.

#### **0.3 MISCELLANEOUS PROVISIONS**

N/A

#### **PART 1 - PRODUCTS**

N/A

#### **PART 2 - EXECUTION**

##### **2.1 STOP ACTION LEVELS:**

- A. Inside Work Area:** Maintain an average airborne count in the Work Area of less than 0.5 fibers per cubic centimeter. If the fiber counts rise above this figure for any sample taken, revise work procedures to lower fiber counts. If the Time Weighted Average (TWA) fiber count for any work shift or 8 hour period exceeds 0.5 fibers per cubic centimeter, stop all work, leave Pressure Differential System in operation and notify Designer. After correcting cause of high fiber levels, do not recommence work for 24 hours unless otherwise authorized, in writing, by Designer.

If airborne fiber counts exceed 2.5 fibers per cubic centimeter for any period of time cease all work except corrective action until fiber counts fall below 0.5 fibers per cubic centimeter and notify Designer. After correcting cause of high fiber levels, do not recommence work for 24 hours unless otherwise authorized, in writing, by Designer.

STOP ACTION LEVEL (f/cc)	IMMEDIATELY STOP LEVEL (f/cc)	MINIMUM RESPIRATOR REQUIRED	PROTECTION FACTOR
0.1	0.5	Half face	10
0.5	2.5	PAPR	50
1.0	5.0	Supplied Air Pressure Demand	100

1.c If airborne fiber counts exceed Immediate Stop Level given above for type of respiratory protection in use for any period of time cease all work except corrective action. Notify Designer. Do not recommence work until fiber counts fall below Stop Action Level given above for the type of respiratory protection in use. After correcting cause of high fiber levels, do not recommence work for 24 hours unless otherwise authorized, in writing, by Designer.

**B. Outside Work Area:** If any air sample taken outside of the Work Area exceeds the base line established in Part 1 of this section, immediately and automatically stop all work except corrective action. The Designer will determine the source of the high reading and so notify the Contractor in writing. If the high reading was the result of a failure of Work Area isolation measures initiate the following actions:

- d. Immediately erect new critical barriers as set forth in Section 01526 Temporary Enclosures to isolate the affected area from the balance of the building. Erect Critical Barriers at the next existing structural isolation of the involved space (e.g. wall, ceiling, and floor).
  - e. Decontaminate the affected area in accordance with Section 01712 Cleaning & Decontamination Procedures.
  - f. Require that respiratory protection as set forth in Section 01562 Respiratory Protection be worn in affected area until area is cleared for re-occupancy in accordance with Section 01711 Project Decontamination.
  - g. Leave Critical Barriers in place until completion of work and ensure that the operation of the pressure differential system in the Work Area results in a flow of air from the balance of the building into the affected area.
  - h. If the exit from the clean room of the personnel decontamination unit enters the affected area, establish a decontamination facility consisting of a Shower Room and Changing Room as set forth in Section 01563 Decontamination Units at entry point to affected area.
  - f. After Certification of Visual Inspection in the Work Area remove critical barriers separating the work area from the affected area. Final air samples will be taken within the entire area as set forth in Section 01711 Project Decontamination.
1. If the high reading was the result of other causes initiate corrective action as determined by the Designer.

- C. **Effect on Contract Sum:** Complete corrective work with no change in the Contract Sum if high airborne fiber counts were caused by Contractor's activities. The Contract Sum and schedule will be adjusted for additional work caused by high airborne fiber counts beyond the Contractor's control.

## 2.2 STOP WORK:

- A. **If the Owner, Designer, or Project Administrator** presents a written stop work order, immediately and automatically conforms to that stop work order, while maintaining temporary enclosures and pressure differential. Do not recommence abatement work until authorized in writing by Owner, Designer or Project Administrator.
- B. **Immediately initiate the following actions:** After being presented with a stop work order immediately:
  1. Cease all asbestos removal activities, or any other activities that disturbs ACM.
  2. Repair any fallen, ripped or otherwise failed work area isolation measures.
  3. Maintain in operation all work area isolation measures including those required by Sections 01526 A Temporary Enclosures, 01513 A Temporary Pressure Differential & Air Circulation System, 01563 A Decontamination Units.
  4. Maintain all worker protections including those required by Sections 01560 A Worker Protection - Asbestos Abatement, and 01562 A Respiratory Protection.
  5. Fog the air in the work area with a mist of amended water to reduce airborne fiber levels.
- C. **Do not recommence work** until authorized in writing by the Owner or Designer.



## SECTION 01043 - COORDINATION - ASBESTOS ABATEMENT

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. **This Section includes** administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:

1. General project coordination procedures.
2. Conservation.
3. Plan of Action.
4. Contingency Plan.
5. Project Directory.
6. Notifications.
7. Pre-Construction Inspection.
8. Contractors Construction Schedule.
9. Administrative and supervisory personnel.
10. Pre-Construction Conference
11. Progress Meetings
12. Coordination meetings.
13. Record Keeping.
14. Special Reports.

- B. **Related Sections:** The following Sections contain requirements that relate to this Section:

1. Section 01301 - Submittals - Asbestos Abatement for administrative procedures regarding submittals.
2. Section 01601 - Materials and Equipment - Asbestos Abatement for coordinating general installation.
3. Section 01701 - Project Closeout - Asbestos Abatement for coordinating contract closeout.

#### 1.3 COORDINATION

- A. **Owner Occupancy:** Coordinate construction operations and scheduling with partial occupancy requirements of the Owner and the Owners use of utilities.
- B. **Coordinate construction operations** included in various Sections of these Specifications to assure efficient and orderly completion of each part of the Work.

Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in the sequence required to obtain the best results where execution of one part of the Work depends on execution of other components, before or after its own execution.
  2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
  3. Make provisions to accommodate items scheduled for later installation.
- C. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.
- D. **Administrative Procedures:** Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of schedules.
  2. Installation and removal of temporary facilities.
  3. Delivery and processing of submittals.
  4. Progress meetings.
  5. Project closeout activities.
- E. **Conservation:** Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work.

#### 1.4 PLAN OF ACTION:

- A. **Prepare a detailed plan** of the procedures proposed for use in complying with the requirements of this specification. Include in the plan the location and layout of decontamination areas, the sequencing of asbestos work, the interface of trades involved in the performance of work, methods to be used to assure the safety of building occupants and visitors to the site, disposal plan including location of approved disposal site, and a detailed description of the methods to be employed to control pollution. Expand upon the use of portable HEPA ventilation system, closing out of the building's HVAC system, method of removal to prohibit visible emissions, and packaging of removed asbestos debris.
1. Submit the Plan of Action to the Designer for information only, prior to the start of work.

#### 1.5 CONTINGENCY PLAN:

- A. Contingency Plan:** Prepare a contingency plan for emergencies or any other event that may require breaching of work area containment or modification or abridgement of decontamination or work area isolation procedures. Include in this plan procedures for performing electrical and mechanical repairs inside containment after abatement work has begun. Include in plan specific procedures for decontamination or work area isolation. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in the event of an emergency. Items to be addressed in the plan include, but are not limited to the following:

1. Fire
2. Accident
3. Life threatening injury
4. Non-life threatening injury
5. Rescue
6. Power Failure
7. Pressure differential system failure
8. Breach of containment
9. Electrical faults or shock
10. Excessive heat / cold (if/when such limits are specified)
11. Supplied air system failure
12. Water leaks
13. Waste spills
14. Unauthorized entry into work area
15. Elevated air samples outside of containment
16. Repairs inside containment
17. Toxic releases

## 1.6 PROJECT DIRECTORY

- A. Develop a directory** of all entities involved in the project. Include the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site. Identify individuals, their duties and responsibilities. List business name, contact person, normal business and emergency telephone, pager and fax numbers and addresses of:
1. Owner, Designer, and Project Administrator
  2. Contractors General Superintendent, supervisory personnel and Contractors home office
  3. Emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company.
  4. Local, state, and federal agencies with jurisdiction over the project.
- B. Post:** Post copies of the Project Directory in the project meeting room, the temporary field office, each temporary telephone, and at entrance to clean room of Personnel Decontamination Unit

## 1.7 NOTIFICATIONS

- A. Notify other entities** at the job site of the nature of the asbestos abatement activities, location of asbestos-containing materials (ACM), requirements relative to asbestos set

forth in these specifications and applicable regulations. Advance notification will be made to:

1. Owners of the building/facility;
  2. Employees who will perform asbestos abatement work or related activities, or who will be in the work area during the course of the work of this contract.
  3. Employers of employees who work and/or will be working in adjacent areas during the course of the work of this contract.
- B. Notify emergency service agencies** including fire, ambulance, police or other agency that may service the abatement work site in case of an emergency. Notification is to include methods of entering work area, emergency entry and exit locations, modifications to fire notification or firefighting equipment, and other information needed by agencies providing emergency services.
- C. Notifications of Emergency:** Any individual at the job site may notify emergency service agencies, if necessary, without effect on this Contract or the Contract Sum.

#### **1.8 PRE-CONSTRUCTION INSPECTION:**

- A. Inspect areas** in which work will be performed, prior to commencement of work. Prepare a listing of damage to structure, surfaces, equipment or of surrounding properties which could be misconstrued as damage resulting from the work. Photograph or videotape existing conditions as necessary to document conditions. Submit to Designer, for record purposes, prior to starting work.

## 1.9 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. **Schedule:** Prepare a fully developed construction schedule. Submit within 30 days after the date established for "Commencement of the Work."
- B. **Phasing:** On the schedule, show how requirements for phased completion to permit Work by separate Contractors and partial occupancy by the Owner affect the sequence of Work.
- C. **Work Stages:** Indicate important stages of construction for each major portion of the Work, including submittal review, testing, and installation.
  - 1.h Non-asbestos demolitions.
  - 2.h Preparation of the Work Area.
  - 3.h Asbestos removal.
  - 4.h Clearance testing.
  - 5.h Substantial Completion.
- D. **Area Separations:** Provide a separate time bar to identify each major construction area for each major portion of the Work. Indicate where each element in an area must be sequenced or integrated with other activities.
- E. **Distribution:** Following response to the initial submittal, print and distribute copies to the Designer, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.
  - 1.h When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- F. **Schedule Updating:** Revise the schedule after each meeting, event, or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

## 1.10 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. **Project Supervisor:** Provide a full-time Project Supervisor at the work site who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, project scheduling, management, etc. This person is the Contractor's Representative and will function as the competent person at the work site responsible for compliance with all applicable federal, state and local regulations, particularly those relating to ACM.
  - 1.h **Training:** The General Superintendent must have a current certification from a state approved trainer for a course that meets the requirements of the EPA Model Accreditation Plan for asbestos abatement contractor/supervisor (40 CFR part 763, Subpart E, Appendix C).

- 2.h Experience: The General Superintendent must have demonstrable experience in the successful management of asbestos abatement projects that are similar to the work of this contract.
  - i. The General Superintendent must have a minimum of two (2) years experience in the on-site management of asbestos abatement projects.
  - j. The General Superintendent must have had responsible charge of a minimum of ten (10) asbestos abatement projects similar in size and type to the work of this contract.
- 3. Competent Person: The General Superintendent is to be a Competent Person as required by OSHA in 29 CFR 1926.
- B. Supervisors / Forepersons: Provide full-time Supervisors / Forepersons who are experienced in the supervision of asbestos abatement work areas including work practices, building and personnel, disposal practices, etc. These persons are contractor employees directly responsible to the General Superintendent.
- C. Accreditation: The General Superintendent, Supervisors and Forepersons are to be accredited as an Asbestos Abatement Supervisor in accordance with the AHERA regulation 40 CFR Part 763, Subpart E, Appendix C.

#### 1.11 PRE-CONSTRUCTION CONFERENCE:

- A. **An initial progress meeting** recognized as "Pre-Construction Conference" will be convened by the Designer prior to start of any work. The preconstruction conference will be scheduled before start of construction, at a time convenient to the Owner and the Designer, but no later than 15 days after execution of the Agreement. Meet at the project site, or as otherwise directed, with General Superintendent, Owner, Designer, Project Administrator, and other entities concerned with the asbestos abatement work.
- B. **Attendees:** Authorized representatives of the Owner, Designer, and their consultants will be in attendance. An authorized representative of the Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
  - 1. 72 hours advance notice will be provided to all participants prior to convening Pre-Construction Conference.
- C. **Agenda:** This is an organizational meeting, to review responsibilities and personnel assignments, to locate regulated areas and temporary facilities including power, light, water, etc. Items of significance that could affect progress will be discussed, including the following:
  - 1. Tentative construction schedule.
  - 2. Critical work sequencing.
  - 3. Designation of responsible personnel.
  - 4. Procedures for processing field decisions and Change Orders.
  - 5. Procedures for processing Applications for Payment.
  - 6. Distribution of Contract Documents.

7. Submittal of Shop Drawings, Product Data, and Samples.
8. Preparation of record documents.
9. Use of the premises.
10. Parking availability.
11. Office, work, and storage areas.
12. Equipment deliveries and priorities.
13. Safety procedures.
14. First aid.
15. Security.
16. Housekeeping.
17. Working hours.

#### 1.12 PROGRESS MEETINGS:

- A. **General:** In addition to specific coordination and pre-installation meetings for each element of work, and other regular project meetings held for other purposes, the Designer will hold general progress meetings as required. These meeting will be scheduled, where possible, at time of preparation of payment request.
- B. **Attendees:** Representatives of the Owner and Designer will attend these meetings. In addition to representatives of the Contractor, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the work. Require each entity then involved in planning, coordination or performance of work to be properly represented at each meeting.
- C. **Agenda:** Be prepared to discuss the following items at the progress meetings. Review other items of significance that could affect progress.
  1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
  2. Review the present and future needs of each entity present, including the following:
    - a. Interface requirements.
    - b. Time.
    - c. Sequences.
    - d. Status of submittals.
    - e. Deliveries.
    - f. Access.
    - g. Site utilization.
    - h. Temporary facilities and services.
    - i. Hours of work.
    - j. Hazards and risks.
    - k. Housekeeping.

- l. Quality and work standards.
  - m. Change Orders.
  - n. Documentation of information for payment requests.
- D. Reporting:** Revise the Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule no later than 3 days after each meeting. Include a brief summary, in narrative form, of progress since the previous meeting and report.

### 1.13 COORDINATION MEETINGS

- A. Attend project coordination meetings** that will be conducted by the Designer at regular intervals convenient for all parties involved. Project coordination meetings are intended to coordinate the work of all contractors performing work on the site and are in addition to specific meetings held for other purposes, such as regular progress meetings.

### 1.14 RECORD KEEPING:

- A. Daily Log:** Maintain a Daily Log (in an area accessible to the Owner, Designer and Project Administrator) as a bound, sequential, hand-written record carefully prepared daily that documents but is not limited to the following items:
- 1 Meetings; purpose, attendees, brief discussion
  - 2 Special or unusual events, i.e. barrier breaching, equipment failures, accidents
  - 3 Documentation of Contractor's completion of the following:
    - a. Inspection of work area preparation prior to start of removal and daily thereafter.
    - b. Removal of any sheet plastic barriers
    - c. Contractor's inspections prior to spray back, lock back, encapsulation, enclosure or any other operation that will conceal the condition of ACM or the substrate from which such materials have been removed.
    - d. Removal of waste materials from work area
    - e. Decontamination of equipment (list items)
    - f. Contractor's final inspection/final air test analysis.
- B. Entry/Exit Log:** Maintain within the Decontamination Unit a daily log documenting the dates and time of but not limited to, the following items:
- 1 Visitations; authorized and unauthorized with the following information
    - a. Name
    - b. Organization
    - c. Entry time
    - d. Exit Time
    - e. Respiratory protection
  - 2 Personnel, by name, entering and leaving the work area with the following information
    - a. Printed Name
    - b. Identification Number
    - c. Entry Time
    - d. Exit Time
    - e. Respiratory Protection

- C. **Air Monitoring Results:** Post personnel and area air monitoring results in Decontamination Unit within 24 hours of sample collection. Post the respiratory protection requirements for the work in progress.
- D. **Records in Decontamination Unit:** Maintain the following documentation in the Decontamination Unit, in a location accessible to workers.
  - 1 Documentation of inspections by OSHA, EPA or local authority
  - 2 Respiratory Protection Program.
- E. **Other records:** Maintain other documentation in a location that is accessible to the Owner, Designer, and Project Administrator including:
  - 1 Waste Manifests and shipping records
  - 2 Landfill receipts.
  - 3 Accident reports.

### 1.15 SUBMITTALS

- A. **Before the Start of Work:** Submit the following to the Designer in the same manner as product data. Do not begin work until these submittals are returned with designer's action stamp indicating that all submittals have been received-not reviewed.
  - 1 Plan of Action.
  - 2 Contingency Plans.
  - 3 Project Directory.
  - 4 Notifications: copy of notification sent to other entities at the work site, and to emergency service agencies.
  - 5 Pre-Construction Inspection: Report on inspection carried out as required by this section. Include copies of all photographs, video tapes, etc.
  - 6 Contractors Construction Schedule.
  - 7 Accreditation: Submit evidence in the form of training course certificates for the General Superintendent, Supervisors, and Forepersons as asbestos abatement supervisors in accordance with AHERA requirements. Submit evidence in the form of training course certificates that each worker is trained as an asbestos abatement worker in accordance with AHERA requirements.
  - 8 Resume: Submit resume of General Superintendent
  - 9 **Insurance Documents**
  - 10 **Performance Bond**
- B. **Project Close-out:** Submit two (2) copies for information purposes of all documents indicated in the following sections at final closeout of project as a project close-out submittal.
  - 1. Section on Record Keeping.
  - 2. Section on Special Reports.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION**

**END OF SECTION – 01043**

**SECTION 01098 - CODES, REGULATIONS AND STANDARDS - ASBESTOS ABATEMENT**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS:**

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

**1.2 SUMMARY**

- A. This section sets forth governmental regulations which are included and incorporated herein by reference and made a part of the specification. This section also sets forth those notices and permits which are known to the Owner and which either must be applied for and received, or which must be given to governmental agencies before start of work.
  - 1. Requirements include obtaining permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with codes, regulations, and standards.

**1.3 CODES, REGULATIONS AND STANDARDS**

- A. **General Applicability of Codes, Regulations and Standards:** Except to the extent that more explicit or more stringent requirements are written directly into the Contract Documents, all applicable codes and regulations have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the Contract Documents, or as if published copies are bound herewith.
- B. **Contractor Responsibility:** The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold the Owner and Designer harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of the contractor, the contractor's employees, or subcontractors.
- C. **Federal Requirements:** which govern asbestos abatement work or hauling, and disposal of asbestos waste materials include but are not limited to the following:
  - 1. **OSHA:** U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA), including but not limited to:

- a. Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite;  
Final Rules Title 29, Part 1910, Section 1001 of the Code of Federal Regulations  
Final Rules Title 29, Part 1926, Section 1101 of the Code of Federal Regulations
  - b. Respiratory Protection  
Title 29, Part 1910, Section 134 of the Code of Federal Regulations  
Title 29, Part 1926, Section 103 of the Code of Federal Regulations
  - c. Personal Protective Equipment for General Industry  
Title 29, Part 1910, Section 132 of the Code of Federal Regulations  
Title 29, Part 1926, Sections 95 - 107 of the Code of Federal Regulations
  - d. Access to Employee Exposure and Medical Records  
Title 29, Part 1926, Section 33 of the Code of Federal Regulations
  - e. Hazard Communication  
Title 29, Part 1926, Section 59 of the Code of Federal Regulations
  - f. Specifications for Accident Prevention Signs and Tags  
Title 29, Part 1910, Section 145 of the Code of Federal Regulations
  - g. Permit Required Confined Space  
Title 29, Part 1910, Section 146 of the Code of Federal Regulations
  - h. Construction Industry  
Title 29, Part 1910, Section 1001 of the Code of Federal Regulations  
Title 29, Part 1926, Section 1101 of the Code of Federal Regulations
  - i. Construction Industry - General Duty Standards  
Title 29, Part 1926, Sections 20 through 35 of the Code of Federal Regulations
  - j. Shipyard Industry  
Title 29 Part 1915 Section 1001 of the Code of Federal Regulations
- 2. DOT:** U. S. Department of Transportation, including but not limited to:
- a. Hazardous Substances  
Title 49, Part 171 and 172 of the Code of Federal Regulations
  - b. Hazardous Material Regulations  
General Awareness and Training Requirements for Handlers, Loaders and Drivers  
Title 49, Parts 171-180 of the Code of Federal Regulations
  - c. Hazardous Material Regulations  
Editorial and Technical Revisions

Title 49, Parts 171-180 of the Code of Federal Regulations

3. **EPA:** U. S. Environmental Protection Agency (EPA), including but not limited to:
  - a. Asbestos Abatement Projects; Worker Protection Rule  
Title 40 Part 763, Sub-part G of the Code of Federal Regulations
  - b. Asbestos Hazard Emergency Response Act (AHERA) Regulation  
Title 40, Part 763, Sub-part E of the Code of Federal Regulations
  - c. EPA Model Accreditation Plan - Asbestos Containing Materials Final Rule & Notice  
Title 40, Part 763, Sub-part E, Appendix C of the Code of Federal Regulations
  - d. National Emission Standard for Hazardous Air Pollutants (NESHAP)  
National Emission Standard for Asbestos  
Title 40, Part 61, Sub-part A, and Sub-part M (Revised Sub-part B) of the Code of Federal Regulations
- D. **State Requirements:** which govern asbestos abatement work or hauling, and disposal of asbestos waste materials include but are not limited to the following:
- E. **Local Requirements:** which govern asbestos abatement work or hauling, and disposal of asbestos waste materials include but are not limited to the following:

Abide by all local requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials.

## 1.4 NOTICES:

### A. COLORADO DEPARTMENT OF PUBLIC HEALTH & ENVIRONMENT

1. Postmark, Electronic or Deliver Written Notification as required by USEPA National Emission Standards for Hazardous Air Pollutants (NESHAP) Asbestos Regulations (40 CFR 61, Subpart M) to the regional Asbestos NESHAP Contact, at CDPHE at least 10 working days prior to beginning any work on asbestos-containing materials (ACM). Send notification to the following address:

Submit form to:

Permit Coordinator Colorado Dept. of Public Health and Environment  
APCD-IE-B1 4300 Cherry Creek Drive South  
Denver, CO 80246-1530  
Phone: 303-692-3100  
Fax: 303-782-0278  
[asbestos@state.co.us](mailto:asbestos@state.co.us)

2. There is a copy of the CDPHE form at the end of this section.
3. Notification: Include the following information in the notification sent to the CDPHE contact:
  - a. Indication whether the notification is the original or revised notification
  - b. Name, address, and telephone number of owner or operator.
  - c. Name, address, and telephone number of contractor.
  - d. Type of Operation (demolition or renovation).
  - e. Description of the facility or affected part of the facility being demolished or renovated, including the size (square feet [square meters], number of floors), age, present and prior use of the facility.
  - f. Estimate of the approximate amount of RACM to be removed from the facility in terms of linear meters [linear feet] of pipe, and surface area in square meters [square feet] of other facility components. Also estimate the approximate amount of Category I and Category II nonfriable ACM in the affected part of the facility that will not be removed before demolition.
  - g. For facilities in which the amount of friable asbestos materials less than 80 linear meters (260 linear feet) on pipes and less than 15 square meters (160 square feet) or 1 cubic meter (35 cubic feet) if the length and width could not be measured. On other facility components, explain techniques of estimation.
  - h. Location and street address (including building number or name and floor or room number, if appropriate), city county, and state, of the facility being demolished or renovated.
  - i. Scheduled starting and completion dates of asbestos removal work (or any other activity, such as site preparation that would break up, dislodge, or similarly disturb asbestos material) in a demolition or renovation; planned renovation operations involving individual nonscheduled operations shall

only include the beginning and ending dates of the report period as described in paragraph (a) (4) (iii) of 40 CFR 61.145.

- j. Scheduled starting and completion dates of demolition or renovation.
- k. Nature of planned demolition or renovation and method(s) to be used, including demolition or renovation techniques to be used and description of affected facility components.
- l. Procedures to be used to comply with the requirements of USEPA National Emission Standards for Hazardous Air Pollutants (NESHAP) Asbestos Regulations (40 CFR 61 Subpart M) and Colorado Regulation 8.
- m. Name and location of the waste disposal site where the asbestos containing waste material will be deposited.
- n. A certification that at least one person trained as required by paragraph (c) (8) of 40 CFR 61.145 will supervise the stripping and removal described by this notification.
- o. For facilities being demolished under an order of a State or local governmental agency, issued because the facility is structurally unsound and in danger of imminent collapse, the name, title, and authority of the State or local governmental representative who has ordered the demolition. A copy of the order shall be attached to the notification.
- p. For emergency renovations described in paragraph (a)(4)(iv) of 40 CFR 61.145 , the date and hour that the emergency occurred, a description of the sudden, unexpected event, and an explanation of how the event caused an unsafe condition, or would cause equipment damage or an unreasonable financial burden.
- q. Description of procedures to be followed in the event that the unexpected RACM is found or Category II nonfriable ACM becomes crumbled, pulverized, or reduced to powder.
- r. Name, address, and telephone number of the waste transporter.

## **B. OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION**

- 1. Send a copy of evaluation and certification of alternative work procedures to the national office of OSHA, Office of Technical Support, Room N3653, 200 Constitution Avenue, NW, Washington, DC 20210 before work which involves the removal of more than 25 linear or 10 square feet (7.5 linear meters or 3 square meters) of thermal system insulation or surfacing material is begun using an alternative method.

## **C. STATE AND LOCAL AGENCIES:**

- 1. Send written notification as required by state and local regulations prior to beginning any work on ACM.

## **1.5 PERMITS:**

- A.** Permit: All asbestos containing waste is to be transported by an entity maintaining a current "Industrial waste hauler permit" specifically for ACM, as required for transporting of waste ACM to a disposal site.
- B.** Contractor is responsible for obtaining any demolition, building, renovation or other permits, and for paying application fees, if any, where required by State or Local jurisdictions.

## **1.6 LICENSES:**

- A.** Licenses: Maintain current licenses as required by applicable state or local jurisdictions for the removal, transporting, disposal or other regulated activity relative to the work of this contract.

## **1.7 POSTING AND FILING OF REGULATIONS**

- A. Posting and Filing of Regulations:** Post all notices required by applicable federal, state and local regulations.

## **1.8 SUBMITTALS:**

- A. Before Start of Work:** Submit the following to the Designer for review. No work shall begin until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use or final-but-restricted use.
  - 1.** Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work including:
    - a.** State and Local Regulations: Submit copies of codes and regulations applicable to the work.
  - 2.** Notices: Submit notices required by federal, state and local regulations together with proof of timely transmittal to agency requiring the notice.
  - 3.** Permits: Submit copies of current valid permits required by state and local regulations.
  - 4.** Licenses: Submit copies of all State and local licenses and permits necessary to carry out the work of this contract.

## **PART 2 - PRODUCTS**

N/A

## **PART 3 - EXECUTION**

N/A

**END OF SECTION – 01098**

for CDPHE Form see attached.

## **SECTION 01503 - TEMPORARY FACILITIES - ASBESTOS ABATEMENT**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS:**

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

#### **1.2 SUMMARY**

- A. This Section includes requirements** for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection.
- B. Temporary utilities include**, but are not limited to, the following:
  - 1. Water service and distribution.
  - 2. Temporary electric power and light.
  - 3. Temporary heat.
  - 4. Ventilation.
  - 5. Telephone service.
  - 6. Sanitary facilities, including drinking water.
  - 7. Storm and sanitary sewer.
- C. Support facilities include**, but are not limited to, the following:
  - 1. Field offices, laboratories and storage sheds.
  - 2. Temporary enclosures.
  - 3. Hoists and temporary elevator use.

**D. Security and protection facilities include**, but are not limited to, the following:

1. Temporary fire protection.
2. Barricades, warning signs, and lights
3. Temporary fence

### **1.3 DESCRIPTION OF REQUIREMENTS:**

**A. General:** Provide temporary connection to existing building utilities or provide temporary facilities as required herein or as necessary to carry out the work.

### **1.4 SUBMITTALS**

**A. Before the Start of Work:** Submit the following to the Designer for review. Begin no work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use or final-but-restricted use.

1. Implementation and Termination Schedule: Within 15 days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each phase of work.

### **1.5 QUALITY ASSURANCE**

**A. Regulations:** Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, fire department, and rescue squad rules.
5. Environmental protection regulations.

**B. Standards:** Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."

**C. Electrical Service:** Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."

**D. Inspections:** Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

## 1.6 PROJECT CONDITIONS

- A. **Temporary Utilities:** Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.
- B. **Conditions of Use:** Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

## PART 2 - PRODUCTS

### 2.1 MATERIALS AND EQUIPMENT

- A. **General:** Provide new materials and equipment. If acceptable to the Designer, the Contractor may use undamaged, previously used materials and equipment in serviceable condition. Provide materials and equipment suitable for use intended.
- B. **Lumber and Plywood:**
  - 1. For job-built temporary offices, shops, and sheds within the construction area, provide UL-labeled, fire-treated lumber and plywood for framing, sheathing, and siding.
  - 2. For fences and vision barriers, provide minimum 3/8-inch- (9.5mm) thick exterior plywood.
- C. **Scaffolding:** Provide scaffolding, ladders and/or staging, etc. as necessary to accomplish the work of this contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of scaffolding shall comply with applicable OSHA provisions.
  - 1. Equip rungs of metal ladders, etc. with an abrasive non-slip surface.
  - 2. Provide a nonskid surface on scaffold surfaces subject to foot traffic.

### 2.2 WATER SERVICE

- A. **Temporary Water Service Connection:** Connections to the Owner's water system shall include backflow protection. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or

located over an existing sink or grade where water will not damage existing finishes or equipment. Provide separate hoses and/or pumps for shower water and amended water, without the possibility of cross connection.

- B. Water Hoses:** Provide, heavy-duty, abrasion-resistant, flexible hoses in diameters and lengths necessary to adequately serve temporary facilities, and with a pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
  - 1. Provide water into each work area and to each Decontamination Unit. Provide fittings as required to allow for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment.
- C. Hot Water Heater:** Provide UL rated minimum 40 gallon (150 liters) electric hot water heater to supply hot water for the Decontamination Unit shower. Activate from 30 amp circuit breaker located within the Decontamination Unit subpanel. Provide with relief valve compatible with water heater operation; pipe relief valve down to drip pan on floor with type L copper. Drip pans shall consist of a 12" X 12" X 6" (30 cm. X 30 cm. X 15 cm) deep pan, made of 19 gauge galvanized steel, with handles. A 3-quart (3 liter) kitchen saucepan may be substituted for this purpose. Drip pan shall be securely fastened to the hot water heater with bailing wire or similar material. Wiring of the hot water heater shall be in compliance with NEMA, NECA, and UL standards.

### 2.3 ELECTRICAL SERVICE:

- A. General:** Comply with applicable NEMA, NECA and UL standards and governing regulations for materials and layout of temporary electric service.
- B. Temporary Power:** Provide service to Decontamination Unit subpanel with minimum 60 amp, 2 pole circuit breaker or fused disconnect connected to the buildings main distribution panel. Subpanel and disconnect shall be sized and equipped to accommodate electrical equipment required for completion of the work.
  - 1. Connection to the buildings main distribution panel is to be made by a licensed electrician
- C. Voltage Differences:** Provide identification warning signs at power outlets which are other than 110-120 volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 volt plugs into higher voltage outlets. Dry type transformers shall be provided where required to provide voltages necessary for work operations.
- D. Electrical Outlets:** Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters (GFCI), reset button, and pilot light for connection of power tools and equipment.

1. Locate GFCI's exterior to Work Area so that circuits are protected prior to entry to Work Area. Provide circuit breaker type ground fault circuit interrupters (GFCI) equipped with test button and reset switch for circuits to be used for any purpose in work area, decontamination units, exterior, or as otherwise required by national electrical code, OSHA or other authority. Locate in panel exterior to Work Area.
- E. Electrical Power Cords:** Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- F. Lamps and Light Fixtures:** Provide general service incandescent lamps or fluorescent lamps of wattage indicated or required for adequate illumination as required by the work or this section. Protect lamps with guard cages or tempered glass enclosures, where fixtures are exposed to breakage by construction operations. Provide vapor tight fixtures in work area and decontamination units. Provide exterior fixtures where fixtures are exposed to the weather or moisture.

## 2.4 TEMPORARY STRUCTURES

- F. Temporary Offices:** N/A
- G. Temporary Toilet Units:** Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

## 2.5 FIRST AID

- A. First Aid Supplies:** Comply with governing regulations and recognized recommendations within the construction industry.

## 2.6 FIRE EXTINGUISHERS:

- A. Fire Extinguishers:** Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. **General:** Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. **Provide** each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. **Require** that personnel accomplishing this work be licensed as required by local authority for the work performed.
- D. **Relocate**, modify and extend services and facilities as required during the course of work so as to accommodate the entire work of the project.

### 3.2 SCAFFOLDING:

- A. **During the erection and/or moving** of scaffolding, care must be exercised so that no damage is done to the building.
- B. **Clean** as necessary debris from non-slip surfaces.

### 3.3 TEMPORARY UTILITY INSTALLATION

- A. **General:** Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
  - 1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
  - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
  - 3. **Use Charges:** Cost or use charges for temporary facilities are not chargeable to the Owner or Designer. Neither the Owner nor Designer will accept cost or use charges as a basis of claims for Change Orders.
- B. **Water Service:**
  - 1. Water connection (without charge) to Owner's existing potable water system is limited to one 3/4" (19 mm) pipe-size connection, and a maximum flow of 10 g.p.m. (38 liters / minute) each to hot and cold water supply. Install using vacuum

breakers or other backflow preventer as required by local authority. Hot water shall be supplied at a minimum temperature of 100 degrees F (35 degrees C). Supply hot and cold water to the Decontamination Unit in accordance with Section 01563.

- a. Maintain hose connections and outlet valves in leak proof condition. Where finish work below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize the possibility of water damage. Drain water promptly from pans as it accumulates.

### **C. Electrical Service:**

1. Lock out: Lock out all existing power to or through the work area as described below. Unless specifically noted otherwise existing power and lighting circuits to the Work Area are not to be used. All power and lighting to the Work Area and Decontamination facilities are to be provided from temporary electrical panel described below.
  - a. Comply with requirements to OSHA 29 CFR 1910.147 the control of hazardous energy lock out/tag out.
  - b. Lock out power to Work Area by switching off breakers serving power or lighting circuits in work area. Tag out breakers with notation "DANGER circuit being worked on". Lock panel and have all keys under control of authorized person who has locked pane.
  - c. Lock out power to circuits running through Work Area wherever possible by switching off and locking all breakers serving these circuits. Tag out breakers with notation "DANGER circuit being worked on". Sign and date danger tag. Lock panel and supply keys to authorized person who has applied locks. If circuits cannot be shut down for any reason, label at intervals of 4-feet" (1.25 meter) on center with signs reading, "DANGER live electric circuit. Electrocution hazard." All asbestos abatement work in the vicinity of the live circuit is to be performed dry. All necessary notifications and procedures for dry removal are to be followed.
  - d. Lock out power to electrical equipment located in the work area, and to any fans or other equipment that is going to be worked on.
2. Temporary Electrical Panel: Provide temporary electrical panel sized and equipped to accommodate electrical equipment and lighting required by the work. Connect temporary panel to existing building electrical system. Protect with circuit breaker or fused disconnect. Locate temporary panel as directed by Owner or Designer. Panel is to be installed by a licensed electrician.
3. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, ac

20 Ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

4. Circuit Protection: Protect each circuit with a ground fault circuit interrupter (GFCI) of proper size located in the temporary panel. Do not use outlet type GFCI devices.
5. Temporary Wiring: in the Work Area shall be type UF non-metallic sheathed cable located overhead and exposed for surveillance. Do not wire temporary lighting with plain, exposed (insulated) electrical conductors. Provide liquid tight enclosures or boxes for wiring devices.
6. Number of Branch Circuits: Provide sufficient branch circuits as required by the work. Branch circuits are to originate at temporary electrical panel. At minimum provide the following:
  - a. One Circuit for each HEPA filtered fan unit
  - b. For power tools and task lighting, provide one temporary 4-gang outlet in the following locations. Provide a separate 110-120 Volt, 20 Amp circuit for each 4-gang outlet (4 outlets per circuit).
  - c. One outlet in the work area for each 2500 square feet (225 square meters) of work area
  - d. One outlet at each decontamination unit, located in equipment room
7. 110-120 volt 20 amp branch circuits with 4-gang outlet for Owner's exclusive use while conducting visual inspection and air sampling during the work as follows:
  - a. One in each work area
  - b. One at clean side of each Decontamination Unit.
  - c. One at each exhaust location for HEPA filtered fan units
8. 110-120 volt 20 amp branch circuits with 4-gang outlet for Owner's exclusive use for conducting visual inspection and final air sampling as set forth in Section 01711 Project Decontamination as follows:
  - a. Five inside work area
  - b. Two outside work area in location designated by Designer

#### **D. Temporary Lighting:**

1. Lock out: Lock out existing power to lighting circuits in Work Area as described in section 01526 Temporary Enclosures. Unless specifically noted otherwise existing lighting circuits to the Work Area are not to be used. All lighting to the Work Area and Decontamination facilities is to be provided from temporary electrical panel described above.
2. Provide the following or equivalent where natural lighting or existing building lighting does not meet the required light level:
  - a. One 200-watt incandescent lamp per 1000 square feet (92.9 square meters) of floor area, uniformly distributed, for general construction lighting, or equivalent illumination of a similar nature. In corridors and similar traffic areas provide one 100-watt incandescent lamp every 50 feet (15.2 meters). In stair ways and at ladder runs, provide one lamp minimum per story, located to illuminate each landing and flight. Provide sufficient temporary lighting to ensure proper workmanship everywhere; by combined use of daylight, general lighting, and portable plug-in task lighting.
3. Number of Lighting Circuits: Provide sufficient lighting circuits as required by the work. Lighting circuits are to originate at temporary electrical panel.
4. Circuit Protection: Protect each circuit with a ground fault circuit interrupter (GFCI) of proper size located in the temporary panel.

#### **E. Sanitary Facilities:**

1. Sanitary facilities include temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
  - a. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.
- 3.a Provide separate facilities for male and female personnel.
- 4.a Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

5. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.
  - a. Filter out excessive amounts of soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
  - b. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.

### 3.4 FIRE PROTECTION FACILITIES INSTALLATION

- A. **Except for use of permanent fire protection** as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Designer.
- B. **Temporary Fire Protection:** Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."
  - 1.b Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
  2. Store combustible materials in containers in fire-safe locations.
  - 3.b Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires.
  - 4.b Prohibit smoking within any building, structure, and other enclosures or in hazardous fire-exposure areas.
  - 5.b Prohibit smoking in hazardous fire-exposure areas.
  - 6.b Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- C. **Permanent Fire Protection:** At the earliest feasible date in each area of the Project, complete installation of the permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

- D. Barricades, Warning Signs, and Lights:** Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
  
- E. Environmental Protection:** Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.

**END OF SECTION 01503**

## SECTION 01513 - TEMPORARY PRESSURE DIFFERENTIAL AND AIR CIRCULATION SYSTEM

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

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

#### 1.2 RELATED SECTIONS

- A. **Heating and cooling requirements** are set forth in Section 01503 Temporary Facilities - Asbestos Abatement.

#### 1.3 MONITORING

- A. **Continuously monitor** and record the pressure differential between the Work Area and the building outside of the Work Area with a monitoring device incorporating a continuous recorder (e.g. strip chart).

#### 1.4 SUBMITTALS

- A. **Before Start of Work:** Submit design of pressure differential system to the Designer for review. Do not begin work until submittal is returned with the Designer's action stamp indicating that the submittal is returned for unrestricted use. Include in the submittal at a minimum:
  1. Number of HEPA filtered fan units required and the calculations necessary to determine the number of machines
  2. Description of projected air flow within Work Area and methods required to provide adequate air flow in all portions of the work area
  3. Anticipated pressure differential across Work Area enclosures
  4. Description of methods of testing for correct air flow and pressure differentials
  5. Manufacturer's product data on the HEPA filtered fan units to be used
  6. Location of the machines in the Work Area
  7. Method of supplying adequate power to the machines and designation of building electrical panel(s) which will be supplying the power.
  8. Description of work practices to ensure that airborne fibers travel away from workers

## 1.5 QUALITY ASSURANCE:

- A. **Monitor pressure differential** at Personnel and Equipment Decontamination Units with a differential pressure meter equipped with a continuous recorder. Meter shall be equipped with a warning buzzer which will sound if pressure differential drops below 0.02 inch [0.5 mm] of water.

## PART 2 - PRODUCTS

### 2.1 HEPA FILTERED FAN UNITS:

- A. **General:** Supply the required number of HEPA filtered fan units to the site in accordance with these specifications. Use units that meet the following requirements.
- B. **Cabinet:** Constructed of durable materials able to withstand damage from rough handling and transportation. The width of the cabinet should be less than 30 inches [0.76 meters] to fit through standard-size doorways. Provide units whose cabinets are:
  - 1. Factory-sealed to prevent asbestos-containing dust from being released during use, transport, or maintenance
  - 2. Arranged to provide access to and replacement of all air filters from intake end
  - 3. Mounted on casters or wheels
- C. **Fans:** Rate capacity of fan according to usable air-moving capacity under actual operating conditions.
- D. **HEPA Filters:** Provide units whose final filter is the HEPA type with the filter media (folded into closely pleated panels) completely sealed on all edges with a structurally rigid frame.
  - 1. Provide units with a continuous rubber gasket located between the filter and the filter housing to form a tight seal.
  - 2. Provide HEPA filters that are individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 um dioctylphthalate (DOP) particles when tested in accordance with Military Standard Number 282 and Army Instruction Manual 136-300-175A. Provide filters that bear a UL586 label to indicate ability to perform under specified conditions.
  - 3. Provide filters that are marked with: the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.
  - 4. Pre-filters, which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. Provide units with the following pre-filters:
    - a. First-stage pre-filter: low-efficiency type (e.g., for particles 100 um and larger)
    - b. Second-stage (or intermediate) filter: medium efficiency (e.g. effective for particles down to 5 um)
    - c. Provide units with pre-filters and intermediate filters installed either on or in the intake grid of the unit and held in place with special housings or clamps.

- E. Instrumentation:** Provide units equipped with:
1. Magnehelic gauge or manometer to measure the pressure drop across filters and indicate when filters have become loaded and need to be changed
  2. A table indicating the usable air-handling capacity for various static pressure readings on the Magnehelic gauge affixed near the gauge for reference, or the Magnehelic reading indicating at what point the filters should be changed, noting Cubic Feet per Minute (CFM) (Liters / Second (LPS)) air delivery at that point
  3. Elapsed time meter to show the total accumulated hours of operation
- F. Safety and Warning Devices:** Provide units with the following safety and warning devices:
1. Electrical (or mechanical) lockout to prevent fan from operating without a HEPA filter
  2. Automatic shutdown system to stop fan in the event of a rupture in the HEPA filter or blocked air discharge
  3. Warning lights to indicate normal operation (green), too high a pressure drop across the filters (i.e., filter overloading) (yellow), and too low of a pressure drop (i.e., rupture in HEPA filter or obstructed discharge) (red)
  4. Audible alarm if unit shuts down due to operation of safety systems
- G. Electrical components:** Provide units with electrical components approved by the National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL). Each unit is to be equipped with overload protection sized for the equipment. The motor, fan, fan housing, and cabinet are to be grounded.

(800) 634-9091 or (404) 925-2761

## 2.2 AUXILIARY GENERATOR:

- A. Auxiliary Generator:** Provide a gasoline-powered self-starting generator with a capacity adequate to power a minimum of 50% of the HEPA filtered fan units in operation at any time during the work.

## 2.3 AUXILIARY POWER SWITCH:

- A. Auxiliary Power Switch:** Provide a switching relay which will automatically start auxiliary generator and switch over power supplied to HEPA filtered fan units to auxiliary generator.

## PART 3 - EXECUTION

### 3.1 PRESSURE DIFFERENTIAL ISOLATION

- A. Isolate the Work Area** from all adjacent areas or systems of the building with a Pressure Differential that will cause a movement of air from outside to inside at any breach in the physical isolation of the Work Area.

- B. Relative Pressure in Work Area:** Continuously maintain the work area at an air pressure that is lower than that in any surrounding space in the building, or at any location in the immediate proximity outside of the building envelope. This pressure differential when measured across any physical or critical barrier must equal or exceed a static pressure of:
1. 0.02 inches (0.5 mm) of water.
- C. Accomplish the pressure differential by exhausting** a sufficient number of HEPA filtered fan units from the work area. The number of units required will depend on machine characteristics, the seal at barriers, and required air circulation. The number of units will increase with increased make-up air or leaks into the Work Area. Determine the number of units required for pressure isolation by the following procedure:
1. Establish required air circulation in the work area, personnel and equipment decontamination units.
  2. Establish isolation by increased pressure in adjacent areas or as part of seals where required.
  3. Exhaust a sufficient number of units from the work area to develop the required pressure differential.
  4. The required number of units is the number determined above plus one additional unit.
  5. Vent HEPA filtered fan units to outside of building unless authorized in writing by Designer.
  6. Vent each HEPA filtered fan unit to inlet of second unit. Vent second unit to a controlled area in the building. Ensure that controlled area is isolated from balance of building by critical barriers at all times that units are in operation.
  7. Mount units to exhaust directly or through disposable ductwork.
  8. Use only new ductwork except for sheet metal connections and elbows.
  9. Use ductwork and fittings of same diameter or larger than discharge connection on fan unit.
  10. Use inflatable, disposable plastic ductwork in lengths not greater than 100 feet (30 meters).
  11. Use spiral wire-reinforced flex duct in lengths not greater than 50 feet (15 meters).
  12. Arrange exhaust as required to inflate duct to rigidity sufficient to prevent flapping.
  13. If direction of discharge from fan unit is not aligned with duct use sheet metal elbow to change direction. Use six feet (2 meters) of spiral wire reinforced flex duct after direction change.
- D. Isolation of elevators, stair towers, and return air intakes:** Erect seals with an air space at doors to elevators and stair towers. Pressurize this space with HEPA-filtered air so that it is at a pressure greater than either the Work Area elevator shaft or stair tower.
1. Fabricate seal by first sealing door with duct tape and 6 mil polyethylene. Construct a barrier from 2" (13 mm) gypsum board supported by 3-5/8" (92 mm) x 25 gauge metal studs at 16" (410 mm) on centers. Space face of barrier a

minimum of 3" (76 mm) from face of door. Seal barrier with 6 mil (0.15 mm) sheet plastic and duct tape.

2. Fabricate seal by first sealing door with duct tape and 6 mil (0.15 mm) polyethylene. Construct a barrier from 2" (13mm) CDX plywood supported by 2" X 4" (51 mm x 102 mm) wood studs at 16" (410 mm) on centers. Space face of barrier a minimum of 3" (76 mm) from face of door. Seal barrier with 6 mil (0.15 mm) sheet plastic and duct tape.
3. Use plywood and framing lumber that is treated to be fire resistant.
4. Pressurize space with exhaust from HEPA filtered fan unit. Continuously maintain a pressure differential with this space a minimum of 0.02 inches (0.5 mm) of water higher in static pressure than any adjacent space.
5. Locate HEPA filtered fan unit outside of work area. Fabricate a manifold as required to distribute air to individual spaces to be isolated. Provide relief venting at unit as required to prevent shut down due to low air flow while still maintaining required air pressure.

### 3.2 AUXILIARY GENERATOR

- A. **Provide auxiliary gasoline-powered generator** located outside of the building in a location protected from the weather. Install the generator in a location so that the exhaust from the generator does not flow to any building ventilation or supplied air intakes. Arrange so that if a power failure occurs the generator automatically starts and supplies power to a minimum of 50% of the HEPA filtered fan units in operation.

### 3.3 AIR CIRCULATION IN THE WORK AREA:

- A. **Air Circulation:** For purposes of this section air circulation refers to either the introduction of outside air to the Work Area or the circulation and cleaning of air within the Work Area.
- B. **Air circulation in the Work Area** is a minimum requirement intended to help maintain airborne fiber counts at a level that does not significantly challenge the work area isolation measures. The Contractor may also use this air circulation as part of the engineering controls in the worker protection program.
- C. **Determining the Air circulation Requirements:** The air flow volume (cubic meters per minute) exhausted (removed) from the workplace must exceed the amount of makeup air supplied to the enclosure. Provide a fully operational air circulation system supplying a minimum of the following air circulation rate:
  1. 4 air changes per hour
- D. Determine Number of Units needed to achieve required air circulation according to the following procedure:
  1. Determine the volume in cubic feet of the work area by multiplying floor area by ceiling height. Determine total air circulation requirement in cubic feet per minute (CFM) for the work area by dividing this volume by 60 and multiplying by the air change rate.
  2. Air Circulation Required in Cubic Feet of Air per Minute (CFM) =

$$\frac{\text{Volume of work area (cu. ft.)}}{60 \text{ (minutes per hour)}} \times \text{Number of air changes per hour}$$

3. Determine the volume in cubic meters of the work area by multiplying floor area by ceiling height. Determine total air circulation requirement in cubic feet per minute liters / second (LPS) for the work area by dividing this volume by 3.6 and multiplying by the air change rate.
- 4.c Add one (1) additional unit as a backup in case of equipment failure or machine shutdown for filter changing.

### 3.4 EXHAUST SYSTEM:

- A. **Pressure differential isolation and air circulation** and pressure differential in the Work Area are to be accomplished by an exhaust system as described below.
  - 1.c Exhaust all units from the Work Area to meet air circulation requirement of this section.
  - 2.c Location of HEPA Filtered Fan Units: Locate fan unit(s) so that makeup air enters work area primarily through decontamination facilities and traverses Work Area as much as possible. This may be accomplished by positioning the HEPA filtered fan unit(s) at a maximum distance from the worker access opening or other makeup air sources.
  - 3.c The end of the unit or its exhaust duct should be placed through an opening in the plastic barrier or wall covering. Seal plastic around the unit or duct with tape.
  - 4.c Vent to Outside of Building, unless authorized in writing by the Designer.
  - 5.c Air Handling Unit Exhaust: The exhaust plume from air handling units should be located away from adjacent personnel and intakes for HVAC systems.
  6. Decontamination Units: Arrange Work Area and decontamination units so that the majority of make up air comes through the Decontamination Units. Use only personnel or equipment Decontamination Unit at any time and seal the other so that make up air passes through unit in use.
  - 7.c Supplemental Makeup Air Inlets: Provide where required for proper air flow through the Work Area in location approved by the Designer by making openings in the plastic sheeting that allow air from outside the building into the Work Area. Locate auxiliary makeup air inlets as far as possible from the fan unit(s) (e.g., on an opposite wall), off the floor (preferably near the ceiling), and away from barriers that separate the Work Area from occupied clean areas. Cover with flaps to reseal automatically if the pressure differential system should shut down for any reason. Spray flap and around opening with spray adhesive so that if flap closes meeting surfaces are both covered with adhesive. Use adhesive that forms contact bond when dry.

### 3.5 AIR CIRCULATION IN DECONTAMINATION UNITS:

- A. **Pressure Differential Isolation:** Continuously maintain the pressure differential required for the work area in the:

1. Personnel Decontamination Unit: across the Shower Room with the Equipment Room at a lower pressure than the Clean room.
  - 2.c Equipment Decontamination Unit: Across the Holding Room with the Wash Room at a lower pressure than the Clean Room.
- B. Air Movement:** Arrange air circulation through the Personnel Decontamination Unit so that it produces a movement of air from the Clean Room through the Shower Room into the Equipment Room. At each opening, the air flow velocity must be sufficient to provide visible indications of air movement into the work area. The velocity of air flow within the enclosure must be adequate to remove airborne contamination from each worker's breathing zone without disturbing the asbestos-containing material on surfaces.
- B. Demonstrate Condition of Equipment** for each HEPA filtered fan unit and pressure differential monitoring equipment including proper operation of the following:
- 1.c Squareness of HEPA Filter
  - 2.c Condition of Seals
  - 3.c Proper operation of all lights
  - 4.c Proper operation of automatic shut down if exhaust is blocked
  - 5.c Proper operation of alarms
  - 6.c Proper operation of Magnehelic gauge
  - 7.c Proper operation and calibration on pressure monitoring equipment
- C. Demonstrate Operation** of the pressure differential system to the Designer will include, but not be limited to, the following:
- 1.c Plastic barriers and sheeting move lightly in toward Work Area,
  - 2.c Curtain of decontamination units move lightly in toward Work Area,
  - 3.c There is a noticeable movement of air through the Decontamination Unit.
  - 4.c Use smoke tube to demonstrate air movement from Clean Room through Shower Room to Equipment Room.
  - 5.c Use smoke tubes to demonstrate a definite motion of air across all areas in which work is to be performed.
  - 6.c Use a differential pressure meter or manometer to demonstrate the required pressure differential at every barrier separating the Work Area from the balance of the building, equipment, and ductwork or outside.
  - 7.c Modify the Pressure Differential System as necessary to demonstrate successfully the above.
- D. Use of System During Abatement Operations:**
- 1.c Start fan units before beginning work (before any asbestos-containing material is disturbed). After abatement work has begun, run units continuously to maintain a constant pressure differential and air circulation until decontamination of the work area is complete. Do not turn off units at the end of the work shift or when abatement operations temporarily stop.
  - 2.c Monitoring Pressure within the Enclosure: After the initial air flow patterns have been checked, the static pressure must be monitored within the enclosure. Monitoring may be made using manometers, pressure gauges, or combinations of

these devices. It is recommended that they be attached to alarms and strip chart recorders

- 3.c** Do not shut down air pressure differential system during encapsulating procedures, unless authorized by the Designer in writing. Supply sufficient pre-filters to allow frequent changes.
- 4.c** Start abatement work at a location farthest from the fan units and proceed toward them. If an electric power failure occurs, immediately stop all abatement work and do not resume until power is restored and fan units are operating again.
- 5.c** Corrective Actions: If the manometers or pressure gauges demonstrate a reduction in pressure differential below the required level, work should cease and the reason for the change investigated and appropriate changes made. The air flow patterns should be retested before work begins again.
- 6.c** At completion of abatement work, allow fan units to run as specified under section 01711, to remove airborne fibers that may have been generated during abatement work and cleanup and to purge the Work Area with clean makeup air. The units may be required to run for a longer time after decontamination, if dry or only partially wetted asbestos material was encountered during any abatement work.

**E. Dismantling the System:**

- 1.c** When a final inspection and the results of final air tests indicate that the area has been decontaminated, fan units may be removed from the Work Area. Before removal from the Work Area, remove and properly dispose of pre-filter, decontaminate exterior of machine and seal intake to the machine with 6 mil (0.15 mm) polyethylene to prevent environmental contamination from the filters.

**END OF SECTION – 01513**

## SECTION 01526 - TEMPORARY ENCLOSURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

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

#### 1.2 SUBMITTALS:

- A. **Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal is returned for unrestricted use.
  - 1. Strippable Coatings: Submit following:
    - a. Product description including major components and solvents.
    - b. Test report on ASTM E84 test of surface burning characteristics.
    - c. Manufacturer's installation instructions. Indicate portions applicable to the project and selected assemblies where the manufacturer offers alternatives.
  - 2. Spray Cement: Submit following:
    - a. Product description including major components and solvents.
    - b. Manufacturer's installation instructions. Indicate portions applicable to the project.
  - 3. Sheet Plastic: For fire retardant plastic submit test reports on NFPA 701 test.
  - 4. Signs: Submit samples of signs to be used.
- B. **Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal has been submitted.
  - 1. Material Safety Data Sheet: Submit Material Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for the following:
    - a. Strippable Coating.
    - b. Spray Cement.

### PART 2 - PRODUCTS

#### 2.1 SHEET PLASTIC:

- A. **Polyethylene Sheet:** A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil (0.15 mm) thick, clear, frosted, or black as indicated.
- B. **Polyethylene Sheet:** Provide flame-resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small

Scale Fire Test for Flame-Resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick frosted or black as indicated.

- C. Reinforced Polyethylene Sheet:** Where plastic sheet constitutes the only barrier between the work area and the building exterior, provide translucent, nylon reinforced or woven polyethylene, laminated, flame-resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick, frosted or black as indicated.

## 2.2 STRIPPABLE COATINGS:

- A. Strippable Coatings:** Provide strippable coatings in aerosol cans or premixed for spray application formulated to adhere gently to surfaces and remove cleanly by peeling off at the completion of the work.
1. Provide only water-based latex materials.
  2. Provide materials manufactured for the specific application required.
- B. Wall coating:** designed to be easy to remove.
- C. Floor coating:** designed to provide a tough film which resists spread of water beneath plastic layer.
- D. Window coating:** recommended by the manufacturer for use on windows. Supply materials that are designed to be stable on glass in sunlight and resist the transmission of ultraviolet radiation.
- E. Fire Safety:** Provide materials that meet the following requirements:
1. When wet or while being installed:
    - a. Do not create combustible vapors
    - b. Have no flash point
    - c. Are not noxious
    - d. Department of Transportation category of non-flammable.
  2. When dry, material must have a Class A rating as a building material and meet the following requirements when tested in accordance with ASTM E-84:
    - a. Flame Spread no greater than 20
    - b. Fuel Contributed 0
    - c. Smoke Developed no more than 110
- F. Deliver materials** to the job site in unopened, factory-labeled containers.

## 2.3 MISCELLANEOUS MATERIALS:

- A. Duct Tape:** Provide duct tape in 2 inch or 3 inch (50 mm or 75 mm) widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.

- B. **Spray Cement:** Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
- C. **Mastic Remover:** Provide mastic remover that is soy based/low odor. No chemical mastic remover is allowed.

## PART 3 - EXECUTION

### 3.1 SEQUENCE OF WORK:

- A. **Carry out work of this section sequentially.** Complete each of the following activities in accordance with requirements before proceeding to the next.
  1. Provide emergency exits and emergency lighting.
  2. Control access
  3. Provide respiratory and worker protection.
  4. Provide Critical Barriers.
  5. Prepare Area.
  6. Provide Primary Barriers.
  7. Provide Isolation Areas as required.
  8. Provide Secondary Barrier.

### 3.2 GENERAL:

- A. **Work Area:** the location where asbestos abatement work occurs. The Work Area is a variable of the extent of work of the Contract. It may be a portion of a room, a single room, or a complex of rooms. A "Work Area" is considered contaminated during the work and must be isolated from the balance of the building, and decontaminated at the completion of the asbestos control work.
- B. **Completely isolate the Work Area** from other parts of the building so as to prevent asbestos-containing dust or debris from passing beyond the isolated area. Should the area beyond the Work Area(s) become contaminated with asbestos-containing dust or debris as a consequence of the work, clean those areas in accordance with the procedures indicated in Section 01711. Perform all such required cleaning or decontamination at no additional cost to owner.
- C. Construct enclosures to provide an air-tight seal around ducts and openings into existing ventilation systems and around penetrations for electrical conduits, telephone wires, water lines, drainpipes, etc. Construct enclosures to be both airtight and watertight except for those openings designed to provide entry and/or air flow control.
- D. **Size:** Construct enclosure with sufficient volume to encompass all of the working surfaces yet allow unencumbered movement by the worker(s), provide unrestricted air flow past the worker(s), and ensure walking surfaces can be kept free of tripping hazards.

- E. **Shape:** The enclosure may be any shape that optimizes the flow of ventilation air past the worker(s).
- F. **Structural Integrity:** The walls, ceilings and floors must be supported in such a manner that portions of the enclosure will not fall down during normal use.
- G. **Barrier Supports:** Provide frames as necessary to support all unsupported spans of sheeting.
- H. **Openings:** It is not necessary that the structure be airtight; openings may be designed to direct air flow. Such openings are to be located at a distance from active removal operations. They are to be designed to draw air into the enclosure under all anticipated circumstances. In the event that negative pressure is lost, they are to be fitted with either HEPA filters to trap dust or automatic trap doors that prevent dust from escaping the enclosure. Openings for exits are to be controlled by an airlock or a vestibule.
- I. **Place all tools,** scaffolding, staging, etc. necessary for the work in the area to be isolated prior to completion of Work Area isolation.
- J. **Areas within an Enclosure:** Each enclosure consists of a work area, a decontamination area, and waste storage area. The work area where the asbestos removal operations occur are to be separated from both the waste storage area and the contamination control area by physical curtains, doors, and/or airflow patterns that force any airborne contamination back into the work area.
- K. **Removing Mobile Objects:** Clean movable objects and remove them from the work area before an enclosure is constructed unless moving the objects creates a hazard. Mobile objects will be assumed to be asbestos contaminated and are to be either cleaned with amended water and a HEPA vacuum and then removed from the area or wrapped and then disposed of as asbestos-contaminated waste.
- L. **Disabling HVAC Systems:** The power to the heating, ventilation, and air conditioning systems that service the regulated area must be deactivated and locked out. All ducts, grills, access ports, windows and vents must be sealed off with two layers of plastic to prevent entrainment of contaminated air.
- M. **Operating HVAC Systems in the regulated Area:** If components of a HVAC system located in the regulated area are connected to a system that will service another zone during the project, the portion of the duct in the regulated area must be sealed and pressurized. Necessary precautions include caulking the duct joints, covering all cracks and openings with two layers of sheeting, and pressurizing the duct throughout the duration of the project by restricting the return air flow. The power to the fan supplying the positive pressure should be locked "on" to prevent pressure loss.
  - 1. If fan providing positive pressure fails for any reason, immediately stop asbestos removal work; mist the area to reduce airborne fiber levels. Notify the Project Administrator. Do not re-start asbestos removal work until authorized by the Designer.

- N. Lockout power to Work Area** by switching off all breakers serving power or lighting circuits in work area. A lock and tag shall be placed on each breaker used to de-energize circuits and equipment with notation "DANGER circuit being worked on". Lock panel and have all keys under control of authorized person who has applied the locks.
- O. Lockout power** to circuits running through work area wherever possible by switching off all breakers or removing fuses serving these circuits. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Lock panel and have all keys under control of authorized person who applied locks. If circuits cannot be shut down for any reason, label at intervals 4 feet (1.22 m) on center with signs reading, "DANGER live electric circuit. Electrocutation hazard." Label circuits in hidden locations but which may be affected by the work in a similar manner.
- P. Inspection Windows:** Install inspection windows in locations shown on the plans or as directed by the Designer. Each inspection window is to have a 24 inch X 24 inch (610 X 610 mm) viewing area fabricated from 1/4 inch (6.35 mm) acrylic or polycarbonate sheet. Install window with top at 6 feet-6 inches (1.98 m) above floor height in a manner that provides unobstructed vision from outside to inside of the Work Area. Protect window from damage from scratching, dirt or any coatings used during the work. A sufficient number of windows are to be installed to provide observation of all portions of the Work Area that can be made visible from adjacent areas. Inspection windows that open into uncontrolled area are to be covered with a removable plywood hatch secured by lock and key. Provide keys to Designer for all such locks.

### 3.3 EMERGENCY EXITS:

- A. Provide emergency exits and emergency lighting** as set forth below:
  - 1. Emergency Exits: At each existing exit door from the Work Area provide the following means for emergency exiting:
  - 2. Arrange exit door so that it is secure from outside the Work area but permits exiting from the Work Area.
  - 3. Mark outline of door on Primary and Critical Barriers with luminescent paint at least 1 inch (25.4 mm) wide. Hang a razor knife on a string beside outline. Arrange Critical and Primary barriers so that they can be easily cut with one pass of razor knife. Paint words "EMERGENCY EXIT" inside outline with luminescent paint in letters at least one foot high and 2 inches (50.8 mm) wide.
  - 4. Provide lighted EXIT sign at each exit.
  - 5. Provide battery-operated emergency lighting that switches on automatically in the event of a power failure.

### 3.4 CONTROL ACCESS:

- A. Isolate the Work Area** to prevent entry by building occupants into Work Area or surrounding controlled areas. Accomplish isolation by the following:

1. Submit to Designer a list of doors and other openings that must be secured to isolate Work Area. Include on list notation if door or opening is in an indicated exit route.
2. After receiving written authorization from the Designer lock all doors into Work Area, or, if doors cannot be locked, chain shut. Notify the local fire department of the list of doors/or other openings which must be chained or otherwise secured shut. Cover any signs that direct emergency exiting, either outside or inside of Work Area, to locked doors. Do not obstruct doors required for emergency exits from Work Area or from building.
3. After receiving written authorization from the Designer, construct partitions or closures across any opening into Work Area. Partitions are to be a minimum of 8 feet (2.44 meters) high.
4. Fabricate partitions from 3-5/8 inch (9.21 cm), 25 gage metal studs with 2 inch (1.27 cm) gypsum board on both faces. Brace at intervals of 4 feet (1.22 m) on center.
5. Fabricate partitions from 2 inch X 4 inch (50.8mm X 101.6mm) wood studs with 2 inch (1.27 cm) plywood on both faces. Brace at intervals of 4 feet (1.25 m) on center.
6. Fabricate partitions from 2 inch X 4 inch (50.8 mm X 101.6 mm) wood studs with 2 inch (1.27 cm) plywood on both faces. Brace at intervals of 4 feet (1.22 m) on center. Use only fire-retardant treated wood.
7. Fabric-type folding partitions: provide temporary partitions across fabric-type folding doors or partitions into Work Area.
8. Rigid-type folding partitions: remove operating bar and latch on clean side of folding partitions. Fasten down operating lever with hook and chain or other secure device on Work Area side. At completion of all abatement work reinstall bar and latch and adjust for proper operation.
9. Modify elevator controls to prevent elevators from stopping at doors in Work Areas. This work is to be performed by a qualified elevator technician.
10. Replace passage sets on doors required for exiting from Work Area with temporary locksets for duration of the project. Use entry type locksets that are key lockable from one side and always operable from inside. Install locksets with key side in stair tower and escape side on Work Area side. Provide one key to Owner and maintain one key in clean room of decontamination unit. After meeting Contractor release criteria set forth in Section 01711 Project Decontamination, reinstall original passage sets and adjust for proper operation.

**B. Locked Access:** Arrange Work Area so that the only access into Work Area is through lockable doors to personnel and equipment decontamination units.

1. Install temporary doors with entrance type locksets that are key lockable from the outside and always unlocked and operable from the inside. Do not use deadbolts or padlocks.
2. Replace locksets or passage sets on doors leading to decontamination units with temporary locksets for duration of the project. Remove any deadbolts or padlocks. Use entry type locksets that are key lockable from outside and always unlocked and operable from inside. After meeting contractor release criteria set forth in

Section 01711 Project Decontamination reinstall original locks, passage sets and locksets and adjust for proper operation.

3. Provide one key for each door to Owner, and Designer and maintain one key in clean room of decontamination unit (3 total).
  
- C. **Visual Barrier:** Where the Work Area is immediately adjacent to or within view of occupied areas provides a visual barrier of opaque polyethylene sheeting at least 6 mil (0.15 mm) in thickness so that the work procedures are not visible to building occupants. Where this visual barrier would block natural light, substitute frosted or woven rip-stop sheet plastic in locations approved by the Designer.
  
- D. **Demarcation.** Demarcate the regulated area in any manner that minimizes the number of persons within the area and protects persons outside the area from exposure to airborne concentrations of asbestos. Where critical barriers or negative pressure enclosures are used, they may demarcate the regulated area.
  
- E. **Access.** Limit access to regulated areas to authorized persons as defined by OSHA, and to the Owner, Designer, Project Administrator or a representative authorized by one of these entities.
  
- F. **Provide Warning Signs** at each locked door leading to Work Area reading as follows:
  1. Print text in both English and Spanish

<b>Legend</b>	<b>Notation</b>
KEEP OUT Block	3 inch (77 mm) Sans Serif Gothic or
BEYOND THIS POINT Block	1 inch (25.4 mm) Sans Serif Gothic or
ASBESTOS ABATEMENT WORK Block	1 inch (25.4 mm) Sans Serif Gothic or
IN PROGRESS Block	1 inch (25.4 mm) Sans Serif Gothic or
BREATHING ASBESTOS DUST MAY BE HAZARDOUS TO YOUR HEALTH	14 Point Gothic

2. Provide Warning Signs at each locked door leading to Work Area reading as follows

	<b>Legend</b>	<b>Notation</b>
	KEEP OUT	3 inch (77 mm) Sans Serif Gothic or Block
	CONSTRUCTION	1 inch (25.4 mm) Sans Serif
Gothic or Block	WORK AREA	1 inch (25.4 mm) Sans Serif Gothic or
Block	PROTECTIVE CLOTHING REQUIRED BEYOND THIS POINT	14 Point Gothic

3. Immediately inside door and outside critical barriers post an approximately 20 inch by 14 inch (508 mm X 356 mm) manufactured caution sign displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

**Legend**

DANGER  
 ASBESTOS  
 CANCER AND LUNG DISEASE HAZARD  
 AUTHORIZED PERSONNEL ONLY  
 RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

4. Provide spacing between respective lines at least equal to the height of the respective upper line.

**3.5 RESPIRATORY AND WORKER PROTECTION:**

- A. **Before proceeding** beyond this point in providing Temporary Enclosures:
  - 1. Provide Worker Protection per Section 01560
  - 2. Provide Respiratory Protection per Section 01562
  - 3. Provide Personnel Decontamination Unit per Section 01563

**3.6 CRITICAL BARRIERS:**

- A. **Completely Separate** the Work Area from other portions of the building, and the outside by closing all openings with sheet plastic barriers at least 6 mil (0.15 mm) in thickness, or by sealing cracks leading out of Work Area with duct tape.
- B. **Individually seal** all ventilation openings (supply and exhaust), lighting fixtures, clocks, doorways, windows, convectors and speakers, and other openings into the Work Area with duct tape alone or with polyethylene sheeting at least 6 mil (0.15 mm) in thickness, taped securely in place with duct tape. Maintain seal until all work including Project Decontamination is completed. Take care in sealing of lighting fixtures to avoid melting or burning of sheeting.

- C. **Provide Sheet Plastic** barriers at least 6 mil (0.15 mm) in thickness as required to seal openings completely from the Work Area into adjacent areas. Seal the perimeter of all sheet plastic barriers with duct tape or spray cement.
- D. **Mechanically Support** sheet plastic independently of duct tape or spray cement seals so that seals do not support the weight of the plastic. Following are acceptable methods of supporting sheet plastic barriers. Alternative support methods may be used if approved in writing by the Designer.
  - 1. Plywood squares 6 inch x 6 inch x 3/8 inch (152 mm x 152 mm x 9.53mm ) held in place with one 6d smooth masonry nail or electro-galvanized common nail driven through center of the plywood and duct tape on plastic so that plywood clamps plastic to the wall. Locate plywood squares at each end, corner and at maximum 4 feet (1.22 m) on centers.
  - 2. Nylon or polypropylene rope or wire with a maximum unsupported span of 10 feet (3.05 m), minimum 1/4 inch (6.35 mm) in diameter suspended between supports securely fastened on either side of opening at maximum 1 foot (304.8 mm) below ceiling. Tighten rope so that it has 2 inches (50.8 mm) maximum dip. Drape plastic over rope from outside Work Area so that a two foot long flap of plastic extends over rope into Work Area. Staple or wire plastic to itself 1 inch (25.4 mm) below rope at maximum 6 inches (152 mm) on centers to form a sheath over rope. Lift flap and seal to ceiling with duct tape or spray cement. Seal loop at bottom of flap with duct tape. Erect entire assembly so that it hangs vertically without a "shelf" upon which debris could collect.
- E. **Provide Pressure Differential System** per Section 01513.
  - 3. Clean housings and ducts of all overspray materials prior to erection of any Critical Barrier that will restrict access.

### 3.5 PREPARE AREA:

- A. **Scaffolding:** If fixed scaffolding is to be used to provide access HEPA vacuum and wet clean area prior to scaffolding installation.
- B. **Remove all electrical and mechanical items**, such as lighting fixtures, clocks, diffusers, registers, escutcheon plates, etc. which cover any part of the surface to be worked on with the work.
- C. **Remove all general construction items** such as cabinets, casework, door and window trim, moldings, ceilings, trim, etc., which cover the surface of the work as required to prevent interference with the work. Clean, decontaminate and reinstall all such materials, upon completion of all removal work with materials, finishes, and workmanship to match existing installations before start of work.
- D. **Clean all contaminated furniture**, equipment, and or supplies with a HEPA filtered vacuum cleaner or by wet cleaning, as specified in Section 01712 Cleaning and Decontamination Procedures, prior to being moved or covered. All equipment furniture,

etc. is to be deemed contaminated unless specifically declared as uncontaminated on the drawings or in writing by the Designer.

- E. **Clean All Surfaces in Work Area** with a HEPA filtered vacuum or by wet wiping prior to the installation of primary barrier.
- F. **Cleaning and Sealing Surfaces:** After cleaning with water and a HEPA vacuum, surfaces of stationary objects should be covered with two layers of plastic sheeting. The sheeting should be secured with duct tape or an equivalent method to provide a tight seal around the object.

### 3.6 PRIMARY BARRIER:

- A. **Protect building and other surfaces** in the Work Area from damage from water and high humidity or from contamination from asbestos-containing debris, slurry or high airborne fiber levels by covering with a primary barrier as described below.

- 1. **Strippable Coating:** Protect surfaces in the Work Area with a strippable coating. Perform all work in strict compliance with manufacturer's instructions. Carry out work in the following sequence.

- a. **Inspect:** Before start of coating work inspect all surfaces to be coated. Report on any surfaces that may be damaged by the material or any condition that may interfere with adhesion of the coating to a surface to the Designer before application of coating.
- b. **Photograph or videotape** existing damage to affected surfaces and submit documentation to Designer.
- c. **Test Patches:** Apply test patches as directed by Owner or Designer. Apply a small area of strippable coating to a hidden or obscure area of each surface in the Work Area to be coated. Allow to dry and peel off. Demonstrate results to Designer prior to coating entire area. Commence coating of area only after receiving written authorization from the Designer.
- d. **Cover surfaces and equipment** in work area from which coating may not strip cleanly.
- e. **Cover shelving, clocks, light fixtures and other equipment** with one layer of 6 mil (0.15 mm) sheet plastic.
- f. **Cover fabric, paper, cork wall coverings or unpainted gypsum board** with one layer of 6 mil (0.15 mm) sheet plastic.
- g. **Tape over any cracks** that are larger than 1/16 inch (1.59 mm).
- h. **Tape over electrical outlets, switches, door locks etc.**
- i. **Do not use strippable coating as an adhesive** to hold sheet plastic in place.
- j. **Coat or cover windows into Work Area:**
  - 1. **Coat windows with window coating** applied in a minimum 10 mil (0.254 mm) thickness when wet.
  - 2. **Cover windows with one layer of 6 mil (0.15 mm) sheet plastic.** Cover sheet plastic with a thin but continuous coat of window or wall coating.

- k. Protect critical barriers: Install strippable coating so that it will not remove critical barriers during stripping of coating. Cover critical barriers comprised of sheet plastic with a second layer of sheet plastic configured to be removed with strippable coating. Protect critical barriers made from tape with a protective layer of sheet plastic or duct tape.
- l. Coat all surfaces in Work Area with strippable coating in following order.
  - 3. Walls: Coat seams, corners, and junctions vertically. Coat balance of walls horizontally lapping over vertical sprayed areas by 50%.
  - 4. Floor: Coat floor lapping wall by 12 inches (305mm). Start at point furthest from entrance to Work Area and work toward door.
  - 5. Use straight edge to shield ACM from coating during spray application.
- m. Apply: to a minimum of the following thicknesses. Thickness is to be measured when material is wet using a wet film thickness gauge.

SURFACE TO BE COATED	MINIMUM THICKNESS WHEN WET	REQUIRED COATING TYPE
Critical Barriers	Not Applicable	Sheet Plastic Covers
Glass	10 mil (0.254 mm)	Window Coating
Plastic Over Glass	2 mil (0.051 mm)	Wall Coating
Paneling Painted Walls, Wall Covering,	12 mil (0.305 mm)	Wall Coating
Glazed Tile Smoothly Painted Brick, Painted Concrete Block	15 mil (0.381 mm)	Wall Coating
Floors	15 mil (0.381 mm)	Floor Coating
Unpainted Brick, Unpainted Concrete Block, Rough Wood	20 mil (0.51 mm)	Wall Coating

- n. Respiratory protection: Require that all workers in Work Area from start of spray operation until all surfaces are dry use as a minimum requirement a half-face negative pressure respirator equipped with combination ammonia and HEPA type filter cartridges or other appropriate respiratory protection as required by OSHA 29 CFR 1926.1101(h)(2) and as specified in Section 01562 Respiratory Protection.

- o. Worker protection: Equip all workers in Work Area during spray operation with eye protection, disposable gloves, and disposable paper suits.
  - p. Ventilation: during spraying operation maintain a minimum of 4 air changes per hour in the entire Work Area. Operate one additional HEPA filtered fan unit per spray operator in area while spraying is taking place.
4. Sheet Plastic: Protect surfaces in the Work Area with two (2) layers of plastic sheeting on floor and walls, or as otherwise directed on the Contract Drawings or in writing by the Designer. Perform work in the following sequence.
- a. All seams in the sheeting should overlap, be staggered and not be located at corners or wall-to-floor joints.
  - b. Cover Floor of Work Area with 2 individual layers of clear polyethylene sheeting, each at least 6 mil (0.15 mm) in thickness, turned up walls at least 12 inches (305 mm). Form a sharp right angle bends at junction of floor and wall so that there is no radius which could be stepped on causing the wall attachment to be pulled loose. Both spray-glue and duct tape all seams in floor covering. Locate seams in top layer six feet from, or at right angles to, seams in bottom layer. Install sheeting so that top layer can be removed independently of bottom layer.
  - c. Cover Carpeting with three (3) layers of polyethylene sheeting at least 6 mil (0.15 mm) in thickness. Place corrugated cardboard sheets between the top and middle layers of polyethylene.
  - d. Cover Sheet Plastic in areas where scaffolding is to be used with a single layer of 2 inch (13 mm) CDX plywood or 1/4 inch (6.5 mm) tempered hardboard. Wrap edges and corners of each sheet with duct tape. At completion of abatement work wrap plywood or hardboard with 2 layers of 6 mil (0.15 mm) polyethylene and move to next Work Area or dispose of as an asbestos-contaminated waste material in accordance with section 02084 of this specification.
  - e. Cover all walls in Work Area including "Critical Barrier" sheet plastic barriers with one layer of polyethylene sheeting, at least 6 mil (0.15 mm) in thickness, mechanically supported and sealed with duct tape or spray-glue in the same manner as "Critical Barrier" sheet plastic barriers. Tape all joints including the joining with the floor covering with duct tape or as otherwise indicated on the Contract Documents or in writing by the Designer.
  - f. Repair of Damaged Polyethylene Sheeting: Remove and replace plastic sheeting which has been damaged by removal operations or where seal has failed allowing water to seep between layers. Remove affected sheeting and wipe down entire area. Install new sheet plastic only when area is completely dry.

#### 4.0 ISOLATION AREA:

- A. **Maintain isolation areas** between the Work Area and adjacent building area:
  - 1. In locations shown on the plans.
  - 2. In unoccupied rooms located between Work Area and adjacent occupied portions of the building.

3. In locations where separation between Work Area and occupied portions of building is formed by sheet plastic and/or temporary barriers.
4. Floor below Work Area.

**B. Form isolation area** by controlling access to the space in the same manner as a Work Area. Physically isolate the space from the Work Area and adjacent areas. Accomplish physical isolation by:

1. Installing critical barriers in unoccupied space.
2. Erecting a second Critical Barrier a minimum of 3 feet (1.0 m) away from Work Area.

### **3.7 STOP WORK:**

**A. If the Critical or Primary barrier falls** or is breached in any manner stop asbestos removal work immediately and comply with AStop Work requirements of Section 01013 ASummary of Work - Asbestos Abatement. Does not start work until authorized in writing by the Designer.

### **3.8 EXTENSION OF WORK AREA:**

**A. Extension of Work Area:** If the Critical Barrier is breached in any manner that could allow the passage of asbestos debris or airborne fibers, then add affected area to the Work Area, enclose it as required by this Section of the specification and decontaminate it as described in Section 01711 Project Decontamination.

### **3.9 SECONDARY BARRIER:**

**A. Secondary layer** of plastic as a drop cloth to protect the primary layer from debris generated by the asbestos abatement work is specified in the appropriate work sections.

### **3.10 EXTERIOR ENCLOSURES:**

**A. Construct exterior enclosures** as a Critical Barrier as necessary to completely enclose the work. Fabricate from reinforced polyethylene sheeting and 2 inch x 4 inch (51mm X 102 mm) wood framework. Attach to existing building components or brace as necessary for lateral stability. Construct walls to meet all state and local regulations for construction of temporary buildings. Construct to resist a wind of 30 MPH (13.41 m/s), slope ceiling to permit drainage of rainwater.

**END OF SECTION – 01526**

## SECTION 01529 - MINI ENCLOSURES AND GLOVEBAGS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to work of this section.

#### 1.2 DESCRIPTION OF THE WORK:

- A. **Work of this section** consists of preparing a Regulated Area for work for which there is no negative exposure assessment or that involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of thermal system insulation or surfacing material. This is Class III OSHA work and is limited in size to operations that generate small amounts of ACM, i.e., no more than can be contained in one standard (60 inch x 60 inch) glove or waste bag filled no more than 1/3 to 1/2 full.

#### 1.3 SUBMITTALS:

- A. **Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal is returned for unrestricted use.
  1. Surfactant: Submit product data, use instructions and recommendations from manufacturer of surfactant intended for use. Include data substantiating that material complies with requirements.
  2. NESHAP Certification: Submit certification from manufacturer of surfactant that, to the extent required by this specification, the material, if used in accordance with manufacturer's instructions, will wet ACM to which it is applied as required by the National Emission Standard for Hazardous Pollutants (NESHAP) Asbestos Regulations (40 CFR 61, Subpart M).
  3. Material Safety Data Sheet: Submit Material Safety Data Sheet, or equivalent, in accordance with the OSHA Hazard Communications Standard (29 CFR 1910.1200) for each surfactant and encapsulating material proposed for used. Submit in the same manner as product data. Submittal is for information purposes only. Submittal will not be reviewed by Designer.
  4. Spray Cement: Submit following:
    - a. Product description including major components and solvents
    - b. Manufacturer's installation instructions. Indicate portions applicable to the project
  5. Sheet Plastic: For fire retardant plastic submit test reports on NFPA 701 test.
  6. Glovebags: Submit product data.
  7. HEPA Vacuums: Submit product data
  8. Signs: Submit samples of signs to be used.
  9. Mini-enclosure: Provide shop drawing of mini-enclosure arrangement to used.

**B. Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal has been received.

1. Material Safety Data Sheet: Submit Material Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for the following:
  - a. Surfactants.
  - b. Spray Cement.
  - c. Lock down.

## **PART 2 - PRODUCTS**

### **2.1 GLOVE BAGS:**

**A. Glovebags:** Provide minimum 6 mil (0.15 mm) thick polyethylene, polyvinyl chloride or equivalent plastic sack, with a seamless bottom, and two sealed inward projecting long sleeved gloves or mittens, preprinted with same warning notice as a disposal bag, equipped with a pouch for storage of tools, with designated location for wand or HEPA vacuum wand. Glove bag is to be not more than 60 inches by 60 inches in size.

1. An air filtration unit attached to the box
2. The box fitted with gloved apertures
3. An aperture at the base of the box to serve as a bagging outlet for waste ACM and water
4. Provide waste bags made of 6 mil (0.15 mm) thick plastic labeled as set forth in section 02084 A Disposal of Regulated Asbestos-Containing Material.
5. A HEPA filtration system (or HEPA vacuum) to maintain pressure barrier in box.

### **2.2 SHEET PLASTIC:**

**A. Polyethylene Sheet:** A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil (0.15 mm) thick, clear, frosted, or black as indicated.

**B. Polyethylene Sheet:** Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick, frosted or black as indicated.

**C. Reinforced Polyethylene Sheet:** Where plastic sheet constitutes the only barrier between the Work Area and the building exterior, provide translucent, nylon reinforced or woven polyethylene, laminated, flame resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick, frosted or black as indicated.

### **2.3 MISCELLANEOUS MATERIALS:**

- A. **Duct Tape:** Provide duct tape in 2 inch or 3 inch (51 mm or 76 mm) widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
- B. **Spray Cement:** Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
- C. **Wetting Materials:** For wetting prior to disturbance of ACM use either amended water:
  - 1. Amended Water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the ACM and retardation of fiber release during disturbance of the material equal to or greater than that provided by water amended with a surfactant consisting of one ounce of a solution of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.
- D. **Encapsulants** are specified in Section 09805.
- E. **Garden Sprayer:** Provide a hand pump type pressure-can garden sprayer fabricated out of either metal or plastic, equipped with a metal wand at the end of a hose that can deliver a stream or spray of liquid under pressure.

## PART 3 - EXECUTION

### 3.1 GENERAL:

- A. **Before Start of Work:** Complete the following before start of work of this section:
  - 1. 01527 Regulated Areas

### 3.2 WORKER PROTECTION:

- A. Before beginning work with any material for which a Material Safety Data Sheet has been submitted provide workers with the required protective equipment. Require that appropriate protective equipment be used at all times.

### 3.3 GLOVE BAGS AND BOXES:

- A. **Complete requirements** of the following:
  - 1. 01562 Respiratory Protection
  - 2. 01561 Worker Protection - Repair and Maintenance
- B. **Glovebag:** Remove ACM inside a glove bag according to the following procedure:
  - 1. Use at least two persons to perform glovebag removals operations.
  - 2. Use each glovebag only once
  - 3. Do not move glovebag once it has been mounted in place.
  - 4. Do not use glovebag on surface whose temperature exceeds 150EF (65.6EC).

5. Check materials adjacent to locations where glovebag will be installed. Wrap damaged (broken lagging, hanging, etc.), loose or friable material in 2 layers of 6 mil (0.15 mm) plastic and "candy-stripe" with duct tape, or render material intact by some other method. Place one layer of duct tape around undamaged pipe at each location where the glove bag will be attached.
6. Slit top of the glove bag open (if necessary) and cut down the sides to accommodate the size of the pipe (about two inches longer than the pipe diameter) and allow additional so that the top of the glove bag will be clear of the pipe after installation.
7. Place necessary tools into pouch located inside glove bag. This will usually include: bone saw, utility knife, rags, scrub brush, wire cutters, tin snips and pre-wetted cloth.
8. Place a strip of duct tape along both edges of the open top slit of glove bag for reinforcement.
9. Place the glove bag around section of pipe to be worked on and staple top together through reinforcing duct tape. Staple down sides approximately 6 inches so that top of the glove bag is clear of pipe. Seal top and sides with duct tape. Next, duct tape the ends of glove bag to pipe itself, where previously covered with plastic or duct tape.
10. Install glovebag so that it completely covers the circumference of pipe or other structures where the work is to be done.
11. Use smoke tube and aspirator bulb to test seal. Place tube into water sleeve (two-inch opening to glove bag) squeezing bulb and filling bag with visible smoke. Remove smoke tube and twist water sleeve closed. While holding the water sleeve tightly, gently squeeze glove bag and look for smoke leaking out, (especially at the top and ends of the glove bag). If leaks are found, tape closed using duct tape and re-test.
12. Insert wand from garden sprayer through water sleeve. Duct tape water sleeve tightly around the wand to prevent leakage.
13. Thoroughly wet material to be worked on with amended water and allow to soak in. Wet adequately to penetrate and soak material through to substrate.
14. One person places their hands into the long-sleeved gloves while the second person directs garden sprayer at the work.
15. Use bone saw, if required, to cut insulation at each end of the section to be removed. A bone saw is a serrated heavy gauge wire with ring-type handles at each end. Throughout this process, spray amended water on the cutting area to keep dust to a minimum.
16. Remove insulation using putty knives or other tools. Place pieces in bottom of bag without dropping.
17. Rinse all tools with water inside the bag and place back into pouch.
18. Using scrub brush, rags and water, scrub and wipe down the exposed pipe.
19. Thoroughly wash and wipe down interior of glovebag to a point below the location where the bag will be twisted and taped to seal waste in bottom of bag.
20. Remove water wand from water sleeve and attach the small nozzle from HEPA-filtered vacuum. Turn on the vacuum only briefly to collapse the bag.
21. Remove the vacuum nozzle, twist water sleeve closed and seal with duct tape.

22. From outside the bag, pull the tool pouch away from the bag. Place duct tape over twisted portion and then cut the tool bag from the glove bag, cutting through the twisted/taped section. Contaminated tools may then be placed directly into next glove bag without cleaning. Alternatively, tool pouch with the tools can be placed in a bucket of water, opened underwater, and tools cleaned and dried. Discard rags and scrub brush with asbestos waste.
23. With removed insulation in the bottom of the bag, twist the bag several times and tape it to seal material in the bottom during removal of the glove bag from the pipe.
24. Slip a 6 mil (0.15 mm) disposal bag over the glove bag (still attached to the pipe). Remove tape or cut bag and open the top of the glove bag and fold it down into disposal bag.
25. Clean all surfaces in the Work Area using disposable cloths wetted with water with surfactant added. When these surfaces have dried, clean with a HEPA filtered vacuum.
26. Seal exposed ends of remaining pipe insulation in accordance with Section 15254.
27. Remove disposable suits and place these into bag with waste.
28. Collapse the bag with a HEPA vacuum twist top of bag, seal with at least 3 wraps of duct tape, bend over and seal again with at least 3 wraps of duct tape.

### 3.4 MINI-ENCLOSURES:

- A. **A mini enclosure** is a small walk-in enclosure which accommodates no more than two persons. Provide a fabricated or job-made enclosure constructed of 6 mil (0.15 mm) plastic or equivalent. Place the enclosure under negative pressure by means of a HEPA filtered vacuum or similar HEPA filtered ventilation unit.
- B. **Provide a remote personnel decontamination unit** meeting requirements of Section 01563 Decontamination Units for worker decontamination.
- C. **Sequence of Work:** Before beginning work of this sub-section complete the following:
  1. Isolation of area in accordance with Section 01527 Regulated Area.
  2. Construction of a personnel decontamination unit in accordance with Section 01563 Decontamination Units.
- D. **Work Room:** Construct Work Room in the same manner as a Primary Barrier fabricated from 6 mil (0.15 mm) sheet plastic. Arrange so that Primary Barrier provides both a Critical and Primary Barrier. Line walls and floor of Work Room with a continuous Secondary Barrier.
- E. **Change Room:** Provide an approximately 3 feet by 3 feet (0.9 m x 0.9 m) Change Room, with additional space as required for storage, attached to each Work Room. Fabricate Change Room from 6 mil (0.15 mm) sheet plastic in the same manner as a Primary Barrier. Locate so that access to Work Area is through Change Room.
- F. **Step Off Area:** Cover floor in front of entry to Change Room with one layer of 6 mil (0.15 mm) sheet plastic. Securely anchor sheet plastic to prevent slipping.

- G. Flapped Door Construction:** Provide flapped door as entry to Change Room and entry from Change Room to Work Room. Fabricate each flapped door from overlapping contacting layers of sheet plastic. Fasten each layer on the top and one side. Each flap is to be 3 inches (76 mm) longer than door opening. Reinforce free side and bottom of each sheet with duct tape. Alternate sides that are fastened on each layer. Form arrows pointing to entry side from duct tape on inside and outside of door.
- H. Signage:** At entry to Change Room post an approximately 20 inch by 14 inch ( 508 mm x 356 mm) manufactured caution sign displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

**Legend**

DANGER

ASBESTOS

CANCER AND LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL ONLY

RESPIRATORS AND PROTECTIVE CLOTHING  
ARE REQUIRED IN THIS AREA

1. Provide spacing between respective lines at least equal to the height of the respective upper line.

**I. Complete requirements** of the following:

1. Section 01560 Worker Protection - Asbestos Abatement
2. Section 01562 Respiratory Protection
3. Section 01513 Temporary Pressure Differential & Air Circulation System: HEPA filtered vacuum cleaner with vacuum in space outside Mini-Enclosure may be used for compliance with this section. Provide a minimum of 8 air changes per hour in the Work Room.

**J. Testing:** The mini enclosure shall be inspected for leaks and smoke tested to detect breaches, and breaches sealed.

**K. Entry to Work Room:** Require that any time a worker enter the Work Room the following procedure is followed.

1. Outside of Change Room remove all street clothes and don clean coveralls and respirator. A swimsuit or second disposable suit may be worn beneath outer coveralls.

2. Enter Change Room be sure that entry is completely closed.
  3. Enter Work Room be sure that entry is completely closed.
- L. Work Procedures:** Arrange work area within the mini enclosure so that during use air movement is directed away from the workers breathing zone.
- M. Worker Decontamination:** Require that any time a worker leaves the mini-Enclosure the following procedure be followed.
1. Maintain a bucket of clean potable water in the Work Area. Do not amend with a wetting agent.
  2. Remove contaminated suit inside the Work Area. Leave respirator in place.
  3. Wash hands, face and surface of respirator with water and wet paper towels. Use caution to avoid breaking seal between respirator face-piece and face.
  4. Proceed with respirator in place to Change Room.
  5. Be sure that entry to Work Area is completely closed.
  6. In Change Room don clean disposable suit leaving respirator in place.
  7. Exit change room be sure that entry to Change Room is completely closed. Proceed to next Mini-Enclosure, or a remote shower.
  8. At end of workday decontaminate fully in accordance with procedures in appropriate specification section describing Worker Protection.
- N. Material Decontamination:** Require that the following procedure be used in removing equipment and bagged debris from the Work Room.
1. Three workers are required. One in the Work Room, one in the Change Room, and one on Step Off Area.
  2. Equipment and bagged debris are to be removed from the Mini-Enclosure in separate operations.
  3. Worker in Work Room cleans equipment and bagged debris and hands one piece of equipment or one bag of debris at a time to worker in Change Room.
  4. Worker in Change Room wet cleans each piece of equipment or bag and stores them in Change Room. Equipment is sealed completely in 6 mil (0.15 mm) sheet plastic in the Change Room.
  5. When the amount of stored material in the Change Room becomes large enough that the worker cannot clean incoming material without contacting previously cleaned material the door between the Work and Clean Room is closed.

6. The worker in the Changing Room then passes each item into a new disposal bag held open in the doorway between the Changing Room and Step Off Area by the worker on the Step Off Area. The Worker on the Step Off Area places each bag in a sealed cart for transport to the load out area. No bags are to be stored outside of the Mini-Enclosure.
  7. All bags are to be transported through the building in clean sealed containers that have never been in an asbestos Work Area, Mini-Enclosure or decontamination unit.
- O. Mini-Enclosure Decontamination:** At completion of all work decontaminate the Work and Changing Rooms as set forth in Section 01711 Project Decontamination for non-friable materials.

## **END OF SECTION – 01529**

## **SECTION 01560 - WORKER PROTECTION - ASBESTOS ABATEMENT**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS:**

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

#### **1.2 DESCRIPTION OF WORK:**

- A. This section describes the equipment and procedures required for protecting workers against asbestos contamination and other workplace hazards except for respiratory protection.

#### **1.3 RELATED WORK SPECIFIED ELSEWHERE:**

- A. **Respiratory Protection:** is specified in Section 01562.

#### **1.4 WORKER TRAINING:**

- A. **AHERA Accreditation:** All workers are to be accredited as Abatement Workers as required by the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).
- B. **State and Local License:** All workers are to be trained, certified and accredited as required by state or local code or regulation.
- C. **Training - Class I:** Train in accordance with 29 CFR 1926.1101. Provide training for all workers who will perform Class I operations that is the equivalent in curriculum, training method and length to the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

- D. Training - Class II Intact (Non-Friable):** Provide training for workers who will be performing Class II work involving only the removal and/or disturbance of one generic category of building material, such as roofing materials, flooring materials, siding materials or cement asbestos panels; which includes as a minimum the specific work practices and engineering controls which specifically relate to that category. Provide a course that includes "hands-on" training and takes at least 8 hours. Provide training that includes the elements set forth in 29 CFR 1926.1101(k) and the Compliance Directive CPL 2-2.63.
- E. Training - Class II Non-Intact (Friable):** Provide training for workers who will be performing Class II work on materials that are friable, or will become friable during the work that is the equivalent in curriculum, training method and length to the EPA Interim Final Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

### 1.5 MEDICAL SURVEILLANCE:

- A. Provide a medical surveillance program** for all employees who are:
1. Engaged in Class I, II and III work for a combined total of 30 or more days per year or,
    - a. For the purposes of this paragraph, any day in which a worker engages in Class II or Class III work or a combination thereof for one hour or less (taking into account the entire time spent on the removal operation, including cleanup) and, while doing so, adheres fully to the work practices specified in the OSHA standard (29 CFR 1926.1101) is not counted.
  2. Are exposed at or above the permissible exposure limit or excursion limit or,
  3. Before an employee can be assigned to work requiring use of a respirator.

### 1.6 SUBMITTALS:

- A. Before Start of Work:** Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.
1. **AHERA Accreditation:** Submit copies of certificates from an EPA-approved AHERA Abatement Workers course for each worker as evidence that each asbestos Abatement Worker is accredited as required by the EPA Interim Final Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).
  2. **State and Local License:** Submit evidence that all workers have been trained, certified and accredited as required by state or local code or regulation.

3. **Certificate Worker Acknowledgment:** Submit an original signed copy of the Certificate of Worker's Acknowledgment found at the end of this section, for each worker who is to be at the job site or enter the Work Area.
4. **Training Program:** Submit a course outline of the worker training course. Include date and time course was given, name and title of teacher.
5. **Report from Medical Examination:** conducted within last 12 months as part of compliance with OSHA medical surveillance requirements for each worker who is to enter the Work Area. Submit, at a minimum, for each worker the following:
  - a. Name and Social Security Number
  - b. The physician's written opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of material health impairment from exposure to asbestos;
  - c. Any recommended limitations on the employee or on the use of personal protective equipment such as respirators; and
  - d. A statement that the employee has been informed by the physician of the results of the medical examination and of any medical conditions that may result from asbestos exposure.
  - e. A statement that the employee has been informed by the physician of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure (29 CFR 1926.1101(m)).
  - f. A legible typed version of the physician's name, the physician's signature, and date of examination.

## **PART 2 - EQUIPMENT**

### **2.1 PROTECTIVE CLOTHING:**

- A. General.** Provide and require the use of protective clothing, such as coveralls or similar whole-body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos that exceed the TWA and/or excursion limit prescribed by 29 CFR 1926.1101 or for which a required negative exposure assessment is not produced, and for any employee performing Class I operations which involve the removal of over 25 linear or 10 square feet (7.5 linear meters or 3 square meters ) of TSI or surfacing ACM or PACM.
- B. Coveralls:** Provide cloth full-body coveralls and hats; require that they be worn by all workers in the Work Area. Require that workers change out of coverall in the Equipment Room of the Personnel Decontamination Unit. Dispose of coverall as asbestos waste at completion of all work.

- C. **Additional Protective Clothing:** Provide each worker with the protective clothing as required by Federal State and local regulations. This includes, but is not necessarily limited by Hardhats, Cold weather gear, Glove, boots and goggles.
- D. **Cold Weather Gear:** Provide each worker with an insulated jacket, pants, gloves, and hat. Require that cold weather gear be removed in Equipment Room of Personnel Decontamination Unit. Dispose of cold weather gear as asbestos waste at completion of all work.
- E. **Boots:** Provide work boots with non-skid soles, and where required by OSHA, foot protective, for all workers. Provide boots at no cost to workers. Paint uppers of all boots red with waterproof enamel. Do not allow boots to be removed from the Work Area for any reason, after being contaminated with ACM. Dispose of boots as asbestos-contaminated waste at the end of the work.
- F. **Hard Hats:** Provide head protective (hard hats) as required by OSHA for all workers, and provide 4 spares for use by Designer, Project Administrator, and Owner. Label hats with same warning labels as used on disposal bags. Require hard hats to be worn at all times that work is in progress that may potentially cause head injury. Provide hard hats of type with plastic strap type suspension. Require hats to remain in the Work Area throughout the work. Thoroughly clean, decontaminate and bag hats before removing them from Work Area at the end of the work.
- G. **Goggles:** Provide eye protection (goggles) as required by OSHA for all workers involved in scraping, spraying, or any other activity which may potentially cause eye injury. Thoroughly clean, decontaminate and bag goggles before removing them from Work Area at the end of the work.
- H. **Gloves:** Provide work gloves to all workers and require that they be worn at all times in the Work Area. Do not remove gloves from Work Area and dispose of as asbestos-contaminated waste at the end of the work.

## 2.2 ADDITIONAL PROTECTIVE EQUIPMENT:

- A. Disposable coveralls, head covers, and footwear covers shall be provided by the Contractor for the Owner, Designer, Project Administrator, and other authorized representatives who may inspect the job site. Provide six (6) complete coveralls per day.

## PART 3 - EXECUTION

### 3.1 GENERAL:

- A. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work. The following procedures are minimums to be adhered to regardless of fiber count in the Work Area.

- B. Each time Work Area is entered remove all street clothes in the Changing Room of the Personnel Decontamination Unit and put on new disposable coverall, new head cover, and a clean respirator. Proceed through shower room to equipment room and put on work boots.

### 3.2 DECONTAMINATION PROCEDURES:

- A. Require all workers to adhere to the following personal decontamination procedures whenever they leave the Work Area:

- 1. Type C Supplied Air or Powered Air-Purifying Respirators: Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the Work Area:

- a. When exiting area, remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the equipment room.
- b. Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:
- c. Thoroughly wet body including hair and face. If using a Powered Air-Purifying Respirator (PAPR) hold blower unit above head to keep canisters dry.
- d. With respirator still in place thoroughly wash body, hair, respirator face piece, and all parts of the respirator except the blower unit and battery pack on a PAPR. Pay particular attention to seal between face and respirator and under straps.
- e. Take a deep breath, hold it and/or exhale slowly, completely wet hair, face, and respirator. While still holding breath, remove respirator and hold it away from face before starting to breath.
- f. Carefully wash face piece of respirator inside and out.

- 2. If using PAPR: shut down in the following sequence, first cap inlets to filter cartridges, then turn off blower unit (this sequence will help keep debris which has collected on the inlet side of filter from dislodging and contaminating the outside of the unit). Thoroughly wash blower unit and hoses. Carefully wash battery pack with wet rag. Be extremely cautious of getting water in battery pack as this will short out and destroy battery.

- a. Shower completely with soap and water.
- b. Rinse thoroughly.
- c. Rinse shower room walls and floor prior to exit.

- d. Proceed from shower to Changing Room and change into street clothes or into new disposable work items.
3. Air Purifying-Negative Pressure Respirators: Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the Work Area with a half or full-face cartridge type respirator:
- a. When exiting area, remove disposable coveralls, disposable headcovers, and disposable footwear covers or boots in the Equipment Room.
  - b. Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator and filters to avoid asbestos fibers while showering. The following procedure is required as a minimum:
  - c. Thoroughly wet body from neck down.
  - d. Wet hair as thoroughly as possible without wetting the respirator filter if using an air purifying type respirator.
  - e. Take a deep breath, hold it and/or exhale slowly, complete wetting of hair, thoroughly wetting face, respirator and filter (air purifying respirator). While still holding breath, remove respirator and hold it away from face before starting to breath.
  - f. Dispose of wet filters from air purifying respirator.
  - g. Carefully wash face piece of respirator inside and out.
  - h. Shower completely with soap and water.
  - i. Rinse thoroughly.
  - j. Rinse shower room walls and floor prior to exit.
  - k. Proceed from shower to Changing Room and change into street clothes or into new disposable work items.
- B. Remote Shower:** The procedures above are to be used if the decontamination facility is used as a remote shower. If a worker cannot gain direct access to the Equipment Room require that he enter Decontamination Unit and proceed directly through Shower Room to Equipment Room. Decontamination procedure is then completed as required above.
- C. Within Work Area:**
- 1. Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area. To eat, chew, drink or smoke, workers shall follow

the procedure described above, then dress in street clothes before entering the non-Work Areas of the building.

**TRAINING COURSE:** You must have been trained in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and area protective measures. This training must have been the equivalent in curriculum, training method and length to the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

## **SECTION 01562 - RESPIRATORY PROTECTION**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS:**

- A. Drawings and general provisions of Contract**, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to work of this section.

#### **1.2 DESCRIPTION OF WORK:**

- A. Instruct and train each worker** involved in asbestos abatement or maintenance and repair of friable asbestos-containing materials (ACM) in proper respiratory use and require that each worker always wear a respirator, properly fitted on the face in the Work Area from the start of any operation which may cause airborne asbestos fibers until the Work Area is completely decontaminated. Use respiratory protection appropriate for the fiber level encountered in the workplace or as required for other toxic or oxygen-deficient situations encountered.

#### **1.3 DEFINITIONS:**

- A. "Negative Pressure Respirator":** A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
- B. "Protection Factor":** The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
- C. "Respirator":** A device designed to protect the wearer from the inhalation of harmful atmospheres.

#### **1.4 STANDARDS:**

- A. Except to the extent** that more stringent requirements are written directly into the Contract Documents, the latest edition of the following regulations and standards have

the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents, or as if published copies were bound herewith. Where there is a conflict in requirements set forth in these regulations and standards, meet the more stringent requirement.

1. **OSHA** - U.S. Department of Labor Occupational Safety and Health Administration, Safety and Health Standards Section 29 CFR 1910.1001, Section 1910.134, and Section 29 CFR 1926.1101.
2. **CGA** - Compressed Gas Association, Inc., New York, Pamphlet G-7, "Compressed Air for Human Respiration", and Specification G-7.1 "Commodity Specification for Air".
3. **CSA** - Canadian Standard Association, Rexdale, Ontario, Standard Z180.1, "Compressed Breathing Air".
4. **ANSI** - American National Standard Practices for Respiratory Protection, ANSI Z88.2.
5. **NIOSH** - National Institute for Occupational Safety and Health
  - NIOSH Respirator Decision Logic (May 1987) DHHS/NIOSH Publication No. 87-108;
  - NIOSH/EPA, AA Guide to Respiratory Protection for the Asbestos Abatement Industry EPA-560-OPTS-86-001 (September 1986);
  - 42 CFR 84, NIOSH Standard for Certification of Non-Powered Air Purifying Respirator filters;
  - 30 CFR 11, NIOSH - Certification of Respirators
6. **MSHA** - Mine Safety and Health Administration

## 1.5 SUBMITTALS:

- A. **Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal is returned for unrestricted use.
  1. **Product Data:** Submit manufacturer's product information for each component used, including NIOSH and MSHA Certifications for each component in an assembly and/or for entire assembly.
  2. **System Diagram:** When a supplied air respiratory system is required by the work, submit drawing showing assembly of components into a complete supplied air respiratory system. Include diagram showing location of compressor, filter banks, backup air supply tanks, hose line connections in Work Area(s), routing of air lines to Work Area(s) from compressor.
  3. **Operating Instruction:** Submit complete operating and maintenance instructions for all components and systems as a whole. Submittal is to be in bound manual form suitable for field use.
  4. **Respiratory Protection Program:** Submit Contractor's written respiratory protection program manual as required by OSHA 1926.1101.
  5. **Initial Exposure Assessment:** Submit level of respiratory protection intended for each operation required by the project. Base this selection on an Initial Exposure Assessment as required by OSHA 29 CFR 1926.1101. Submit information to support this "Initial Exposure Assessment" on the form included at the end of this Section.

- a. Submit data from exposure monitoring for the PEL and EL from prior asbestos jobs within 12 months;
  - b. Submit monitoring and analysis that were performed in compliance with the OSHA asbestos standard in effect;
  - c. Submit data that was obtained under workplace conditions "closely resembling" those that will exist during the Work;
  - d. Submit data from past asbestos jobs where the type of asbestos abatement and other work, material, control methods, work practices, and environmental conditions closely resemble those that will exist during the Work;
  - e. Submit exposure data from prior asbestos jobs where the work that was conducted by employees whose training and experience are no more extensive than that of employees performing the current job;
  - f. Based on the exposure data from the previous asbestos jobs, select respiratory protection for the Work that will, to a high degree of certainty, prevent worker exposures (inside the respirator) that exceed the Permissible Exposure Limits (PEL) set forth in this Section of the specifications.
- 6. Resume information:** Submit resume and information on training for individual monitoring the operation of supplied air respiratory systems. Submit training certifications where applicable.

#### **1.6 AIR QUALITY FOR SUPPLIED AIR RESPIRATORY SYSTEMS:**

- A. Provide air** used for breathing in supplied air respiratory systems that meets or exceeds standards set for C.G.A. type 1 (Gaseous Air) Grade H or CSA Z180.1 whichever presents the more stringent quality standard:
- B. Provide air** used for breathing in supplied air respiratory systems that meets or exceeds standards set for C.G.A. type 1 (Gaseous Air) Grade D:

#### **1.7 ALLOWABLE CONTAMINANTS:**

- A. Supply air** that has an asbestos concentration no greater than outside ambient conditions.
- B. Supply air** that meets the level of contaminants allowed according to the air quality standard specified.

#### **1.8 DELIVERY:**

- A. Deliver replacement parts**, etc., not otherwise labeled by NIOSH or MSHA to job site in manufacturer's containers.

### **PART 2 - EQUIPMENT**

#### **2.1 AIR PURIFYING RESPIRATORS**

- A. Respirator Bodies:** Provide half face or full-face type respirators. Equip full face respirators with a nose cup or other anti-fogging device as would be appropriate for use in air temperatures less than 32 degrees Fahrenheit (0 degrees Celsius).

- B. Filter Cartridges:** Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos-Containing Dusts and Mists" and color coded in accordance with 42 CFR Part 84 and ANSI Z228.2. Also, additional cartridge sections may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.
- C. Non-permitted respirators.** Do not use single use, disposable or quarter face respirators.

## 2.2 SUPPLIED AIR RESPIRATOR SYSTEMS:

- A. Provide equipment** capable of producing air of the quality and volume required by the above reference standards applied to the job site conditions and crew size. Comply with provisions of this specification if more stringent than the governing standard.
- B. Facepiece and Hose:** Provide full facepiece and hose by same manufacturer that has been certified by NIOSH/MSHA as an approved Type "C" respirator assembly operating in pressure demand mode with a positive pressure facepiece.
- C. Auxiliary backup system:** In atmospheres which contain sufficient oxygen (greater than or equal to 19.5 percent oxygen) provide a pressure-demand full facepiece supplied air respirator equipped with an emergency backup HEPA filter.
- D. Escape air supply:** In atmospheres which are oxygen deficient (less than 19.5 percent oxygen) provide a pressure-demand full facepiece supplied air respirator incorporating an auxiliary self-contained breathing apparatus (SCBA) which automatically maintains an uninterrupted air supply in pressure demand mode with a positive pressure face piece.
- E. Backup air supply:** Provide a reservoir of compressed air located outside the Work Area which will automatically maintain a continuous uninterruptible source of air automatically available to each connected facepiece and hose assembly in the event of compressor shut-down, contamination of air delivered by compressor, power loss or other failure. Provide sufficient capacity in the back-up air supply to allow a minimum escape time of one-half hour times the number of connections available to the Work Area. Air requirement at each connection is the air requirement of the respirators in use plus the air requirement of an average-sized adult male engaged in moderately strenuous activity.
- F. Warning device:** Provide a warning device that will operate independently of the building's power supply. Locate so that alarm is clearly audible above the noise level produced by equipment and work procedures in use, in all parts of the Work Area and at the compressor. Connect alarm to warn of:
  - 1. Compressor shut down or other fault requiring use of backup air supply
  - 2. Carbon Monoxide (CO) levels in excess of 5 PPM/V
- G. Carbon Monoxide (CO) Monitor:** Continuously monitor and record on a strip chart recorder Carbon Monoxide (CO) levels. Place monitors in the air line between compressor and back-up air supply and between backup air supply and workers. Connect monitors so that they also sound an alarm as specified under "Warning Devices".
- H. Compressor Shut Down:** Interconnect monitors, alarms and compressor so that compressor is automatically shut down and the alarms sound if any of the following occur:

1. Carbon Monoxide (CO) concentrations exceed 5 PPM/v in the air line between the filter bank and backup air supply
  2. Compressor temperature exceeds normal operating range
- I. **Compressor Motor:** Provide a compressor driven by an electric motor. Do not use a gas or diesel engine to drive compressor. Insure that electrical supply available at the work site is adequate to energize motor.
  - J. **Compressor Location:** Locate compressor outside of building in location that will not impede access to the building, and that will not cause a nuisance by virtue of noise or fumes to occupied portions of the building.
  - K. **Air Intake:** Locate air intake remotely from any source of automobile exhaust or any exhaust from engines, motors, auxiliary generator or buildings.
  - L. **After-Cooler:** Provide an after-cooler at entry to filter system which is capable of reducing temperatures to outside ambient air temperatures.
  - M. **Self-Contained Breathing Apparatus (SCBA):** Configure system to permit the recharging of 2 hour 2260 PSI (15.58 MPa) SCBA cylinders.

## PART 3 - EXECUTION

### 3.1 GENERAL:

- A. **Respiratory Protection Program:** Comply with ANSI Z88.2 "Practices for Respiratory Protection" and OSHA 29 CFR 1910.314 and 1926.103.
- B. **Require** that respirators be used in the following circumstances:
  1. During all Class I asbestos jobs.
  2. During all Class II work where the ACM is not removed in a substantially intact state,
  3. During all Class II and III work which is not performed using wet methods.
  4. During all Class II and III asbestos jobs where the employer does not produce a "negative exposure assessment".
  5. During all Class III jobs where TSI or surfacing ACM or PACM is being disturbed.
  6. During all Class IV work performed within regulated areas where employees performing other work are required to wear respirators.
  7. During all work covered by this section where employees are exposed above the OSHA PEL (TWA, or excursion limit).
  8. In emergencies. During emergencies where the airborne asbestos fiber concentration is not known, a self-contained breathing apparatus (SCBA) must be used.
- C. **Require** that respiratory protection be used at all times that there is any possibility of disturbance of ACM whether intentional or accidental.
- D. **Require** that a respirator be worn by anyone in a Work Area at all times, regardless of activity, during a period that starts with any operation which could cause airborne fibers until the area has been cleared for re-occupancy in accordance with Section 01711.
- E. **Regardless of Airborne Fiber Levels:** Require that the minimum level of respiratory protection used be half-face air-purifying respirators with high efficiency filters.
- F. **Do not allow** the use of single-use, disposable, or quarter-face respirators for any purpose.

### 3.2 FIT TESTING:

- A. **Initial Fitting:** Provide initial fitting of respiratory protection during a respiratory protection course of training set up and administered by an individual qualified to do fit testing. Fit types and sizes of respirator to be worn by each individual. Allow an individual to use only those respirators for which training and fit testing has been provided.
- B. **On a Weekly Basis,** check the fit of each worker's respirator by having irritant smoke blown onto the respirator from a smoke tube.
- C. **Upon Each Wearing:** Require that each time an air-purifying respirator is put on it be checked for fit with a positive and negative pressure fit test in accordance with the manufacturer's instructions or ANSI Z88.2.

### 3.3 TYPE OF RESPIRATORY PROTECTION REQUIRED:

- A. **General:** After reducing airborne asbestos levels to the lowest feasible level with engineering controls and work practices, provide respiratory protection as necessary to ensure that workers are not exposed to an airborne concentration of asbestos in excess of the Specified Permissible Exposure Limits (SPEL) set forth in this Section.
- B. **Level of Respiratory Protection:** Determine the proper level of respiratory protection by dividing the expected or actual airborne fiber count in the Work Area by the "protection factors" given below. The level of respiratory protection which supplies an airborne fiber level inside the respirator, at the breathing zone of the wearer, at or below the Specified Permissible Exposure Limits (PEL) set forth in this Section is the minimum level of protection allowed.
- C. **Specific Respiratory Protection Requirements:** Provide respiratory protection as indicated below as a minimum requirement:
  - 1. **Half-face Negative Pressure Air-Purifying Respirators:** Provide half-face negative pressure air-purifying respirators during installation of Critical or Primary Barriers or other activities where there has been an Initial Exposure Assessment<sup>2</sup> that has determined that airborne asbestos fiber levels will not exceed 0.1 fiber per cubic centimeter (0.1 f/cc). Provide a PAPR where a half-face negative pressure air-purifying respirator is allowed to any worker who so requests.
  - 2. **Powered Air-Purifying Respirators (PAPR):** Provide powered air-purifying respirators (PAPR) during removal of asbestos-containing thermal system insulation (TSI) or surfacing material where there has been an Initial Exposure Assessment<sup>2</sup> that has determined that airborne asbestos fiber levels will not exceed 1.0 fiber per cubic centimeter (1.0 f/cc).
  - 3. **Type "C" Supplied-air respirators:** full facepiece pressure demand supplied air respirators are to be used by all workers engaged in the removal of thermal system insulation (TSI) or surfacing materials, or demolition of pipes, structures, or equipment covered or insulated with asbestos, or in the removal or demolition of asbestos insulation or coverings, or any other activity which results in or may result in airborne asbestos fiber levels above 1.0 fibers per cubic centimeter (1.0 f/cc).

- D. **Provide** a full facepiece supplied air respirator operated in the pressure demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus for all workers within a regulated area where Class I work is being performed and for which an initial exposure assessment has not been produced. After an initial exposure assessment is made, use the level of respiratory protection required by that assessment and requirements of this specification and the OSHA Asbestos Construction Standard 29 CFR 1926.1101.

**3.4 SPECIFIED PERMISSIBLE EXPOSURE LIMITS (SPEL):**

- A. **Specified Permissible Exposure Limits (SPEL):** Ensure that no worker is exposed to an airborne concentration of asbestos in excess of the Time-Weighted Average (TWA) limit, and Excursion Limit (EL) set forth below.
  - 1. **Time Weighted Average (TWA) limit** - Concentration of airborne asbestos fibers to which any worker may be exposed as an eight (8) hour time-weighted average (TWA) shall not exceed the following.
    - a. 0.1 fibers per cubic centimeter
    - b. 0.01 fibers per cubic centimeter
  - 2. **Excursion Limit (EL)** - Concentration of airborne asbestos fibers to which any worker may be exposed as averaged over a sampling period of thirty (30) minutes shall not exceed the following.
    - a. 1.0 fibers per cubic centimeter.
- B. **Fibers:** For purposes of this section, fibers are defined as all fibers regardless of composition as counted in the OSHA Reference Method (ORM), or NIOSH 7400 procedure.
  - 1. **Electron Microscopy:** If Electron Microscopy is used to determine airborne fiber levels, only asbestos fibers will be enumerated, but fibers of any size detected by the testing of Section 01711 Project Decontamination will be counted.

**3.5 RESPIRATORY PROTECTION FACTOR:**

<b>A. Respirator Type</b>	<b>Protection Factor</b>
<ul style="list-style-type: none"> <li>a <b>Air purifying:</b> Negative pressure respirator High efficiency filter Half facepiece</li> </ul>	10
<ul style="list-style-type: none"> <li>a <b>Air purifying:</b> Negative pressure respirator High efficiency filter</li> </ul>	50

	Full facepiece	
<b>a</b>	<b>Powered Air Purifying (PAPR):</b> Positive pressure respirator High efficiency filter Half facepiece	50
<b>a</b>	<b>Powered air-purifying respirator</b> equipped with high efficiency filters or any supplied air respirator operated in continuous flow mode. Full facepiece	100
<b>a</b>	<b>Supplied air:</b> Positive pressure respirator Pressure demand or other positive pressure mode Full facepiece Equipped with an auxiliary HEPA cartridge or positive pressure Self-contained breathing apparatus (SCBA) for escape	1,000

### 3.6 AIR PURIFYING RESPIRATORS:

- A. Negative pressure - half or full-face mask:** Supply a sufficient quantity of respirator filters approved for asbestos, so that workers can change filters during the work day. Require that respirators be wet-rinsed, and filters discarded, each time a worker leaves the Work Area. Require that new filters be installed each time a worker re-enters the Work Area. Store respirators and filters at the job site in the changing room and protect totally from exposure to asbestos prior to their use.
- B. Powered air purifying - half or full-face mask:** Supply a sufficient quantity of high efficiency respirator filters approved for asbestos so that workers can change filters at any time that flow through the face piece decreases to the level at which the manufacturer recommends filter replacement. Require that regardless of flow, filter cartridges be replaced after 40 hours of use. Require that HEPA elements in filter cartridges be protected from wetting during showering. Require entire exterior housing of respirator, including blower unit, filter cartridges, hoses, battery pack, face mask, belt, and cords, and be washed each time a worker leaves the Work Area. Caution should be used to avoid shorting battery pack during washing. Provide an extra battery pack for each respirator so that one can be charging while one is in use.

### 3.7 SUPPLIED AIR RESPIRATOR:

- A. Air Systems Monitor:** Continuously monitor the air system operation including compressor operation, filter system operation, backup air capacity and all warning and monitoring devices at all times that system is in operation.

**END OF SECTION - 01562**

## SECTION 01563 - DECONTAMINATION UNITS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

#### 1.2 DESCRIPTION OF WORK:

- A. **Provide separate Personnel and Equipment Decontamination facilities.** Require that the Personnel Decontamination Unit be the only means of ingress and egress for the Work Area. Require that all materials exit the Work Area through the Equipment Decontamination Unit.

#### 1.3 RELATED WORK SPECIFIED ELSEWHERE:

- A. **Refer to Section 01503 Temporary Facilities - Asbestos Abatement** for electrical requirements and requirements relative to connection of decontamination facilities to building systems such as water, sewer, and electrical.

#### 1.4 SUBMITTALS

- A. **Before the Start of Work:** Submit the following to the Designer for review. Do not begin work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use or final-but-restricted use.
  1. Personnel Decontamination Unit: Provide shop drawing showing location and assembly of personnel decontamination units.
  2. Equipment Decontamination Unit: Provide shop drawing showing location and assembly of equipment decontamination units.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. **Polyethylene Sheet:** A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil (0.15 mm) thick, clear, frosted, or black as indicated.
- B. **Polyethylene Sheet:** Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick, frosted or black as indicated.
- C. **Reinforced Polyethylene Sheet:** Where plastic sheet is the only separation between the Work Area and building exterior, provide translucent, nylon reinforced, laminated, flame resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant

Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick, frosted or black as indicated.

- D. Duct Tape:** Provide duct tape in 2 inch or 3 inch (51mm or 76 mm) widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
- E. Spray Adhesive:** Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
- F. Shower Pan:** Provide one-piece waterproof shower pan 4 feet x 8 feet x 6 inches deep (102 mm X 204 mm x 152 mm deep). Fabricate from seamless fiberglass minimum 1/16 inch (1.59 mm) thick reinforced with wood, 18 ga. stainless or galvanized steel with welded seems, copper or lead with soldered seams, or a seamless liner of minimum 60 mil (1.5 mm) thick elastomeric membrane.
- G. Shower Walls:** Provide 8 feet (2.44 m) long by approximately 7 feet (2.13 m) high walls fabricated from rigid, impervious, waterproof material, either corrugated fiberglass roofing or equivalent. Structurally support as necessary for stability.
- H. Shower Head and Controls:** Provide a factory-made shower head producing a spray of water which can be adjusted for spray size and intensity. Feed shower with water mixed from hot and cold supply lines. Arrange so that control of water temperature, flow rate, and shut off is from inside shower without outside aid.
- I. Filters:** Provide cascaded filter units on drain lines from showers or any other water source carrying asbestos-contaminated water from the Work Area. Provide units with disposable filter elements as indicated below. Connect so that discharged water passes primary filter and output of primary filter passes through secondary filter.
  - 1. Primary Filter - Passes particles 20 microns and smaller
  - 2. Secondary Filter - Passes particles 5 microns and smaller
- J. Hose Bib:** Provide heavy bronze angle type with wheel handle, vacuum breaker, and 3/4 inch (19.05 mm) National Standard male hose outlet.
- K. Shower Stall:** For Wash Down Station provide leak tight shower enclosure with integrated drain pan fabricated from fiberglass or other durable waterproof material, approximately 3 feet x 3 feet (0.91m x 0.91 m) square with minimum 6 feet (1.83 m) high sides and back. Structurally support as necessary for stability. Equip with hose bib, as specified in this section, mounted at approximately 4 feet (1.22 m) above drain pan. Connect drain to a reservoir, pump water from reservoir through filters to a drain or store and use for amended water. Mount filters inside shower stall on back wall beneath hose bib.
- L. Elastomeric membrane:** Provide uniform flat sheets of flexible sheet roofing material fabricated from EPDM (ethylene propylene diene monomers) or Neoprene (polychloroprene), in a nominal 45 mil (1.14 mm) thickness.
- M. Lumber:** Provide kiln dried lumber of any grade or species.
- N. Sump Pump:** Provide totally submersible waterproof sump pump with integral float switch. Provide unit sized to pump 2 times the flow capacity of all showers or hoses supplying water to the sump, through the filters specified herein when they are loaded to the extent that replacement is required. Provide unit capable of pumping debris, sand, plaster or other materials washed off during decontamination procedures without damage to mechanism of pump. Adjust float switch so that a minimum of 3 inch (76 mm) remains between top of liquid and top of sump pan.

### **PART 3 - EXECUTION**

### 3.1 PERSONNEL DECONTAMINATION UNIT:

- A. Provide a Personnel Decontamination Unit** consisting of a serial arrangement of connected rooms or spaces, Changing Room, Drying Room, Shower Room, and Equipment Room. Require all persons without exception to pass through this Decontamination Unit for entry into and exiting from the Work Area for any purpose. Do not allow parallel routes for entry or exit. Do not remove equipment or materials through Personnel Decontamination Unit. Provide temporary lighting within Decontamination Units as necessary to reach a lighting level of 100 foot candles (1076 lumens / sq. meter).
- B. Changing Room (clean room):** Provide a room that is physically and visually separated from the rest of the building for the purpose of changing into protective clothing.
1. Construct using polyethylene sheeting, at least 6 mil (0.15 mm) in thickness, to provide an airtight seal between the Changing Room and the rest of the building.
  2. Locate so that access to Work Area from Changing Room is through Shower Room.
  3. Separate Changing Room from the building by a sheet plastic flapped doorway.
  4. Require workers to remove all street clothes in this room, dress in clean, disposable coveralls, and don respiratory protection equipment. Do not allow asbestos-contaminated items to enter this room. Require Workers to enter this room either from outside the structure dressed in street clothes, or naked from the showers.
  5. An existing room may be utilized as the Changing Room if it is suitably located and of a configuration whereby workers may enter the Changing Room directly from the Shower Room. Protect all surfaces of room with sheet plastic as set forth in Section 01526 Temporary Enclosures. Authorization for this must be obtained from the Designer in writing prior to start of construction. Submit written request in accordance with Section 01632 "Substitutions" detailing layout and protective measures proposed.
  6. Maintain floor of changing room dry and clean at all times. Do not allow overflow water from shower to wet floor in changing room.
  7. Damp wipe all surfaces twice after each shift change with a disinfectant solution.
  8. Provide posted information for all emergency phone numbers and procedures.
  9. Provide 1 storage locker per employee.
  10. Provide all other components indicated on the contract drawings.
- C. Airlock:** Provide an airlock between Drying Room and Changing Room. This is a transit area for workers.
1. Separate this room from Drying Room and Changing Room by sheet plastic flapped doorways.
  2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
  3. Separate this room from the Drying and Changing Rooms with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.

**D. Drying Room:** Provide a drying room as an airlock and a place for workers to dry after showering.

1. Construct room by providing a pan continuous with or draining to Shower Room pan. Install a freely draining wooden or non-skid metal floor in pan at elevation of top of pan.
2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
3. Separate this room from the Changing Room and Shower Room with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
4. Separate from Changing Room by a sheet plastic flapped doorway.
5. Provide a continuously adequate supply of disposable bath towels.
6. Provide a rigid, tight-sealing hinged door between Drying Room and Clean Room. Arrange so that there is a sensible movement of air from clean room through breathing zone of worker in Shower and Drying Room toward Equipment Room.

**E. Shower Room:** Provide a completely watertight operational shower to be used for transit by cleanly dressed workers heading for the Work Area from the Changing Room, or for showering by workers headed out of the Work Area after undressing in the Equipment Room.

1. Construct room by providing a shower pan and 2 shower walls in a configuration that will cause water running down walls to drip into pan. Install a freely draining wooden floor in shower pan at elevation of top of pan.
2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
3. Separate this room from the Drying Room and Airlock with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
4. Provide splash proof entrances to Drying Room and Airlock with doors arranged in the following configuration:
  - a. At each entrance to the Shower Room construct a door frame out of nominal 2 inch x 4 inch (51 mm X 102 mm) lumber with 1-1/2 inch (39 mm) jambs (sides) and 1-1/2 inch (39 mm) head (top) and sill (bottom). Attach to this door frame two overlapping flaps of elastomeric membrane material, fastened at the head (top) and jambs (sides) (by clamping between a 1-1/2 inch (39 mm) x 3/4 inch (19mm) batten and frame). Overlap the flaps a minimum of 6 inch (152 mm) in a direction that presents a shingle-like configuration to the water stream from the shower. Overlap sill (bottom) by 1-1/2 inch (39 mm) minimum. Arrange so that any air movement out of the Work Area will cause the flaps to seal against the door frame.
5. Provide shower head and controls.
6. Provide temporary extensions of existing hot and cold water and drainage, as necessary for a complete and operable shower.
7. Provide a soap dish and a continuously adequate supply of soap and maintain in sanitary condition.

8. Arrange so that water from showering does not splash into the Changing or Equipment Rooms.
  9. Arrange water shut off and drain pump operation controls so that a single individual can shower without assistance from either inside or outside of the Work Area.
  10. Provide flexible hose shower head.
  11. Pump wastewater to drain or to storage for use in amended water. If pumped to drain, provide 20 micron and 5 micron waste water filters in line to drain or waste water storage. Change filters daily or more often if necessary. Locate filters inside shower unit so that water lost during filter changes is caught by shower pan.
  12. Provide hose bib.
  13. Provide all other items indicated on contract drawings.
- F. Airlock:** Provide an airlock between Shower Room and Equipment Room. This is a transit area for workers. Separate this room from Equipment Room by a sheet plastic flap doorway.
1. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
  2. Separate this room from the Equipment Room and Shower Room with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
  3. Separate from Equipment Room by a sheet plastic flapped doorway.
- G. Equipment Room (contaminated area):** Require work equipment, footwear and additional contaminated work clothing to be left here. This is a change and transit area for workers.
1. Separate this room from the Work Area by a 6 mil (0.15 mm) polyethylene flapped doorway.
  2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
  3. Separate this room from the Shower Room and Work Area with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
  4. Provide a drop cloth layer of sheet plastic on floor in the Equipment Room for every shift change expected. Roll drop cloth layer of plastic from Equipment Room into Work Area after each shift change. Replace before next shift change. Provide a minimum of two (2) layers of plastic at all times. Use only clear plastic to cover floors.
- H. Airlock:** Provide an airlock between Equipment Room and Work Area. This is a transit area for workers.
1. Separate this room from Equipment Room and Work Area by a sheet plastic flapped doorway.
  2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
  3. Separate this room from the Equipment Room and Work Area with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.

- I. **Work Area:** Separate Work Area from the Equipment Room by polyethylene barriers. If the airborne asbestos level in the Work Area is expected to be high, as in dry removal, add an intermediate cleaning space between the Equipment Room and the Work Area. Damp wipe clean all surfaces after each shift change. Provide one additional floor layer of 6 mil (0.15 mm) polyethylene per shift change and remove contaminated layer after each shift.
- J. **Decontamination Sequence:** Require that all workers adhere to the following sequence when entering or leaving the Work Area.
  - 1. Entering Work Area: Worker enters Changing Room and removes street clothing, puts on clean disposable overalls and respirator, and passes through the Shower Room into the Equipment Room.
  - 2. Any additional clothing and equipment left in Equipment Room needed by the worker are put on in the Equipment Room.
  - 3. Worker proceeds to Work Area.
- K. **Exiting Work Area:**
  - 1. Before leaving the Work Area, require the worker to remove all gross contamination and debris from overalls and feet.
  - 2. The worker then proceeds to the Equipment Room and removes all clothing except respiratory protection equipment.
  - 3. Extra work clothing such as boots, hard hats, goggles, and gloves are to be stored in contaminated end of the Equipment Room.
  - 4. Disposable coveralls are placed in a bag for disposal with other material.
  - 5. Require that Decontamination procedures found in Section 01560 be followed by all individuals leaving the Work Area.
  - 6. After showering, the worker moves to the Changing Room and dresses in either new coveralls for another entry or street clothes if leaving.

### 3.2 EQUIPMENT DECONTAMINATION UNIT:

- A. **Provide an Equipment Decontamination Unit** consisting of a serial arrangement of rooms, Clean Room, Holding Room, Wash Room for removal of equipment and material from Work Area. Do not allow personnel to enter or exit Work Area through Equipment Decontamination Unit.
- B. **Arrange with airlocks** between rooms as required below.
- C. **Wash Down Station:** Provide an enclosed Shower Unit located in Work Area just outside Wash Room as an equipment, bag and container cleaning station.
  - 1. Fabricate waterproof floor extending 6 feet (1.83 m) beyond Wash Down station in all directions. Install seamless waterproof membrane over area and extend over curbs on all four sides. Form curbs from 2 inch x 4 inch (51 X 102 mm) lumber laid on the flat.

2. Waterproof membrane is to be fabricated from elastomeric membrane.
  3. Waterproof membrane is to be fabricated from minimum 10 mil (.254 mm) polyethylene.
  4. Do not allow water to collect on waterproof membrane. Remove continuously with a wet vacuum or mops.
- D. Wash Room:** provide wash room for cleaning of bagged or containerized asbestos-containing waste materials passed from the Work Area.
1. Construct wash room of nominal 2 inch x 4 inch (51 X 102 mm) wood framing and polyethylene sheeting, at least 6 mil (0.15 mm) in thickness and located so that packaged materials, after being wiped clean, can be passed to the Holding Room.
  2. Separate this room from the Work Area by a single flapped door of 6 mil (0.15 mm) polyethylene sheeting.
  3. Provide a drop cloth layer of plastic on floor in the Wash Room for every load-out operation. Roll this drop cloth layer of plastic from Wash Room into Work Area after each load-out. Provide a minimum of two (2) layers of plastic at all times. Use only clear plastic to cover floors.
- E. Airlock:** Provide an airlock between Wash Room and Holding Room. This is a transit area.
1. Separate this room from adjacent spaces by a sheet plastic flapped doorway.
  2. Separate this room from the rest of the building and adjacent spaces with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
- F. Holding Room:** Provide Holding Room as a drop location for bagged asbestos-containing materials passed from the Wash Room. Construct Holding Room of nominal 2 inch x 4 inch (51 X 102 mm) wood framing and polyethylene sheeting, at least 6 mil (0.15 mm) in thickness and located so that bagged materials cannot be passed from the Wash Room through the Holding Room to the Clean Room.
1. Separate this room from the adjacent rooms by flapped doors fabricated from 1/16 inch (1.59 mm) +/- thick single ply elastomeric membrane material either EPDM or Neoprene.
  2. Separate this room from the adjacent rooms by flap doors fabricated from 6 mil (0.15 mm) sheet plastic.
- G. Airlock:** Provide an airlock between Holding Room and Clean Room. This is a transit area.
1. Separate this room from adjacent spaces by a sheet plastic flap doorway.
  2. Separate this room from the rest of the building and adjacent spaces with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.

- H. Clean Room:** provide Clean Room to isolate the Holding Room from the building exterior. If possible, locate to provide direct access to the Holding Room from the building exterior.
1. Erect Critical and Primary Barriers as described in Section 01526 "Temporary Enclosures" in an existing space. If no space exists construct Clean Room of 2 x 4 (51 X 102 mm) wood framing and polyethylene sheeting, at least 6 mil (0.15 mm) in thickness.
  2. Separate this room from the exterior by a single flap door of 6 mil (0.15 mm) polyethylene sheeting.
- I. Load-out Area:** The load-out area is the transfer area from the building to a truck or dumpster. It may be the Clean Room of the Equipment Decontamination unit or a separate room or loading dock area. Erect Critical and Primary barriers as described in Section 01526 "Temporary Enclosures" in load-out area.
1. During transfer of material from load-out area erect primary barriers as described in Section 01526 "Temporary Enclosures" as necessary to seal path from load-out area to truck or dumpster.
- J. Decontamination Sequence:** Take all equipment or material from the Work Area through the Equipment Decontamination Unit according to the following procedure:
1. At washdown station, thoroughly wet clean contaminated equipment or sealed polyethylene bags and pass into Wash Room.
  2. When passing equipment or containers into the Wash Room, close all doorways of the Equipment Decontamination Unit, other than the doorway between the Washdown Station and the Wash Room. Keep all outside personnel clear of the Equipment Decontamination Unit.
  3. Once inside the washroom, wet clean the bags and/or equipment.
  4. When cleaning is complete pass items into Holding Room. Close all doorways except the doorway between the Holding room and the Clean Room.
  5. Workers from the building exterior enter Holding Area and remove decontaminated equipment and/or containers for disposal.
  6. Require these workers to wear full protective clothing and appropriate respiratory protection.
  7. At no time is a worker from an uncontaminated area to enter the enclosure when a removal worker is inside.

### 3.3 CONSTRUCTION OF THE DECONTAMINATION UNITS:

- A. Walls and Ceiling:** Construct airtight walls and ceiling using polyethylene sheeting, at least 6 mil (0.15 mm) in thickness. Attach to existing building components or a temporary framework.
- B. Floors:** Use 2 layers (minimum) of 6 mil (0.15 mm) polyethylene sheeting to cover floors in all areas of the Decontamination Units. Use only clear plastic to cover floors.

- C. **Flap Doors:** Fabricated from three (3) overlapping sheets with openings a minimum of three feet (3') (0.91 meters) wide. Configure so that sheeting overlaps adjacent surfaces. Weights at bottom of sheets as required so that they quickly close after being released. Put arrows on sheets to indicate direction of overlap and/or travel. Provide a minimum of six feet (6') (1.22 meters) between entrance and exit of any room. Provide a minimum of three feet (3') (0.91 meters) between doors to airlocks.
- D. **If the Decontamination area** is located within an area containing friable asbestos on overhead ceilings, ducts, piping, etc., provide the area with a minimum 1/4 inch (6.4 mm) hardboard or 1/2 inch (12.7 mm) plywood "ceiling" with polyethylene sheeting, at least 6 mil (0.15 mm) in thickness covering the top of the "ceiling".
- E. **Visual Barrier:** Where the Decontamination area is immediately adjacent to and within view of occupied areas, provide a visual barrier of opaque polyethylene sheeting at least 6 mil (0.15 mm) in thickness so that worker privacy is maintained, and work procedures are not visible to building occupants. Where the area adjacent to the Decontamination area is accessible to the public, construct a solid barrier on the public side of the sheeting to protect the sheeting. Construct barrier with wood or metal studs covered with minimum 1/4-inch (6.4 mm) thick hardboard or 1/2 inch (12.7 mm) plywood. Where the solid barrier is provided, sheeting need not be opaque.
- F. **Alternate methods** of providing Decontamination facilities may be submitted to the Designer for approval. Do not proceed with any such method(s) without written authorization of the Designer.
- G. **Electrical:** Provide subpanel at Changing Room to accommodate all removal equipment. Power subpanel directly from a building electrical panel.
  - 2a Connect all electrical branch circuits in Decontamination unit and particularly any pumps in shower room to a ground-fault circuit protection device.

### 3.4 CLEANING OF DECONTAMINATION UNITS:

- A. **Clean debris and residue** from inside of Decontamination Units on a daily basis or as otherwise indicated on Contract Drawings. Damp wipe or hose down all surfaces after each shift change. Clean debris from shower pans on a daily basis.
- B. **If the Changing Room** of the Personnel Decontamination Unit becomes contaminated with asbestos-containing debris, abandon the entire Decontamination Unit and erect a new Decontamination Unit. Use the former Changing Room as an inner section of the new Equipment Room.

### 3.5 SIGNS:

- A. **Post** an approximately 20 inches by 14 inch (508 mm x 356 mm) manufactured caution sign at each entrance to the Work Area displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

**3a** Provide signs in both English and Spanish.

**4a** Legend:

DANGER

ASBESTOS

CANCER AND LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL ONLY

RESPIRATORS AND PROTECTIVE CLOTHING  
ARE REQUIRED IN THIS AREA

**5a** Provide spacing between respective lines at least equal to the height of the respective upper line.

**B. Post** an approximately 10 inches by 14 (254 mm x 356 mm) inch manufactured sign at each entrance to each Work Area displaying the following legend with letter sizes and styles of a visibility at least equal to the following:

**6a** Provide signs in both English and Spanish.

**7a Legend**

**Notation**

NO FOOD, BEVERAGES OR TOBACCO PERMITTED 3/4 inch (19 mm) Block

ALL PERSONS SHALL DON PROTECTIVE CLOTHING (COVERINGS) BEFORE ENTERING THE WORK AREA 3/4 inch(19 mm) Block

ALL PERSONS SHALL SHOWER IMMEDIATELY AFTER LEAVING WORK AREA AND BEFORE ENTERING THE CHANGING AREA 3/4 inch (19 mm) Block

**END OF SECTION – 01563**

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## **SECTION 01711 - PROJECT DECONTAMINATION**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS:**

**1.1.1** Drawings and General Conditions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to Work of this Section.

#### **1.2 DESCRIPTION OF REQUIREMENTS**

**1.2.1 General:** Decontamination of the Work Area following asbestos abatement. The decontamination procedure is a multi-step procedure requiring at least two cleanings of the Work Area primary barrier walls, ceilings, and plastic as applicable to remove contamination, thus preventing contamination of the building when the Work Area isolation barriers are removed.

#### **1.3 RELATED WORK SPECIFIED ELSEWHERE**

**1.3.1 Removal of Gross Debris** is integral with the performance of abatement work and as such is specified in Section 02081 Removal of Asbestos-Containing Material.

**1.3.2 Work Area Clearance** and other requirements must be met before release of the Contractor and re-occupancy of the Work Area as specified in Section 01714 Work Area Clearance.

#### **1.4 SUBMITTALS**

**1.4.1 Submittals required** are outlined in Section 01301 Submittals – Asbestos Abatement

- A. Work of This Section** includes the decontamination of air in the Work Area which has been, or may have been, contaminated by the elevated airborne asbestos fiber levels generated during abatement activities, or which may previously have had elevated fiber levels due to friable asbestos-containing materials (ACM) in the space.
- B. Work of This Section** includes the cleaning, and decontamination of all surfaces (ceiling, walls, and floor) of the Work Area, and all furniture or equipment in the Work Area.

### **PART 2 – PRODUCTS**

**2.1 Cleaning rags:** Cloth rags are to be used during the project decontamination sequence. Paper towels are prohibited for project decontamination.

### **PART 3 – EXECUTION**

### 3.1 GENERAL

#### 3.1.1 Work of This Section includes the following:

- a. **Decontamination of air in the Work Area** which has been, or may have been, contaminated by the elevated airborne asbestos fiber levels generated during abatement activities, or which may previously have had elevated fiber levels due to friable asbestos-containing materials (ACM) in the space.
- b. **Cleaning, decontamination, and removal of temporary facilities** installed prior to abatement work, including:
  - i. **Primary** and critical barriers erected by work of Section 01526
  - ii. Decontamination Unit erected by work of Section O 1563
  - iii. **Pressure** differential system installed by work of Section 01513
- c. **Cleaning, and decontamination of all surfaces** (ceiling, walls, floor) of the Work Area, and all furniture or equipment in the Work Area.

### 3.2 START OF WORK

**3.2.1 Previous Work:** During completion of the asbestos abatement work specified in other sections, the secondary barrier of polyethylene sheeting will have been removed and disposed of along with any gross debris generated by the asbestos abatement work.

**3.2.2 Visual inspection:** Perform visual inspections of the work area along with the Air Monitoring Specialist and/or the Owner's Representative at each step of the decontamination process.

**3.2.3 Start of Work:** Work of this section begins with the cleaning of the primary barrier. At the start of work, the following will be in place:

- a. **Primary Barrier:** One layer of polyethylene sheeting on floor, ceiling, and walls.
- b. **Critical Barrier:** An airtight barrier between the Work Area and other portions of the building or the outside.
- c. **Critical Barrier Sheeting:** Over lighting fixtures and clocks, ventilation openings, doorways, convectors, speakers and other openings.
- d. **Decontamination Units:** For personnel, equipment, and waste in operating condition.
- e. **Pressure Differential System:** In operation.

### 3.3 FIRST CLEANING

**3.3.1 First Cleaning:** Carry out a first cleaning of all surfaces of the Work Area including remaining sheeting, tools, scaffolding and/or staging by use of damp-cleaning and mopping, and/or a High Efficiency Particulate Air (HEPA) filtered vacuum. (Note: A HEPA vacuum may fail if used with wet

material.) Do not perform dry dusting or dry sweeping. Use each surface of a cleaning cloth one time only and then dispose of as contaminated waste. Continue this cleaning until there is no visible debris from removed materials or residue on plastic sheeting or other surfaces.

**NOTE: WD-40, petroleum, or paraffin-based solutions are prohibited for cleaning any surface in the Work Area.**

**3.3.2 Remove all filters in air handling system(s)** and dispose of as asbestos- containing waste in accordance with requirements of Section 02084 Disposal of Regulated Asbestos-Containing Material.

**3.3.3 Visual Inspection: The Contractor, Air Monitoring Specialist, and Owner's Representative** will conduct a visual inspection verifying that all debris and residue has been removed from the walls, ceilings, and sheet plastic following the first cleaning. If any debris, residue, dust or other matter is found, repeat first cleaning and continue the decontamination procedure from that point.

- a. Temporary lighting: Provide a minimum of 100-foot candles of lighting on all surfaces in the areas to be subjected to visual inspection. Provide handheld lights providing 150-foot candles at 4 feet capable of reaching all locations in work area.**
- b. Lifts: Provide ladders, scaffolding and lifts as required to provide access to all surfaces in the area to be subjected to visual inspection.**

### **3.4 FINAL CLEANING**

**3.4.1 Final Cleaning:** Carry out a final cleaning of all surfaces in the Work Area in the same manner as the previous cleaning.

**3.4.2 Final Visual Inspection: The Contractor, Air Monitoring Specialist, and Owner's Representative** will perform a complete visual inspection of the entire Work Area including: all surfaces, ceiling, walls, floor, decontamination unit, all plastic sheeting, seals over ventilation openings, doorways, windows, and other openings. Lighting and lifts will be provided as outlined above. Look for debris from any source, residue on surfaces, dust or other matter. If any debris, residue, dust or other matter is found repeat final cleaning and continue decontamination procedure from that point. When the area is visually clean, complete the certification at the end of this section. Visual inspection is not complete until confirmed in writing, on the certification, by the Owner's Representative and/or the Air Monitoring Specialist.

### **3.5 LOCKDOWN**

**3.5.1 Lockdown of Substrate:** Lockdown is not required but the Contractor has the option to apply an approved encapsulant as a lockdown material to the decontaminated substrate after

passing a final visual inspection. If the Contractor intends to utilize lockdown procedures, it is recommended that the Contractor notify CDPHE/APCD of this intended procedure on the Emissions Permit application for their review and approval. Maintain pressure differential system in operation during lockdown procedures. Perform work only after receiving a final visual inspection signed certificate from the Owner's Representative and/or Air Monitoring Specialist.

### **3.6 AIR CHANGES**

**3.6.1 Following Lockdown (if applicable) and prior to Clearance Air Sampling, wait 96 Air Changes** to allow HEPA-filtered fan units to clean the air of airborne asbestos fibers. Use oscillating fans as necessary to assure circulation of air in all parts of Work Areas during this period. Maintain pressure differential system in operation for the entire period.

### **3.7 CLEARANCE AIR SAMPLING BY OWNER**

**3.7.1 Aggressive clearance air monitoring** will be conducted by the Owner as outlined in Section 01714 Work Area Clearance.

**3.7.2 Method:** The Owner's Representative will determine the appropriate clearance sample method to use based on regulatory requirements and building conditions.

- a. Phase Contrast Microscopy (PCM): After the Work Area is found to be visually clean, air samples will be collected and analyzed by the Owner in accordance with the procedure for Phase Contrast Microscopy set forth in Part 1 of this section.
  - i. If release criteria are not met, repeat final cleaning and continue decontamination procedure from that point.
  - ii. If release criteria are met, remove Work Area isolation in accordance with requirements of this section.
- b. Transmission Electron Microscopy (TEM): After the Work Area is found to be visually clean, TEM air samples will be collected and analyzed by the Owner in accordance with the procedure for Transmission Electron Microscopy set forth in Part 1 of this section.
  - i. If release criteria are not met, repeat final cleaning and continue decontamination procedure from that point.
  - ii. If release criteria are met, remove Work Area isolation in accordance with requirements of this section.

### **3.7 REMOVAL OF WORK AREA ISOLATION**

**3.7.1 After all requirements of this section and Section 01714 Work Area Clearance** have been met:

- a. Shut down and remove the pressure differential system. Seal HEPA-filtered fan units, HEPA vacuums and similar equipment with 6-mil polyethylene sheet and duct tape to form a tight seal at intake end before being moved from Work Area.
- b. Remove Personnel Decontamination Unit.
- c. Remove the critical barriers separating the Work Area from the rest of the building. Remove any small quantities of residual material found upon removal of the plastic

sheeting with wet wiping, HEPA-filtered vacuum cleaners and local area protection. If significant quantities, as determined by the Owner's Representative, are found then the entire area affected shall be decontaminated.

- d. Remove all equipment, materials, debris from the work site.
- e. Dispose of all asbestos-containing waste material as specified in Section 02084 Disposal of Regulated Asbestos-Containing Material.

### **3.8 SUBSTANTIAL COMPLETION OF ABATEMENT WORK**

**3.8.1 Asbestos abatement work is substantially complete** upon meeting the requirements of this section including submission of:

- a. Certificate of Visual Inspection
- b. Receipts documenting proper disposal as required by Section 02084 Disposal of Regulated Asbestos-Containing Material.
- c. Punch list detailing repairs to be made and incomplete items.
- d. Receipt of submittals as required in Section 01301 Submittals - Asbestos

Abatement.

### **3.9 CERTIFICATE OF VISUAL INSPECTION**

**3.9.1 Following this section is a "Certificate of Visual Inspection."** This certification is to be completed by the Contractor and certified by the Owner's Representative and/or Air Monitoring Specialist. Submit completed certificate as part of the closeout documents.

**END OF SECTION 01711**

**CERTIFICATION OF VISUAL INSPECTION**

In accordance with Section 01711 Project Decontamination the Contractor hereby certifies that he has visually inspected the Work Area (all surfaces including pipes, beams, ledges, walls, ceiling and floor, decontamination unit, sheet plastic, etc.) and has found no dust, debris or residue.

Contractor: \_\_\_\_\_

Project Name: \_\_\_\_\_

by: (Signature) \_\_\_\_\_ Date: \_\_\_\_\_

(Print Name) \_\_\_\_\_

(Print Title) \_\_\_\_\_

The Owner's Representative and/or Air Monitoring Specialist hereby certifies that he/she has accompanied the Contractor on the Contractor's visual inspection and verifies that this inspection has been thorough and to the best of their knowledge and belief, the Contractor's Certification above is a true and honest one.

**Air Monitoring Specialist:**

by: (Signature) \_\_\_\_\_ Date: \_\_\_\_\_

(Print Name) \_\_\_\_\_

(Print Title)\_ \_\_\_\_\_

**Owner's Representative:**

by:(Signature) \_\_\_\_\_ Date: \_\_\_\_\_

(Print Name) \_\_\_\_\_

(Print Title) \_\_\_\_\_

**SECTION 01714 -WORK AREA CLEARANCE  
PART 1 – GENERAL**

## 1.1 SUMMARY

**1.1.1 Not in Contract Sum:** This section describes work being performed by the Owner. This Work is not in the Contract Sum.

**1.1.2 This Section sets forth required post-abatement airborne asbestos concentrations** in the Work Area and describes testing procedures the Owner will use to measure these levels.

## 1.2 RELATED DOCUMENTS

**1.2.1** Drawings and General Conditions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to Work of this Section.

**1.2.2 Visual Inspection** is required as a prerequisite of air testing, is set forth in Section 01711 Project Decontamination - Asbestos Abatement.

## 1.3 CONTRACTOR RELEASE CRITERIA

**1.3.1 The asbestos abatement Work Area is cleared** when the Work Area is visually clean and airborne asbestos structure concentrations have been reduced to the level specified below.

## 1.4 VISUAL INSPECTION

**1.4.1 Work of this Section will not begin until** the visual inspection described in Section 01711 Project Decontamination - Asbestos Abatement is complete and has been certified by the Owner's Representative or Air Monitoring Specialist.

## 1.5 AIR MONITORING

**1.5.1 To determine if the elevated airborne asbestos structure concentration** encountered during abatement operations has been reduced to the specified level, the Owner will secure samples and analyze them according to the following procedures.

- a. **PCM and TEM samples will be secured as indicated below.**
- b. **Work Area Clearance: Upon meeting clearance requirements the work of Section 01711 Project Decontamination- Asbestos Abatement can continue.**

## 1.6 AGGRESSIVE SAMPLING

1.6.1 All Air Samples will be collected using aggressive sampling techniques as follows:

- a. Before sampling pumps are started, the exhaust from forced-air equipment (leaf blower with an approximately 1 horsepower electric motor) will be swept against all walls, ceilings, floors, ledges and other surfaces in the room. This procedure will be continued for five minutes per 1,000 cubic feet of room volume.
- b. One 20-inch diameter fan per 10,000 cubic feet of room volume will be mounted in a central location at approximately 5 feet, if feasible, above the floor, directed toward the ceiling and operated at low speed for the entire period of sample collection.
- c. Air samples will be collected in areas subject to normal air circulation away from room corners, obstructed locations, and sites near windows, doors or vents.
- d. After air sampling pumps have been shut off, fans will be shut off.

## 1.7 SCHEDULE OF AIR SAMPLES

1.7.1 **General:** The number and volume of air samples taken, and analytical methods used by the Owner will be in accordance with the following schedule. Sample volumes given may vary depending upon the analytical instruments used.

## 1.8 PHASE CONTRAST MICROSCOPY

1.8.1 **PCM analysis shall be employed for Work Area final clearance air monitoring when applicable.** In each Work Area after completion of all cleaning work, a minimum of 5 samples will

be collected, a minimum of 2 blanks submitted, and all 7 cassettes analyzed as follows:

1.8.2 **Samples will be collected on 25 mm cassettes with the following filter media:**

**PCM:** 0.8 microns mixed cellulose ester (MCE) filter in a cassette with a 50 mm conductive extension cowl.

Location Sampled	Number of Samples	Limit Value (Fibers/cc)	Approx. Volume (Liters) Minute	Rate Liters /
Each Work Area or Each Room of Work Area	5 1	0.01 0.01	<1,000 <1,000	10 10
Laboratory Blank	2	0.01	0	Do Not Open

**1.8.3 Analysis of Fibers** on each filter will be measured using the NIOSH Method 7400 entitled "Fibers" published in the NIOSH Manual of Analytical Methods. Fibers referred

to in this section include all fibers regardless of composition as counted by the phase contrast microscopy method used.

**1.8.4 Split Sample:** One Work Area sample will be split and both halves analyzed separately for duplicate analysis.

**1.8.5 Release Criteria:** Decontamination of the work site is complete when every Work Area sample is at or below the detection limit listed in the table above. If any sample is above the detection limit then the decontamination is incomplete; repeat cleaning procedures per Section 01711 Project Decontamination. The Owner shall pay for the first set of PCM samples collected and analyzed. The Contractor shall be required to pay all costs for sample collection and analysis of subsequent PCM samples if the

first

set of PCM samples fails to meet the clearance requirements specified above in each Work Area.

## 1.9 TRANSMISSION ELECTRON MICROSCOPY

**1.9.1 TEM analysis shall be employed for Work Area final clearance air monitoring when applicable.**

When TEM analysis is utilized, in each Work Area after completion of all cleaning work, a minimum of 13 samples will be submitted and analyzed as follows:

Location Sampled	Number of Samples	Analytical Sensitivity Struct/cc	Approx. Volume (Liters)	Rate Liters/Minute
Each Work Area	5	0.005	1,300-1,800	1-10
Outside Each Work Area	5	0.005	1,300-1,800	1-10
Work Area Blank	1	0.005	0	Open for 30 Seconds
Outside Blank	1	0.005	0	Open for 30 Seconds
Laboratory Blank	1	0.005	0	Do Not Open

**1.9.2 Analysis** will be performed using the analysis method set forth in the AHERA Regulation 40 CFR Part 763, Subpart E, Appendix A.

**1.9.3 Asbestos Structures** referred to in this Section include asbestos fibers, bundles, clusters or matrices, as defined by method of analysis.

**1.9.4 Release Criteria:** Decontamination of the work site is complete when the following conditions are met:

- a. **Work Area Samples are below filter background levels**
  - i. **All Work Area sample volumes are greater than 1,199 liters for a 25 mm. sampling cassette.**
  - ii. **The concentration of asbestos in each of the five Work Area Samples shall not exceed 70 structures per square millimeter of filter area per sample.**
- b. **If these conditions are not met then the decontamination is incomplete. Repeat the cleaning procedures per Section 01711 Project Decontamination. The Owner shall pay for the first set of TEM sample collection and analysis. The Contractor shall be required to pay all costs for sample collection and analysis of subsequent TEM samples if the first set of TEM samples fails to meet the clearance requirements specified above in each Work Area.**

**1.9.5 Termination of Analysis:** If the arithmetic mean (average) asbestos concentration on the blank filters exceeds 70 structures per square millimeter of filter area the analysis will cease and new samples collected.

## **1.10 LABORATORY TESTING**

**1.10.1 Phase Contrast Microscopy:** The services of a testing laboratory will be employed by the Owner to perform laboratory analysis of the air samples. A microscope and NIOSH-certified microscopist will be set up at the Project Site, or samples will be delivered daily to the testing laboratory, so that verbal reports on air samples can be obtained within 24 hours. A complete record, certified by the testing laboratory, of all air monitoring tests and results will be furnished to the Owner's Representative and the Contractor.

**1.10.2 Transmission Electron Microscopy:** Samples will be delivered for analysis by Transmission Electron Microscopy. Verbal results will normally be available within 24 hours after receipt of samples by the testing laboratory. The laboratory is capable of analyzing a maximum of 13 such samples from this Project at any one time. All Transmission Electron Microscopy results will be available to the Owner's Representative and the Contractor.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

WORK AREA CLEARANCE

01714 - 106



## SECTION 02062 - NON-ASBESTOS DEMOLITION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

#### 1.2 DESCRIPTION OF WORK:

- A. **Extent of non-asbestos selective demolition** work is indicated on drawings.
- B. **Non-Asbestos Demolition Work:** Non-asbestos demolition requires the selective removal and subsequent offsite disposal of the following non- asbestos containing installations:
  - 1. Removal of hard plaster ceilings in bathrooms to reach TSI above ceiling
  - 2. Removal of lights in ceiling tile

#### 1.3 RELATED WORK SPECIFIED ELSEWHERE:

- A. **Section 02086 Hazardous Waste Management** describes the management and disposal of hazardous waste such as PCB Ballasts, fluorescent light tubes, and mercury containing thermostats encountered during the work of this section.

#### 1.4 SUBMITTALS:

- A. **Schedule:** Submit schedule indicating proposed methods and sequence of operations for non-asbestos demolition work to Designer for review prior to commencement of work. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.
  - 1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
  - 2. Coordinate with Owner's continuing occupation of portions of existing building.

#### 1.5 JOB CONDITIONS:

- A. **Occupancy:** Owner will not be using the building during abatement
- B. **Condition of Structures:** Owner assumes no responsibility for actual condition of items or structures to be demolished.

1. Conditions existing at time of commencement of Contract will be maintained by Owner insofar as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.
- C. Partial Demolition and Removal:** Items indicated to be removed but of salvable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.
1. Storage or sale of removed items on site will not be permitted.
- D. Protections:** Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.
1. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to and from occupied portions of building.
  2. Erect temporary covered passageways as required by authorities having jurisdiction.
  3. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished, and adjacent facilities or work to remain.
  4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
  5. Protect floors with suitable coverings when necessary.
  6. Construct temporary insulated solid dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.
  7. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
  8. Remove protections at completion of work.
- E. Damages:** Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.
- F. Traffic:** Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities
1. Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- G. Explosives:** Use of explosives will not be permitted.

**H. Utility Services:** Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.

1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

**I. Environmental Controls:** Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

1. Do not use water when it may create hazardous or objectionable conditions, such as ice, flooding, or pollution.

## SECTION 02081 - REMOVAL OF ASBESTOS-CONTAINING MATERIALS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division - 1 Specification Sections, apply to work of this section.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. **Worker Protection** requirements are set forth in Section 01560 Worker Protection - Asbestos abatement.
- B. **Installation of Critical and Primary Barriers**, and Work Area Isolation Procedures are set forth in Section 01526 Temporary Enclosures.
- C. **Project Decontamination** procedures after removal of the Secondary Barrier are specified in Section 01711 Project Decontamination.
- D. **Disposal of asbestos-containing waste** is specified in Section 02084 Disposal of Regulated Asbestos-Containing Material.
- E. **Section 02086 Hazardous Waste Management** describes the management and disposal of hazardous waste such as PCB Ballasts, fluorescent light tubes, and mercury containing thermostats encountered during the work of this section.

#### 1.3 SUBMITTALS:

- A. **Before Start of Work:** Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.
  - 1. **Surfactant:** Submit product data, use instructions and recommendations from manufacturer of surfactant intended for use. Include data substantiating that material complies with requirements.
  - 2. **Lock down:** Submit product data, use instructions and recommendations from manufacturer of Lockdown intended for use. Include data substantiating that material complies with requirements.
- B. **Before Start of Work** submit the following to the Designer for review.
  - 1. **Material Safety Data Sheet:** Submit Material Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for the following:

- a. Surfactants.
- b. Encapsulants/lockdown
- c. Solvents.

## **PART 2 - PRODUCTS:**

### **2.1 MATERIALS**

- A. Wetting Materials:** For wetting prior to disturbance of ACM use either amended water or a removal encapsulant:
- B. Amended Water:** Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the ACM and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether mixed with five gallons (19 liters) of water.
- C. Polyethylene Sheet:** A single polyethylene film in the largest sheet size practicable to minimize seams, 6.0 mil (0.15 mm) thick clear, frosted, or black as indicated.
- D. Polyethylene Sheet:** Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick frosted or black as indicated.
- E. Duct Tape:** Provide duct tape in 2 inch or 3 inch (50mm or 75 mm) widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
- F. Spray Cement:** Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
- G. Disposal Bags:** Provide 6 mil (0.15 mm) thick leak-tight polyethylene bags labeled as required by Section 02084 Disposal of Regulated Asbestos Containing Material.
- H. Fiberboard Drums:** Provide heavy duty leak tight fiberboard drums with tight sealing locking metal tops.
- I. Paper board Boxes:** Provide heavy duty corrugated paper board boxes coated with plastic or wax to retard deterioration from moisture. Provide in sizes that will easily fit in disposal bags.
- J. Felt:** Standard felt approximately 1/16 inch (1.6 mm) thick and 36 inches (900 mm) to 72 inches (1800 mm) in width.

## **PART 3 - EXECUTION**

### **3.1 SECONDARY BARRIER:**

- A. Secondary Barrier:** Over the Primary Barrier, install as a drop cloth a clear 6 mil (0.15 mm) sheet plastic in all areas where asbestos removal work is to be carried out. Completely cover floor with sheet plastic. Where the work is within 10 feet (3 m) of a wall extend the Secondary Barrier up wall to ceiling. Support sheet plastic on wall with duct tape, seal top of Secondary plastic to Primary Barrier with duct tape so that debris is unable to get behind it. Provide cross strips of duct tape at wall support as necessary to support sheet plastic and prevent its falling during removal operations.
1. **Install Secondary Barrier** at the beginning of each work shift. Install only sufficient plastic for work of that shift.
  2. **Remove Secondary Barrier** at end of each work shift or as work in an area is completed. Fold plastic toward center of sheet and pack in disposal bags. Keep material on sheet continuously wet until bagged.
  3. **Install Walkways** of black 6 mil (0.15 mm) plastic between active removal areas and decontamination units to protect Primary Layer from tracked material. Install walkways at the beginning of, and remove at the end of, each work shift.

### 3.2 WORKER PROTECTION:

- A. Before beginning work** with any material for which a Material Safety Data Sheet has been submitted provide workers with the required protective equipment. Require that appropriate protective equipment be used at all times.

### 3.3 WET REMOVAL:

- A. Thoroughly wet** to satisfaction of Designer ACM to be removed prior to stripping and/or tooling to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of amended water. Saturate material sufficiently to wet to the substrate without causing excess dripping. Allow time for amended water to penetrate material thoroughly. If amended water is used, spray material repeatedly during the work process to maintain a continuously wet condition
1. **Mist work area continuously** with amended water whenever necessary to reduce airborne fiber levels.
  2. **Remove saturated ACM** in small sections from all areas. Do not allow material to dry out. As it is removed, simultaneously pack material while still wet into disposal bags. Twist neck of bags bend over and seal with minimum three wraps of duct tape. Clean outside and move to Wash Down Station adjacent to Material Decontamination Unit.
  3. **Evacuate air from disposal bags** with a HEPA filtered vacuum cleaner before sealing.
- B. Fireproofing or Architectural Finish on Scratch Coat:** Spray asbestos-containing fireproofing or architectural acoustic finish with a fine mist of amended. Allow time for amended water to saturate materials to substrate. Do not over-saturate to cause excess

dripping. Scrape materials from substrate. Remove materials in manageable quantities and control the descent to staging or floor below, if over 20 feet (6000 mm) use drop chute to contain material during descent. If using amended water, spray mist surface continuously during work process. Remove residue remaining on scratch coat after scraping using stiff nylon bristled hand brush. Use high pressure washer only with written authorization of Designer. If substrate dries before complete removal of residue re-wet with amended water.

- C. Fireproofing or Architectural Finish on Wire Lath:** Spray asbestos-containing fireproofing or architectural acoustic finish with a fine mist of amended water. Allow time for amended water to saturate material completely. Do not over-saturate to cause excess dripping. If surface of material has been painted or otherwise coated cut small holes as required and apply amended water from above. Cut wire lath into manageable sections and cut hanger wires. Roll or fold up complete with ACM and hand place in container. Do not drop on floor. After removal of lath and ACM remove any overspray on decking and structure above using stiff nylon bristled brush. Use high pressure washer only with written authorization from Designer. Use one of the following methods for containing waste.
- 1. Deposit material in corrugated paper board box.** When box is full duct tape closed and place in disposal bag.
  - 2. Direct load out specified by the Colorado State Health Department.**
  - 3. Place material directly in a steel drum.** Seal drums when full with leak tight seal. Drum is to be leak tight in any orientation.
- D. Pipe Insulation:** Component removal will be permitted by wrapping with 6 mil poly 6" beyond asbestos containing material and cutting asbestos section of piping. In locations where pipe fitting insulation is removed from pipe with straight runs insulated with fibrous glass or other non-asbestos-containing fibrous material, remove fibrous material 6" (150 mm) from the point where it contacts the asbestos-containing insulation. Use a two-worker crew for work, with one worker removing material and one worker holding the nozzle of a HEPA vacuum in the location of disturbance.

### 3.4 LOCALIZED CONTROL OF MATERIAL RELEASE:

- A. Pipe Insulation:** Component removal will be permitted by wrapping with 6 mil poly 6" beyond asbestos containing material and cutting off asbestos containing section of piping. In locations where pipe fitting insulation is removed from pipe with straight runs insulated with fibrous glass or other non-asbestos-containing fibrous material, remove fibrous material 6" (150 mm) from the point where it contacts the asbestos-containing insulation. Use a two-worker crew for work, with one worker removing material and one worker holding the nozzle of a HEPA vacuum in the location of disturbance.
- B. Material sprayed on wire lath:** Hold the nozzle from an operating HEPA filtered vacuum cleaner in the immediate vicinity of and below the work while cutting the wire lath or otherwise disturbing the ACM. Use a two-worker crew for cutting, with one worker cutting and one worker holding the HEPA vacuum nozzle.

### 3.5 LOCAL VENTILATION AND COLLECTION SYSTEM:

- A. Provide local ventilation and collection systems** as described below for each area where amosite or dry ACM is being removed or otherwise disturbed:
- 1. Provide HEPA filtered fan units in addition** to those required by section 01513, in the vicinity of the work. Arrange so that the units exhaust into the Work Area oriented in a direction away from the work. Extend a 12 inch (300 mm) diameter flexible non-collapsing duct from the intake end to a point no more than 4 feet (1200 mm) from any scraping or wire brushing activity.
  - 2. Locate intake** of duct so that air flow is horizontally and slightly downward into intake. Replace primary filters on HEPA filtered fan units at an interval of no greater than 30 minutes. Allow no more than one scraping or wire brushing activity per fan unit.
  - 3. Attach a job-built 4 feet X 4 feet** (1200 mm x 1200 mm) flared end piece on intake end of duct. Support end piece horizontally at a point 4 feet (1200 mm) below the work, so that airflow is downward into intake.

## **SECTION 02083 - DIRECT WASTE LOADOUT UNITS**

### **PART 1 - GENERAL**

Drawings and General Conditions of Contract, including General and Supplementary Conditions, and other Division 1 Specification Sections, apply to Work of this Section.

#### **1.2 RELATED WORK SPECIFIED ELSEWHERE**

**1.2.1** Installation of negative pressure differential system as described in Section 01513 Temporary Pressure Differential and Air Circulation System.

**1.2.2** Construction of Critical and Primary Barriers, and Work Area Isolation as set forth in Section 01526 Temporary Enclosures.

**1.2.3** Project Decontamination procedures are specified in Section O 1711 - Project Decontamination.

**1.2.4** Disposal of asbestos-containing waste is specified in Section 02084 -Disposal of Asbestos Containing Waste Material.

#### **1.3 SUBMITTALS**

**Before Start of Work:** Submit the following to the Owner's Environmental Services (Project Designer) Representative for review. Do not start Work until the Owner's Representative Services (Project Designer) reviews these submittals.

- a. Drawing showing the location, size, and placement of the transfer chamber and waste trailer in relation to the Work Area.
- b. Product data identifying the dimensions and construction of the waste trailer bag.

### **PART 2 – PRODUCTS**

Waste Trailer Bags: Provide a pre-manufactured waste disposal bag specifically designed for use in direct waste load out. The bag shall be approximately 29 feet long x 7 feet tall x 7 feet wide and open on one end only. Support loops shall be integrated into the bag on minimum 4 feet centers along the top of the bag. The bag will be constructed of seamless polyethylene sheets, taped polyethylene will not be permitted. The bag will be constructed as follows:

- a. Outer Bag - constructed of 3 ounce uncoated woven polypropylene
- b. Primary Bag - 6-mil thick sheet polyethylene film

- c. Secondary Bag - 6-mil thick sheet polyethylene film

**Polyethylene Sheet:** A single polyethylene film in the largest sheet size possible to minimize seams, 6-mil thick, clear, frosted, or black as required by job conditions.

**Duct Tape:** Provide duct or vinyl tape in 2-inch or 3-inch widths.

**Plywood:** Provide full sheets of  $\frac{1}{2}$ -inch thick CDX plywood in good condition for the construction of the transfer chamber.

**Framing:** Provide 2" X 4" wood framing member for the construction of the transfer chamber.

**Flooring Protection:** Provide new sheets of cardboard or masonite sheeting in the largest size possible to protect the sheet polyethylene floor in the transfer chamber and waste trailer bag.

**Rope:** Provide solid braid nylon rope minimum 1/4-inch diameter with a minimum tensile strength of 1,250 lbs.

**Waste Trailer:** Provide a clean enclosed roll-off type waste trailer sized to accommodate the waste trailer bag described above.

**Steel Strapping:** Provide minimum 5/8-inch x .017-inch cold-rolled, medium carbon steel strapping with a break strength of 1,630 pounds for sealing the ends of the waste trailer bags, when full. Use seals, sealing tools, and strapping tensioner compatible with the specified steel strapping.

**Airless Sprayer:** Provide an airless sprayer for the application of amended water or removal encapsulant. A water hose and nozzle may not be substituted for an airless sprayer.

## **PART 3 – EXECUTION**

### **3.1 TRANSFER CHAMBER**

**3.1.1** Provide a transfer chamber to directly connect the waste trailer and Work Area. The transfer chamber shall be a minimum of six (6) feet long by six feet eight inches (6' 8") wide by six feet inches (6' 8") tall. The opening of the transfer chamber shall not exceed the dimensions of the opening of the waste trailer bag.

**3.1.2** Construct the transfer chamber of 2" X 4" wood framing and minimum 1/2-inch thick plywood sheeting. Construct the chamber weather tight and in a manner that maintains building security independent of the waste trailer. Install hinged doors that will swing 180 degrees to close the opening at the connection point with the waste trailer during separation.

**3.1.3** Install critical, primary, and secondary barriers in the transfer chamber as described in Section 01526 Temporary Enclosures, Full Enclosure.

**3.1.4** At opening of transfer chamber and Work Area install a flapped doorway consisting of three (3) layers of alternating polyethylene sheets. This flapped doorway may be taped open during periods of active waste load out.

**3.1.5** At opening of transfer chamber and waste trailer, install three (3) layers of sheet poly. These poly barriers are to be rolled up at all times except for periods when the waste trailer is separated from the transfer chamber. Refer to the Separation and Tie-In Sequences in this Section for Details.

**3.1.6** At the floor opening of the transfer chamber/waste trailer connection install a threshold constructed from 2" X 4" wood framing.

**3.1.7** Protect the polyethylene floor sheeting in the transfer chamber during load out operations with cardboard/masonite.

## **3.2 WASTE TRAILER and WASTE TRAILER BAG**

**3.2.1** Line the interior of the waste trailer with 6 mil polyethylene sheeting prior to installing waste trailer bag.

**3.2.2** Attach rope through closed end of dumpster and run through loops in waste trailer bag. Pull rope tight to support waste trailer bag and tie off to the transfer chamber.

**3.2.3** Install masonite/cardboard sheeting on the floor of the waste trailer bag to protect during waste load out.

## **3.3 WASTE TRAILER BAG TO TRANSFER CHAMBER TIE-IN PROCEDURE**

**3.3.1** Open hinged doors to transfer chamber and direct waste trailer driver to backup and deposit the opening of the waste trailer to within 2 feet of the opening of the transfer chamber.

**3.3.2** From the outside attach the 3-ounce un-coated woven polypropylene outer bag to the opening of the transfer chamber. Secure using staples and duct tape.

**3.3.3** Enter the Work Area and proceed into the transfer chamber. Roll-up and secure the three (3) layers, 6-mil curtain at the opening of the transfer chamber/waste trailer. When complete, the curtain should be rolled up between the outer bag and primary bag of the waste trailer bag.

**3.3.4** Attach the primary bag to the primary layer of polyethylene sheeting in the transfer chamber with a minimum overlap of twelve (12) inches. Seal this joint with spray glue

and duct tape. Install layers so that the primary bag is the innermost layer in the transfer chamber.

**3.3.5** Attach the secondary bag to the secondary layer of polyethylene sheeting in the transfer chamber with a minimum overlap of twelve (12) inches. Seal this joint with spray glue and duct tape. Install layers so that the secondary bag is the innermost layer in the transfer chamber.

**3.3.6** Install a plywood ramp to bridge the opening between the transfer chamber and the waste trailer. Use caution to not damage the poly sheeting and immediately repair any damage.

### **3.4 WASTE HANDLING PROCEDURES**

**3.4.1** Remove asbestos-containing material according to Section 02081 - Removal of Asbestos-Containing Materials.

**3.4.2** In lieu of immediately bagging the material as described in Section 02081, the Contractor shall immediately place the material into a cart, wheelbarrow, or similar, and transport to the waste trailer bag via the transfer chamber.

**3.4.3** Deposit the material into the waste trailer bag. At all times the debris in the waste trailer bag shall be maintained adequately wet.

**3.4.4** Continue the process until the waste trailer bag is full, then proceed with Waste Trailer Separation as described below.

### **3.5 WASTE TRAILER SEPARATION PROCEDURES**

**3.5.1** Close flapped doorway between Work Area and Transfer Chamber.

**3.5.2** Remove plywood ramp, cardboard sheeting, and all gross debris from the transfer chamber.

**3.5.3** Confirm that the debris in the waste trailer bag is adequately wet and continuously mist the air in the transfer chamber during the separation sequence.

**3.5.4** Wet wipe and HEPA-vacuum all debris from the secondary layer of the transfer chamber.

**3.5.5** Remove the secondary bag from the transfer chamber, wrap and seal using the metal strapping. Seal with duct tape and fold the secondary bag into the waste trailer.

**3.5.6** Remove the secondary barrier layer from the transfer chamber and pass back into the Work Area through the flapped doorway.

- 3.5.7** Wet wipe and HEPA vacuum all debris from the primary layer of the transfer chamber.
- 3.5.8** Remove the primary bag from the transfer chamber, wrap and seal using the metal strapping. Seal with duct tape and fold the primary bag into the waste trailer.
- 3.5.9** Unroll the two layers 6-mil curtain and seal to the opening of the transfer chamber.
- 3.5.10** From outside the Work Area, open the plywood hinged doors of the transfer chamber and disconnect the outer bag from the transfer chamber, wrap and seal using the metal strapping. Seal with duct tape and fold the outer bag into the waste trailer.
- 3.5.11** Label the outside bag with the four labels identified in Part 2 of Section 02084 Disposal of Asbestos Containing Waste Materials.
- 3.5.12** Remove the rope supporting the bag from the transfer chamber and from within the waste trailer
- 3.5.13** Attach the waste trailer to the waste hauler's truck and carefully pull away from the transfer chamber and building.
- 3.5.14** Close the plywood doors to the transfer chamber and lock until beginning a new tie-in sequence.
- 3.5.15** The transfer chamber shall be final cleaned, visually inspected, and cleared as part of the final decontamination sequence identified in Section 01711 - Project Decontamination.

**END OF SECTION 02083**

## SECTION 02084 - DISPOSAL OF REGULATED ASBESTOS-CONTAINING MATERIAL

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. **Worker protection requirements** are set forth in Sections 01560 Worker Protection - Asbestos abatement
- B. **Section 01098 Codes, Regulations and Standards - Asbestos Abatement** describes applicable federal, state and local regulations.

#### 1.3 DESCRIPTION OF THE WORK:

- A. **This section describes the disposal of Regulated Asbestos-Containing Materials (RACM).** Disposal includes packaging of Regulated Asbestos-Containing Materials. Disposal may be accomplished either by land filling or converting Regulated Asbestos Containing Materials to non-Asbestos waste.

#### 1.4 SUBMITTALS:

- A. **Before Start of Work:** Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.
  - 1. **Copy of state or local license** for waste hauler.
  - 2. **Name and address of landfill** where Regulated Asbestos Containing Materials are to be buried. Include contact person and telephone number.
  - 3. **Name and address of processor** where Regulated Asbestos-Containing Materials are to be processed into non-asbestos waste. Include contact person and telephone number. Also provide the following information about the process and operation used by the processor:
    - a. Results of start-up performance testing and performance testing for last 90 days including operating parameters, feed characteristics, and analysis of output materials.
    - b. Results of composite analysis required during initial 90 days of operation and results of composite analysis of monthly product composite samples for last 90 days.

- c. Results of continuous monitoring and logs of process operating parameters for the initial 90 days and last 90 days of operation.
  - d. A description of any deviation from the operating parameters established during performance testing, the duration of the deviation, and steps taken to correct the deviation.
  - e. Product data on process to be used
- 4. **Chain of Custody form** and form of waste manifest proposed
  - 5. **Sample of disposal bag** and any added labels to be used.
- B. **On a weekly basis** submit copies of all manifests and disposal site receipts to Designer.
  - C. **Waste Shipment Record:** Maintain a waste shipment record as required by the NESHAP regulation which indicates the waste generator, transporter, and disposal site, and which describes the nature, size, type of container, and form of asbestos waste. Submit to Designer within 35 days of departure from building.

**PART 2 - PRODUCTS:**

**2.1 MATERIALS**

- A. **Disposal Bags:** Provide 6 mil (0.15 mm) thick leak-tight polyethylene bags labeled with three labels with text as follows:
  - 1. **First Label:** Provide in accordance with 29 CFR 1910.1200(f) of OSHA's Hazard Communication standard:
 

DANGER  
CONTAINS ASBESTOS FIBERS  
AVOID CREATING DUST  
CANCER AND LUNG DISEASE HAZARD  
BREATHING AIRBORNE FIBERS IS  
HAZARDOUS TO YOUR HEALTH
  - 2. **Second Label:** Provide in accordance with U. S. Department of Transportation regulation on hazardous waste marking. 49 CFR parts 171 and 172. Hazardous Substances
 

RQ-ASBESTOS WASTE  
CLASS 9  
NA2212-PG III
  - 3. **Third Label:** Provide the name of the waste generator (Owner's name), the location from which the waste was generated and the names and addresses of the contractor and transporter. This label must be durable, able to repel dirt and moisture (e.g., permanent marker). Label must be placed directly on disposal bag(s) in a legible format. **Peel and stick type labels are expressly prohibited.**

## PART 3 - EXECUTION

### 3.1 SEQUENCE

- A. **Comply with the following sections** during all phases of this work:
1. **Section 01560** Worker Protection - Asbestos Abatement
  2. **Section 01562** Respiratory Protection

### 3.2 GENERAL:

- A. **All waste** is to be hauled by a waste hauler with all required licenses from all state and local authority with jurisdiction.
- B. **Liquid waste:** Mix all liquid asbestos-containing waste or asbestos contaminated waste with a bladeable material so that it forms a bladeable (non-liquid) form and have the concurrence of the landfill operator prior to disposal.
- C. **Load all adequately wetted Regulated Asbestos-Containing Material** in disposal bags or leak-tight containers. All materials are to be contained in one of the following
1. **Two 6 mil (0.15 mm) disposal bags** or
  2. **Two 6 mil (0.15 mm) disposal bags and a fiberboard drum** or
  3. **1 12 mil burrito bag in a roll-off**
- D. **Protect interior of truck** or dumpster with Critical and Primary Barriers as described in Section 01526 Temporary Enclosures.
- E. **Carefully load containerized waste** in fully enclosed dumpsters, trucks or other appropriate vehicles for transport. Exercise care before and during transport, to ensure that no unauthorized persons have access to the material.
- F. **Warning Signs:** During loading and unloading mark dumpsters, receptacles and vehicles with a sign complying with requirements of the EPA NESHAP regulation (40 CFR Part 61), in a manner and location that a person can read the following legend:

DANGER  
ASBESTOS DUST HAZARD  
CANCER AND LUNG DISEASE HAZARD  
Authorized Personnel Only

- G. Do not store containerized materials outside of the Work Area.** Take containers from the Work Area directly to a sealed truck or dumpster.
- H. Do not transport disposal bagged materials on open trucks.** Label drums with same warning labels as bags. Uncontaminated drums may be reused. Treat drums that have been contaminated as Regulated Asbestos-Containing Material and dispose of in accordance with this specification.
- I. Advise the landfill operator or processor, at least ten days in advance of transport, of the quantity of material to be delivered.**
- J. At disposal site** unload containerized waste:
  - 1. At a disposal site,** sealed plastic bags may be carefully unloaded from the truck. If bags are broken or damaged, return to work site for rebagging. Clean entire truck and contents using procedures set forth in section 01711 Project Decontamination.
  - 2. At a processing site** truck and loading dock are arranged as a controlled work area and containerized waste is transferred to storage area by site personnel. All bags including broken ones will be transferred. Clean truck, using procedures set forth in section 01711 Project Decontamination.
- K. Retain receipts from landfill or processor for materials disposed of.**
- L. At completion of hauling and disposal of each load** submit copy of waste manifest, chain of custody form, and landfill receipt to Designer.

**END OF SECTION – 02084**

## SECTION 02086 - HAZARDOUS WASTE MANAGEMENT

PCB CONTAINING FLUORESCENT LIGHT BALLASTS AND MERCURY SWITCHES FROM THERMOSTATS ARE WASTE MATERIALS FREQUENTLY ENCOUNTERED ON ASBESTOS ABATEMENT PROJECTS. A PROJECT CAN EASILY GENERATE A SUFFICIENT QUANTITY OF THESE MATERIALS THAT THEY MUST BE MANAGED AS HAZARDOUS WASTE. FOR EXAMPLE, IT ONLY TAKES 20 TO 25 FLUORESCENT LIGHT BALLASTS TO HAVE A SUFFICIENT QUANTITY OF PCB=S TO REACH THE RCRA REGULATORY LIMIT. THIS SECTION DESCRIBES THE MANAGEMENT OF THESE MATERIALS AS HAZARDOUS WASTE. IF THE PROJECT INVOLVES OTHER HAZARDOUS MATERIALS THEN THE PROJECT DESIGNER SHOULD SEEK THE ADVICE OF AN INDIVIDUAL KNOWLEDGEABLE IN THIS AREA.

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

THIS SECTION IS REQUIRED IF HAZARDOUS WASTE WILL BE GENERATED DUE TO DEMOLITION OF BUILDING MATERIALS THAT HAVE COMPONENTS THAT QUALIFY AS HAZARDOUS MATERIALS, SUCH AS LEAD-BASED PAINT PCB-CONTAINING FLUORESCENT LIGHT BALLASTS AND MERCURY THERMOSTATS, REFER TO THE NIBS PUBLICATION A GUIDE SPECIFICATIONS FOR REDUCING LEAD-BASED PAINT HAZARDS= FOR ADDITIONAL INFORMATION ON DEALING WITH LEAD-BASED PAINT.

#### 1.2 RELATED SECTIONS

- A. **Section 01092 Codes and Regulations - Asbestos Abatement** describes federal, state and local regulations applicable to asbestos.
- B. **Section 02084 Disposal of Regulated Asbestos-Containing Material** describes the handling and disposal of asbestos-containing waste.

#### 1.3 DESCRIPTION OF THE WORK:

- A. **This section describes** the segregation, packaging, labeling, transport, and disposal of waste materials generated by demolition activities and the subsequent shipment of properly packaged and labeled waste materials to an approved disposal site.

## 1.4 CODES AND REGULATIONS

- A. General Applicability of Codes and Regulations:** Except to the extent that more explicit or more stringent requirements are written directly into the Contract Documents, all applicable codes and regulations have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the Contract Documents, or as if published copies are bound herewith.
- B. Contractor Responsibility:** The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to hazardous waste management and disposal. Hold the Owner and Designer harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of the Contractor, the Contractor's employees, or Subcontractors.
- C. Federal Requirements:** which govern the management, hauling and disposal of hazardous waste include but are not limited to the following:
1. **DOT:** U. S. Department of Transportation, including but not limited to:
    - a. Hazardous Substances  
Title 49, Part 171 and 172 of the Code of Federal Regulations
    - b. Hazardous Material Regulations  
General Awareness and Training Requirements for Handlers, Loaders and Drivers  
Title 49, Parts 171-180 of the Code of Federal Regulations
    - c. Hazardous Material Regulations  
Editorial and Technical Revisions  
Title 49, Parts 171-180 of the Code of Federal Regulations
  2. **EPA:** U. S. Environmental Protection Agency (EPA), including but not limited to:
    - a. Management of Hazardous Wastes Resource Conservation and Recovery Act (RCRA)  
Title 40, Parts 260- 268 of the Code of Federal Regulations

## 1.5 DEFINITIONS:

- A. Toxicity Characteristic Leaching Procedure (TCLP):** A laboratory test method to determine the mobility of both organic and inorganic analytes present in liquid, solid, and multiphase wastes performed in accordance with test methods required under 40 CFR Part 268.

## 1.6 SUBMITTALS:

- A. Before Start of Work:** Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.
1. **Copy of state and local licenses** for waste hauler.
  2. **U.S. EPA Identification Number** of waste hauler.
  3. **Name and address of waste disposal facility** where hazardous waste materials are to be disposed including:
    - a. Contact person and telephone number.
    - b. Copy of state license and permit
    - c. Disposal facility permits
  4. **Specimen copy** of Uniform Hazardous Waste Manifest form.
  5. **Copy** of EPA A Notice of Hazardous Waste activity form
  6. **Copy** of forms required by state and local agencies
  7. **Sample** of disposal label to be used.
- B. During Work:** Submit the following as required by the work.
1. **TCLP test results**, as required to characterize waste for segregation and packaging purposes.
  2. **Submit copies** of all executed manifests and disposal site receipts to the Designer.

## PART 2 - PRODUCTS:

### 2.1 MATERIALS

- A. **Disposal Bags:** Provide 6 mil (0.15 mm) thick leak-tight polyethylene bags.
- B. **DOT Hazardous Waste Disposal Drums:** Provide DOT 17-H Open -Top Drums (55 gallon) in accordance with DOT regulations title 49 CFR Parts 173, 178, and 179.
- C. **DOT Hazardous Waste Labels:** in accordance with DOT regulations Title 49 CFR parts 173, 178, and 179.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. **Do not mix potentially hazardous waste streams.** Where feasible, separate each type of hazardous waste from other types of hazardous wastes, from asbestos waste and from construction waste.
- B. **Segregate, package, label, transport and dispose** of Hazardous Waste in accordance with DOT, EPA, State and Local regulations.

### 3.2 HAZARDOUS WASTE DESIGNATION

- A. **Where not otherwise designated** by the Owner as Hazardous waste, characterize all suspect waste products by conducting representative TCLP testing.
- B. **Testing of components by use of TCLP** was completed by Owner's consultant prior to initiating this project.
  - 1. A schedule of materials that must be managed as hazardous waste is attached at the end of this section.

DELETE EITHER ABOVE OR BELOW. A SCHEDULE IS LESS AMBIGUOUS.

2.

INCLUDE THE FOLLOWING WHERE TESTING IS REQUIRED.

- C. Representative sampling of waste products will be in accordance with EPA Document SW 846.
- D. TCLP test analysis will be performed in accordance with EPA Method 1311.

### 3.3 HAZARDOUS WASTE:

EDIT FOLLOWING AS REQUIRED BY PROJECT SPECIFICS.

- A. The following waste products are designated by the Owner as non-salvageable and as Hazardous Waste Types:
  - 1. **Waste Type A:** PCB waste.
    - a. PCB-containing ballasts from fluorescent light fixtures.
  - 2. **Waste Type B:** Mercury-containing waste.
    - a. Thermostats with mercury switches. Individually bagged mercury-containing thermostats.
    - b. Fluorescent, and mercury-vapor lamps.

### 3.4 Hazardous Waste Packaging and Labeling: Package each segregated Hazardous Waste Type, A and B, in specified containers as follows. **IMPORTANT: Do Not Mix Waste Streams:**

#### A. Waste Type A

- 1. Package in DOT 17-H Open-Top Drums
- 2. Fill to capacity only with Waste Type A (Do Not Mix Waste Stream types).
- 3. Install gasket on lid, apply lock ring, and seal.
- 4. Apply Hazardous Waste Label to drum side.
- 5. Enter DOT Shipping Data as follows: RQ Waste Polychlorinated Biphenols, 9, UN-2315, PG-II, (M001).

6. Adjacent to each label, enter the date indicating when waste was first placed in each drum.

**B. Waste Type B**

1. Package in DOT 17-H Open-Top Drums with Polyethylene disposal Bag liners
2. Fill liner bags only with Waste Type B (Do Not Mix Waste Stream types); then neck liner bags down into DOT 17-H Open-Top Drum and seal with duct tape.
3. Install gasket on lid, apply lock ring, and seal.
4. Apply Hazardous Waste Label to drum side.
5. Enter DOT Shipping Data as follows: RQ Hazardous Waste Solid, NOS, 9, NA3077, PG-III, (D009).
6. Adjacent to each label, enter the date indicating when waste was first placed in each drum.

**C. Sealed and Labeled Containers:** maintain all containers in a continuously sealed condition after they have been sealed.

1. Do not reopen sealed containers.
2. Do not place additional waste in sealed containers.

**3.5 Temporary Storage:** Partially filled containers of hazardous waste may be stored at the work site for intermittent packaging provided that:

- A. Each container is properly labeled when it is first placed in service;
- B. Each container remains closed at all times except when compatible waste types are added; and
- C. When moved from site to site, each container remains within the geographic boundaries of the facility without moving nor crossing public access highways.

**3.6 Removal of Hazardous Wastes:** Immediately seal containers of hazardous waste as each the container is filled. Remove containers of hazardous waste from the work site **within seventy-two (72) hours of being filled.**

- A. **Transporting filled containers** from the work site to an approved disposal site or recycling center.
- B. **Continuously maintain custody** of all hazardous material generated at the work site including security, short-term storage, transportation and disposition until custody is transferred to an approved disposal site or recycling center. Document continuous chain-of custody.
- C. **Do not remove**, or cause to be removed, hazardous waste from Owner's property without a legally executed Uniform Hazardous Waste manifest.
- D. **At completion of hauling** and disposal of each load submit copy of waste manifest, chain of custody form, and landfill receipt to Designer.

**3.7 Recycling and Recovery:** Turn over waste which contains materials for which recovery and/or recycling is possible to an approved recycling center. Materials subject to recycling include:

EDIT THE FOLLOWING LIST TO SUIT PROJECT SPECIFICS.
--

- 1. Fluorescent light tubes.
- 2. Thermostats with mercury switches.
- 3. Lead acid batteries
- 4. Combustible lead-based painted building components and lead-based paint chips.

### 3.8 Backcharges:

- A. Where contractor fails to fulfill packaging, handling, transport or disposal requirements as outlined herein, Owner will charge back to the Contractor all costs associated with insuring that hazardous wastes are segregated, packaged, transported and disposed of in accordance with all applicable Federal and State regulations.
- B. Environmental pollution of Owner's property or other environments resulting from Contractor's hazardous waste management activities will be promptly remediated under Owner's direction, to the Owner's sole satisfaction, and at the Contractor's sole expense.
- C. Contractor agrees to either reimburse the Owner or reduce the Contract amount by change order to cover all costs associated with waste re-packaging, waste re-segregation, or pollution remediation efforts.

### 3.9 Removal of Non-Hazardous Waste Materials:

- A. Transport and legally dispose of non-hazardous waste products, materials, residues and refuse at a location not on Owner's property.
- B. Non-hazardous waste products, materials, residues and refuse include, but are not necessarily limited to:
  - 1. Materials which are determined to be non-hazardous wastes through objective sampling in accordance with EPA Document SW-846 and laboratory analysis in accordance with EPA Method 1311.
  - 2. Emptied hazardous material containers: containers holding a material with constituents listed on the MSDS as hazardous.
    - a. When a container is emptied of its hazardous contents by pouring or scraping so that less than one inch of material remains in the bottom of the container, the container is considered empty and is not in itself a hazardous waste.
    - b. Emptied hazardous material containers may be disposed of as construction debris waste (i.e. non-hazardous).
  - 3. Personnel protective clothing and safety equipment with de minimis or trace contamination, as determined by visual inspection by Owner's Representative.
- C. Keep premises in a clean and orderly condition during performance of abatement work.
- D. Place non-hazardous construction debris wastes on a daily basis in secure containers for local landfill disposal.

**END OF SECTION - 02086**