



PROJECT SPECIFICATIONS

FOR

Former United Technologies Building

1446 West Tuscarawas

Canton, Ohio



Prepared For

**City of Canton
218 Cleveland Avenue
Canton, Ohio
330-489-3330**

ENVIRONMENTAL

INDUSTRIAL HYGIENE

WASTE MANAGEMENT



800-570-0690

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**NOTIFICATION TO CONTRACTORS:
PRESENCE OF ASBESTOS IN BUILDING
PRE-DEMOLITION ASBESTOS ABATEMENT PROJECT**

In compliance with 29 CFR 1910.1001 and 29 CFR 1926.1101 (OSHA Asbestos Standards) please be advised that the former United Technologies Building in Canton, Ohio, does contain asbestos-containing materials (ACM). ACM materials are primarily TSI, pipe and tank insulation, transite wall panels, ceiling tile mastic, flooring, ceiling tile mastic, window glazing compound, masonry caulking and roofing materials.

For specific asbestos-containing materials description and locations, please refer to the asbestos hazard assessment dated June 12, 2014. A copy of the assessment will be made available upon request.

Disturbance of these materials via cutting, drilling, tearing, etc. may expose yourself and other occupants of this facility to airborne asbestos fibers; therefore, such disturbance is NOT to occur unless authorized by the owner and then only by a license asbestos abatement contractor and workers.

We **require** that you contact the City of Canton prior to removal or disturbance of any material in close proximity to the identified material. The City will first confirm whether the material is asbestos free. If the material is ACM, the City will have the material removed by a licensed asbestos abatement contractor prior to your commencement of the project.

In accordance with the Asbestos Standard, it is your responsibility to provide this information to all your affected employees and/or subcontractors.

I have read and understand the above paragraphs and agree to communicate these requirements to my employees and any subcontractors I have on site.

(PRINTED NAME/SIGNATURE)

(DATE)

(TITLE)

(COMPANY)

**NOTIFICATION TO CONTRACTORS:
PRESENCE OF LEAD IN BUILDING**

In compliance with 29 CFR 1926.62 (OSHA Lead Standard) please be advised that the former United Technologies building located at 1446 West Tuscarawas in Canton, Ohio, does contain presumed lead-containing material. Lead-containing materials are primarily assumed lead-containing paint, lead soldered connections, lead-containing components and leaded building materials.

In accordance with the Lead Standard, it is your responsibility to provide this information to all your affected employees and/or subcontractors.

I have read and understand the above paragraphs and agree to communicate these requirements to my employees and any subcontractors I have on site.

(PRINTED NAME/SIGNATURE)

(DATE)

(TITLE)

(COMPANY)

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Asbestos Assessment

This section includes the Asbestos Hazard Assessment conducted at the former United Technologies Building by Emerald Environmental, Inc. and reported on June 12, 2014.

ACM materials at former United Technologies Building are primarily pipe insulation, mudded fittings, tank insulation, transite wall panels, flooring, window glazing compound, masonry caulk, roofing materials and fire doors. There is also plaster containing asbestos at concentrations < 1%.

Please see the attached report for specific descriptions and locations.

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Summary of Work & Time of Completion – Asbestos Abatement

I. GENERAL

A. NAME OF PROJECT

1. The former United Technologies building
Asbestos Abatement and Management/Mitigation of Light Tubes and Ballast,

The City of Canton
2. Raymond Rankin, and John Steele, State of Ohio Certified Asbestos Hazard Abatement Project Designer, No. 60582, 60719, Emerald Environmental, Incorporated, P.O. Box 1953, Kent, Ohio 44240, (330) 677-0785, prepared these specifications dated June 16, 2014.

B. SINGLE CONTRACT

1. This project is to be executed under a single prime contract.
2. Bids will be received for:

ITEM 1: Asbestos Abatement
ITEM 2: Removal and Recycling of Fluorescent Light Tubes and Ballast

C. TIME OF COMPLETION

1. It is understood and agreed that work embodied in this Contract shall be completed within the time indicated in the schedule below following notice to proceed with work unless an extension of time is granted by the City.
 - The time for completion of this work scope is eight (8) weeks, including 10 day notification period.

END OF SECTION

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Scope of the Work – Asbestos Abatement

I. GENERAL

A. WORK COVERED

1. The project consists of the removal, packing, and disposal of various asbestos-containing materials (ACM) as set forth below. Additional non-ACM materials listed are to be removed by the abatement contractor. All material quantities are approximate. Bidders are responsible for confirmation. Estimated quantities, locations, and special requirements are listed below.
2. Floor plans showing how the building was divided are located at the end of this section.

SCOPE of WORK

Building Area 1 - Interior

- Approximately 180 linear feet of friable pipe insulation throughout the building.
- Approximately 80 square feet of non-friable that may become friable during demolition, red and black 9”x 9” floor tile located in the northern hallway to the basement stairs.

Building Area 1 - Exterior

- Approximately 115 linear feet of non-friable that will become friable during demolition activities steel lintel caulking; 5% chrysotile asbestos.

Building Area 2 - Interior

- Approximately 3,600 square feet of non-friable that may become friable during demolition, adhesive attached to 1’ x 1’ ceiling tiles located above lay-in ceiling panels and attached to drywall lath in building area 2.
- Approximately 2,000 square feet of non-friable that may become friable during demolition, red and black 9”x 9” floor tile located throughout the second floor of building area 2. This material is concealed under carpet in most of the area.
- Approximately 360 square feet of non-friable that may become friable during demolition, brown speckled 12” x 12” floor tile located in the “safe” room and two storage rooms located at the southwestern corner of building area 2.
- Approximately 180 square feet of non-friable that may become friable during demolition, blue, flowered sheet flooring located in the second floor women’s room of building area 2.
- Two fire doors located on the first floor at the bottom of the stairs to the second floor and door leading to area 1
- Two safes located in the northwestern offices on the second floor, not sampled, assumed ACM.

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Scope of the Work – Asbestos Abatement

Building Area 2 - Exterior

- Approximately 90 linear feet of non-friable that will become friable during demolition activities steel lintel caulking.

Building Area 3 - Interior

- None.

Building 3 - Exterior

- Approximately 300 square feet of windows (approximately 28 windows) with approximately 115 square feet of friable window glazing compound.
- Approximately 60 linear feet of non-friable that will become friable during demolition activities steel lintel caulking.

Building Area 4 - Interior

- Approximately 95 linear feet of friable pipe insulation throughout the building.

Building Area 4 - Exterior

- Approximately 55 linear feet of non-friable that will become friable during demolition activities steel lintel caulking.

Building Area 5 - Interior

- Approximately 467 linear feet of friable pipe insulation throughout the building.

Building Area 5 - Exterior

- Approximately 70 linear feet of non-friable that will become friable during demolition activities steel lintel caulking.

Building Area 6 - Interior

- Approximately 60 linear feet of friable pipe insulation throughout the building.
- Approximately 100 square feet of non-friable that will become friable during demolition activities mastic attached to 1' x 2' ceiling tiles on drywall lath located in the cooler/office in the southeast corner of building area 6.
- Approximately 1,400 square feet of friable transite wall and ceiling panels with tar paper located in the second floor office area and stairwell.
- Approximately 6 square feet of transite arc shield in the electrical panel on the west wall.

Building Area 6 - Exterior

- Approximately 85 linear feet of non-friable that will become friable during demolition activities steel lintel caulking.

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Scope of the Work – Asbestos Abatement

Building Area 7 - Interior

- None

Building Area 7 - Exterior

- Approximately 30 linear feet of non-friable that will become friable during demolition activities steel lintel caulking.

Building Area 8 - Interior

- Approximately 6 square feet of transite arc shield in the elevator penthouse; not sampled, assume ACM.

Building Area 8 - Exterior

- Approximately 465 square feet of windows (approximately 25 windows) with approximately 200 square feet of friable window glazing compound.
- Approximately 65 linear feet of non-friable that will become friable during demolition activities steel lintel caulking.

Basement

- Undetermined quantity of non-friable gaskets located on 1 boiler in the boiler room in the basement; not sampled, assumed ACM. This material will need to be removed prior to any recycling.
- Approximately 2,675 linear feet of friable pipe insulation (<6 inch diameter) throughout the basement.
- Approximately 100 linear feet of friable pipe insulation (>6 inch diameter) located in the boiler room in the basement.
- One, 3'x 8' aboveground storage tank with approximately 90 square feet of friable insulation located in the boiler room in the basement.
- Approximately 400 square feet of friable transite sandwich panels.

Carriage House (South Building) - Interior

- None

Carriage House (South Building) - Exterior

- Approximately 2,500 square feet of weathered, friable built-up roofing.
- Approximately 336 square feet of windows (approximately 28 windows) with approximately 75 square feet of friable window glazing compound.
- Approximately 70 linear feet of non-friable that will become friable during demolition activities steel lintel caulking.

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Scope of the Work – Asbestos Abatement

3. Project Notes

Demolitions:

- a) This is a pre-demolition asbestos abatement project. The contractor, at his own expense, will be permitted to perform any demolition activities that may expedite the project, provided such demolition does not cause any structural damage or compromise building security. The contractor will be responsible for any shoring and/or fall protection that may be required by OSHA. The contractor will be responsible for securing the building.
- b) All building openings created by the contractor are to be sealed with a minimum of ½” plywood screwed onto metal or wood studs to secure the structure from outside access.
- c) The contractor is to inspect above all lay-in ceiling panel and plaster ceilings for acm pipe insulation & mudded fittings and verify all quantities with the owners on site representative prior to removal. The contractor will be reimbursed for removal and disposal for any additional materials over the quantities that are included in the base bid including roof drains. The contractor will not be reimbursed if the quantities are not first verified prior to removal.
- d) The contractor is responsible for all demolition at approximately thirty (30) locations required to provide access through walls and ceilings at all points where pipes and ductwork penetrate wall and ceiling to allow access for inspection to determine if there is any concealed asbestos pipe insulation or duct paper.
- e) As part of the workscope the contractor is to perform selective masonry/plaster wall demolition to access all pipe that may be concealed within the walls and remove any associated assumed asbestos-containing pipe insulation. Selective demolition will be performed at all locations where there may be reason to suspect that a pipe may be concealed within a wall, such as sinks, toilets, water fountains, water spigots and heaters.
- f) If in the process of accessing concealed asbestos containing materials the contractor causes previously non-regulated asbestos containing materials (based on standard demolition practices) to become a regulated material, then the contractor will be responsible for all associated cost, incurred to properly abate, package and dispose of these previously un-regulated asbestos containing materials.
- g) Since this project is a demolition, all values onsite will become the property of the demolition contractor. The abatement contractor is prohibited from recovering any values other than those removed as part of the abatement activity.
- h) Any remaining furniture or equipment left in the building, not claimed by the owner, shall be removed and disposed of legally as part of the demolition contract. The abatement contractor shall move/relocate furniture and equipment as necessary during abatement activities to prevent contamination of furniture and/or equipment.
- i) All ACM window glazing throughout the building is considered to be friable ACM and must be disposed of as such. Windows and frames are to be removed, double wrapped with poly and disposed of as bulk ACM waste. Window removal must be done prior to demolition of the exterior walls.
- j) The abatement contractor, at the conclusion of the abatement project, will NOT close out their notifications. Instead, the notifications will be placed “on hold” until the completion of the demolition activity. This is to allow for removal of any additional

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Scope of the Work – Asbestos Abatement

materials that may be identified during the demolition. Once the demolition has been completed, the abatement contractor may close out the notification.

Pipe Insulation

- a) Pipe insulation is assumed to be concealed above ceilings, in walls, pipe chases. This facility was constructed in several phases with different type of construction styles and different types of construction materials being utilized throughout. The contractor is responsible for all demolition required to access all asbestos-containing materials. Multiple layers of ceiling and wall finishes will be encountered through this facility, such as plaster walls and ceilings, drywall system walls and ceilings, glued ceiling tile and lay-in ceiling systems. All non-asbestos-containing building materials that are removed in to order to access asbestos-containing materials must be removed from the containment areas. Those materials may be left on site for disposal by the demolition contractor.
- b) All pipe insulation and associated mudded fittings and all mudded fittings associated with fiberglass insulated lines will be abated. Some pipe insulation is located above plaster ceilings and inside masonry wall chases. The contractor is responsible for all ceiling and wall demolition required, to access concealed pipe insulation. The contractor is responsible for the clean up of any loose asbestos debris that may be encountered above the ceilings, or concealed within the walls and pipe chases. The quantities of piping insulation and fitting insulation listed were the observed and estimated quantities and are provided for bidding purposes only. Asbestos pipe insulation and mudded fitting insulation encountered shall be removed by the contractor. Prior to removal of asbestos pipe insulation and mudded fitting insulation the contractor, along with the owners' representative will agree on the quantity to be removed. If the contractor removes any pipe or fitting insulation prior to the contractor and owner's representative agreeing in writing on the quantity, the contractor will not be reimbursed for this work. All non-asbestos containing debris may be left on site after removal from the containment area.
- c) All ACM pipe insulation and mudded fittings on plumbing lines are to be removed by glovebag technique or full containment and the cleaned piping left onsite for the demolition contractor.

Floor Tile / Non-Friable Materials

- a) The contractor is to remove and dispose of all acm 12"x12" and 9"x9" floor tile, mastic and all floor leveler. It is assumed that floor leveler will be encountered during the floor tile and mastic removal. The contractor is to remove all of the floor leveler material whether it is asbestos or non-asbestos, leaving a clean and smooth concrete floor.
- b) Contractor is responsible for any and all demolition of cabinetry, benches and other furniture as necessary to inspect, access and remove floor tile and mastic beneath the cabinetry, benches or furniture.
- c) Floor tile may be present under carpet or other floor tile. Multiple layers of floor tile may be found. The layers may be separated by luan, plywood or OSB board sub-flooring. Floor tile and associated mastic under sub-flooring is assumed to be ACM if not specifically tested. Contractor is responsible for any demolition necessary to access and remove all floor tile. The contractor will have access to the building

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Scope of the Work – Asbestos Abatement

- during the bidding process to field verify all quantities and field conditions the would impact their cost.
- d) All ACM floor tile and floor tile mastic removal will take place in negative pressure regulated work areas. The removal contractor shall place critical seals over all windows, HVAC vents, doorways, etc., and shall place at least one AFD (air filtration device) within each room prior to commencing removal. All removal technicians shall wear respiratory protection and disposable coveralls during the entire floor tile and floor tile mastic removal process. All mastic shall be removed using low-odor removal solvents. The use of volatile solvents, such as gasoline, kerosene, etc., is strictly prohibited. Prior to any mastic removal, all walls will be protected with poly splash guards. Removal contractor shall be responsible for any and all damage to surfaces, including any staining caused by removal solvents. All generated waste shall be properly bagged, labeled and disposed of as asbestos containing material. Clearance sampling for floor tile and floor tile mastic removal work areas shall consist of PCM samples that will be prepared and read on-site.
 - e) All ACM sheet flooring removal will take place in negative pressure regulated work areas. The removal contractor shall place critical seals over all windows, HVAC vents, doorways, etc., and shall place at least one AFD (air filtration device) within each room prior to commencing removal. All removal technicians shall wear respiratory protection and disposable coveralls during the entire sheet flooring removal process. All generated waste shall be properly bagged, labeled and disposed of as asbestos containing material. Clearance sampling for sheet flooring removal work areas shall consist of PCM samples that will be prepared and read on-site.
 - f) The contractor is to remove all baseboards from all rooms where floor tile is being removed.
 - g) All interior and exterior transite panels are to be removed by the contractor, wrapped, labeled and disposed as acm.
 - h) There are non-friable asbestos-containing materials, located throughout the facility that do not meet the definition of regulated asbestos-containing building materials for demolition purposes according to NESHAP and AHERA regulations and are not required to be removed prior to demolition, (refer to the asbestos hazard assessment). The OSHA regulations, however, do apply to any disturbance of this material, both for demolition and renovation activities. If the contractor, during the removal of identified concealed asbestos-containing materials, deems it necessary to disturb any of these non-friable asbestos-containing materials and by so doing makes them become regulated, then the contractor must comply with all applicable regulations. Whenever the contractor disturbs these materials in order to access concealed friable asbestos-containing materials, then any cost associated with this removal will be included in the cost of the contractor's bid. There will be no reimbursement to the contractor for any expense associated with the removal of any drywall wall and/or ceiling systems.

OSHA-Regulated Asbestos

- a) There are building materials that contain not more than 1% asbestos throughout the facility. If in the process of accessing concealed asbestos-containing materials the contractor disturbs these materials, then the contractor will be responsible for all associated costs incurred to comply with all applicable regulations. These materials are not regulated under NESHAPS or AHERA. However, potential exposure to asbestos from these materials is still regulated under the OSHA asbestos in

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Scope of the Work – Asbestos Abatement

construction standard, 29 CFR 1926.1101. This standard establishes exposure limits, work practices and notification requirements for employers whose employees may be exposed to the asbestos as a result of demolition or renovation activities involving these materials. If the contractor during the removal of identified concealed asbestos-containing materials deems it necessary to disturb any of these wall and or ceiling systems, then the contractor must comply with all applicable regulations. Whenever the contractor disturbs this material in order to access concealed asbestos-containing materials then any cost associated with this removal will be included in the cost of the contractor bid. There will be no reimbursement to the contractor for any expense associated with any wall or ceiling systems. The following materials contain not more than 1% asbestos (plaster).

Utilities

- a) The contractor is required to supply portable toilets for the duration of the abatement.
- b) The gas has been terminated. All cost to provide temporary heat is the responsibility of the contractor.
- c) Contractor shall be responsible for all cost associated with providing temporary electrical service and distribution cost for this project. At the completion the contractor shall disconnect and remove temporary electrical service.
- d) Contractor shall be responsible for all cost associated with providing temporary water service and distribution cost for this project. At the completion the contractor shall disconnect and remove temporary water service.
- e) Individual fixtures and valves in some areas may be salvaged by the owner.
- f) Water service has been interrupted. If contractor intends to use the water, it is the responsibility of the contractor to install the necessary equipment to supply the water.
- g) Contractor shall provide temporary lighting, as necessary, to adequately illuminate all work areas during the course of the project.

Miscellaneous Materials

- a) In the base bid, contractor will dismantle and inspect fire doors. At least one door of each type, within each build date must be disassembled and inspected with the owner's representative to determine condition. Selection of doors must be with the agreement of the owner's representative.
- b) Safes are to be removed and disposed of as asbestos containing material.
- c) Sinks with undercoating are to be disposed of as asbestos containing waste.

Fluorescent Lamps/Fixtures & Mercury

- a) Fluorescent light fixtures that are to be demolished may be removed and disposed of as common demolition debris after lamps and ballasts have been removed. Lamps from such fixtures are to be removed, properly packaged, and sent to an approved recycling facility for disposal and/or destruction. Light fixture ballasts are to be removed from the light fixture carcass, properly packaged, and sent to an approved recycling facility for disposal and/or destruction. Proper packaging is to be supplied by the contractor. Light fixture carcasses that are not contaminated by ballast oil

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Scope of the Work – Asbestos Abatement

may be disposed of as common demolition debris. **In the event the light fixture carcass has been stained/contaminated by ballast oil, such carcasses are to be packaged, transported and disposed of as PCB contaminated waste.**

- b) If any mercury-containing switches, thermostats or other equipment are encountered during asbestos abatement activities, owner's representative is to be immediately notified to arrange removal and proper recycle/disposal of mercury-containing equipment.

General Comments

- a) Smoking will not be permitted within the building enclosure.
- b) Wherever HEPA exhaust is ducted through windows or doors, the window or door is to be fitted with a mechanically fastened plywood sheet with a cut-out for the exhaust duct. Use of just poly to seal the window around the duct is not permitted. Holes in plywood are to be covered at the conclusion of the abatement after exhaust ducts are removed.
- c) The use of opaque post-abatement lock down encapsulants, such as paint, adhesives, etc. will not be allowed. Lock down encapsulants, if used, shall be industry standard translucent and/or clear-drying encapsulants, specifically designed for use after asbestos removal. Contractor shall provide Associate with product information on any proposed encapsulant(s) for review and acceptance prior to application.
- d) The contractor will be reimbursed for all unit price items only if the on site owner's representative and the contractor's supervisor agree to the actual quantities of materials to be removed prior to the removal. The contractor will not be reimbursed for any concealed materials removed that have not been verified by the owner's representative prior to their removal.
- e) The project work areas shall be available to the contractor 40 hours per week during daylight hours. Weekend work will only be allowed if deemed necessary by the Owner and/or the Associate.
- f) Clearance testing for all removal activities shall consist of aggressive (PCM) sampling in accordance with established AHERA protocols, at the Owner's discretion, depending on the quantities within the individual work areas.

B. ASBESTOS CONTAINING MATERIALS

1. The work of these specifications 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 work site is set forth herein. If any other ACM or PACM is found, immediately notify the owner, other employers and employees regarding the location and quantity of the ACM or PACM.

C. ASBESTOS HEALTH RISK

1. 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.

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Scope of the Work – Asbestos Abatement

2. 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.

D. CONTRACTOR USE OF PREMISES

1. Use of the Site: Limit use of the premises to work in areas indicated. Do not disturb portions of the site beyond the areas in which the work is indicated.
 - a) Owner Occupancy: Allow for owner occupancy and use.
 - b) Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the owner, the owner's employees, and emergency vehicles at all time. Do not use these areas for parking or storage of materials. Schedule removal of debris as well as deliveries in agreement/coordination with the owner's use of the site and occupants.
2. Use of the Building: Maintain the building in a weather tight condition throughout the construction period. Repair of damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

E. OCCUPANCY REQUIREMENTS

1. Partial Owner Occupancy: The owner may occupy the site during the abatement. Cooperation with the owner during demolition operations to minimize conflicts and facilitate owner usage. Perform the work so as not to interfere with owner's operations.

F. AIR MONITORING

1. The owner has contracted for air monitoring to be performed throughout the entire project. The owner, however, will only pay for 30 shifts (8 hrs/day) or 24 shifts (10 hr/day) for air monitoring services. The owner will only pay up to 10 hours per shift. As such the contractor is responsible for the reimbursement to the owner's air monitoring firm for all time expended beyond the 10, including overtime.
2. The contractor is also responsible for reimbursement to the owner's air monitoring firm for all time expended beyond the 10 hours in a shift. The reimbursement will be accomplished by a deduct from payment to the contractor. Air monitoring will be conducted both outside and inside of the work area before the work, during the work, and for clearance sampling at the end of the project.
3. If the asbestos abatement and selective non-asbestos demolition activities are not completed within the allotted shifts, or if the daily hour limit is exceeded, the asbestos abatement contractor will have deducted from its payment all cost associated with the

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Scope of the Work – Asbestos Abatement

additional time. This reimbursement is above and beyond any liquidated damages that may be assessed under this contract.

4. Any additional hours for this project, beyond the regular workshift, will be billed at a rate equal to that charged to the owner, which is applicable to on site and off site consulting, research, data review, travel, and report generation. This rate is applicable to the first eight (8) hours of a shift. For additional hours expended beyond the first eight (8) hours of a shift, Client will be billed at a multiple of (1.5) times the hourly rate.
5. Air monitoring will be conducted both outside and inside of the work area before the work, during all of the work, and for clearance sampling at the end of the project.
 - a) Outside of the Work Area: Monitoring will include sampling of air outside of the work area to detect faults in the work area isolation such as:
 - (1) Contamination of the building outside of the work area with airborne asbestos fibers.
 - (2) Failure of filtration or rupture in the differential pressure system.
 - (3) Contamination of air outside the building with airborne asbestos fibers.
 - b) Inside the Work Area: The air monitoring firm may monitor airborne fiber counts in the work area. The purpose of this air monitoring is to detect airborne asbestos concentrations that 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.
6. Work Area Clearance: As required by AHERA, clearance air sampling will be performed by the air monitoring firm at the completion of asbestos abatement work.
7. The contractor shall facilitate and cooperate fully with air monitoring performed and shall take no action intended to distort or falsify measurements of fiber concentrations. In the event that the contractor fails to comply with these provisions, the owner may direct the contractor to stop work.
8. The contractor shall provide sufficient electrical circuits and extension cords for the air monitoring firm to conduct air monitoring.

G. PROJECT WORK HOURS

1. All work shall be performed Monday through Friday, 7:00 a.m. to 6:00 p.m., except during emergencies, as authorized by the owner. The contractor may perform weekend work as permitted by the owner. The contractor shall observe legal holidays unless the owner approves alternative arrangements.

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Scope of the Work – Asbestos Abatement

- 2. The contractor shall not work more than 5-8 hour shifts or 4-10 hour shifts per week. If the contractor is granted authorization to work additional shifts other than the standard 40 hour work week, then the contractor shall be required to reimburse the consultant / owner’s representative for all additional cost incurred including travel time, overtime incurred and all additional analytical fees.
- 3. Refer to time of completion and for the number of shifts that have been allocated for this project in the preceding section. If the contractor exceeds the number of allocated shifts, the contractor shall be required to reimburse the consultant / owner's air monitoring firm for all additional shifts and air samples.

H. SCHEDULE OF AIR SAMPLES

- 1. Sample Cassettes: Samples will be collected on 25 mm. cassettes as follows:
 - a) PCM: 0.8 micrometer mixed cellulose ester.
 - b) TEM: 0.45 micrometer mixed cellulose ester or 0.40 micrometer polycarbonate, with 5.0 micron mixed cellulose ester backing filter.
- 2. 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 air monitoring firm may vary depending upon job conditions and the analytical method used.
- 3. Base Line
 - a) Before Start of Work: The air monitoring firm must secure air samples to establish a base line.
 - b) PCM Samples

Sample Location	Number of Samples	Limit Value (fibers/cc)	Approximate Volume (liters)	Rate (liters/minute)
Inside Work Area	3	0.01	1,200	1-16
Outside Work Area	3	0.01	1,200	1-16

c) TEM Samples

Sample Location	Number of Samples	Limit Value (structures/cc)	Approximate Volume (liters)	Rate (liters/minute)
Inside Work Area	1	0.005	1,200	1-10
Outside Work Area	1	0.005	1,200	1-10

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- d) Base Line: A level expressed in fibers per cubic centimeter that equals the greater of either (1) or (2).
 - (1) Average of the PCM samples collected outside the work area.
 - (2) 0.01 fibers per cubic centimeter.
- e) Samples collected for TEM analysis will be held without analysis. These samples will be analyzed under the conditions and terms as set forth herein.

4. Daily

- a) The air monitoring firm will take samples at any time during the project as appropriate to ensure compliance with all required monitoring and the conditions of this scope of work.
- b) 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 herein, the level is considered to have been exceeded.
- c) PCM Samples

Sample Location	Number of Samples	Limit Value (fibers/cc)	Approximate Volume (liters)	Rate (liters/minute)
Inside Work Area	2	0.1	100	1-10
Outside Work Area	4	0.01	1,000	1-10
HEPA Exhaust	1	0.01	1,000	1-10

- 5. Additional samples may be taken at the air monitoring firm’s discretion. If airborne fiber counts exceed allowed limits, additional samples may be taken as necessary to monitor fiber levels.

I. ANALYTICAL METHODS

- 1. The air monitoring firm in analyzing filters used to collect air samples will use either, or both, of the following methods. Sampling rates may be varied from printed standards to allow for high volume sampling.
 - a) Phase contrast microscopy (PCM) will be performed using the NIOSH 7400 method.
 - b) Transmission electron microscopy (TEM) will be performed using the analysis

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Scope of the Work – Asbestos Abatement

method set forth in the AHERA regulation 40 CFR Part 763, Appendix A.

J. LABORATORY TESTING

1. The services of a testing laboratory may be employed by the air monitoring firm to perform laboratory analyses of the air samples.
2. The contractor will be provided with a copy of all air monitoring tests and results on a daily basis.

K. FIBERS AND STRUCTURES

1. 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.
 - a) 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 owner 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 with 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).
 - b) 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.

II. EXECUTION

A. STOP ACTION LEVELS

1. Inside Work Area: Maintain an average airborne count inside the work area of less than 0.50 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 0.50 fibers per cubic centimeter, stop all work, leave pressure differential system in operation and notify the owner. After correcting cause of high fiber levels, do not recommence work until authorized by the owner.
 - a) If airborne fiber counts exceed 1.0 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. After correcting cause of high fiber levels, do not recommence work until authorized by owner.

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Scope of the Work – Asbestos Abatement

2. Outside Work Area: Any air sample taken outside of the work area that exceeds the established baseline will require stopping all work except corrective actions. The air monitor will determine the source of the high reading and so notify the contractor and owner.
 - a) If the high reading was the result of a failure of work area isolation measures, as determined by the owner, initiate the following actions:
 - (1) Immediately erect new critical barriers, as set forth in Section 02 82 16.16, 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).
 - (2) Decontaminate the affected area in accordance with Section 02 82 16.33, Cleaning & Decontamination Procedures.
 - (3) Require that respiratory protection, as set forth in Section 02 82 13.16.B, Respiratory Protection, be worn in affected area until area is cleared for re-occupancy in accordance with Section 02 82 33.16, Project Decontamination and Clearance Testing.
 - (4) 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.
 - (5) 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 02 82 16.23, Decontamination Units, at entry point to affected area.
 - (6) After a visual inspection and acceptable final air sampling results have been conducted, 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 02 82 33.16, Project Decontamination and Clearance Testing.
 - b) If the high reading was the result of other causes, as determined by the air monitor, corrective actions shall be initiated.
3. 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, as determined by the owner.

B. STOP WORK

1. If the air monitor issues a stop work order, immediately and automatically conform to that stop work order, while maintaining temporary enclosures and pressure differential. Do not recommence abatement work until authorized by owner.

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Scope of the Work – Asbestos Abatement

2. After being presented with a stop work order, immediately:
 - a) Cease all asbestos removal activities, or any other activities that disturbs ACM.
 - b) Repair any fallen, ripped or otherwise failed work area isolation measures.
 - c) Maintain in operation all work area isolation measures.
 - d) Maintain all worker protections.
 - e) Fog the air in the work area with a mist of amended water to reduce airborne fiber levels.
3. Do not recommence work until authorized by the owner.

END OF SECTION

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Coordination

I. GENERAL

A. SUMMARY

1. This section includes administrative and supervisory requirements necessary for coordinating construction operations.

B. COORDINATION

1. Owner Occupancy: Coordinate construction operations and scheduling with partial occupancy requirements of the owner and the owner's use of utilities.
2. Coordinate construction operations included in various sections of these specifications to assure efficient and orderly completion of each part of the work. Coordinate all demolition and construction operations included under different sections that depend on each other for proper installation, connection, and operation.
 - a) Schedule 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.
3. 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.
 - a) Prepare similar memoranda for the owner and separate contractors where coordination of their work is required.
 - b) Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the work.

C. CONTINGENCY PLAN

1. Contingency Plan: Prepare a contingency plan for emergencies or any other event that may require breaching of work area containment or modification 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.

D. NOTIFICATIONS

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Coordination

1. Notify other entities at the job site of the nature of the asbestos abatement activities, location of asbestos containing materials (ACM), and requirements relative to asbestos set forth in these specifications and applicable regulations.
2. 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 fire fighting equipment, and other information needed by agencies providing emergency services.

E. PRE-CONSTRUCTION INSPECTION

1. Inspect areas in which work will be performed prior to commencement of work. Prepare a listing of damage to structure, surfaces, and equipment or of surrounding properties that could be misconstrued as damage resulting from the work. Submit to owner for record purposes prior to starting work.

F. ADMINISTRATIVE AND SUPERVISORY PERSONNEL

1. 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.
 - a) Training: The project supervisor 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).
 - b) Experience: The project supervisor must have demonstrable experience in the successful management of asbestos abatement projects that are similar to the work of this specification.
 - (1) The project supervisor must have a minimum of two (2) years' experience in the on-site management of asbestos abatement projects.
 - (2) The project supervisor 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 project supervisor is to be a competent person as required by OSHA in 29 CFR 1926.
2. Supervisors/Forepersons: Provide full-time supervisors/forepersons who are experienced in the supervision of asbestos abatement work areas including work practices, building

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Coordination

and personnel, disposal practices, etc. These persons are contractor employees directly responsible to the project supervisor.

3. Accreditation: The project supervisor, supervisors/forepersons are to be accredited as an Asbestos Abatement Supervisor in accordance with the AHERA regulation 40 CFR Part 763, Subpart E, Appendix C.

G. PRE-CONSTRUCTION CONFERENCE

1. An initial progress meeting, recognized as “Pre-Construction Conference”, will be convened by the owner prior to start of any work. The pre-construction conference will be scheduled before start of construction, at a time convenient to the owner and the contractor.
2. Attendees: Authorized representatives of the owner will be in attendance. An authorized representative of the contractor shall attend the conference. All participants at the conference shall be familiar with the project and authorized to conclude matters relating to the work.
3. 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 but not limited to the following:
 - a) Tentative construction schedule
 - b) Critical work sequencing
 - c) Designation of responsible personnel
 - d) Procedures for processing field decisions
 - e) Submittal of drawings, product data, and samples
 - f) Preparation of record documents
 - g) Use of the premises
 - h) Parking availability
 - i) Office, work, and storage areas
 - j) Equipment deliveries and priorities
 - k) Safety procedures
 - l) First aid

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Coordination

- m) Security
- n) Housekeeping
- o) Working hours

H. PROGRESS MEETINGS

1. General: The owner will hold general progress meetings as found in Section 00 82 11.16 Scope of Work – Asbestos Abatement.
2. Attendees: Representatives of the owner 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.
3. Agenda: Be prepared to discuss the following items at the progress meetings. Review other items of significance that could affect progress.
 - a) Contractor’s Construction Schedule: Review progress since the last meeting as required in Section 00 82 11.19 Coordination – Asbestos Abatement. 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 insure that current and subsequent activities will be completed within the contract time.
 - b) Review and coordinate the present and future needs of each entity present.
 - c) Review Safety Requirements of upcoming work.
4. Reporting: Revise the contractor’s construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Include a brief summary, in narrative form, of progress since the previous meeting and report.

I. RECORD KEEPING

1. Daily Log: Maintain a daily log (in an area accessible to the owner) as a bound, sequential, hand-written record, carefully prepared daily, that documents but is not limited to the following items:
 - a) Meetings; purpose, attendees, brief discussion
 - b) Special or unusual events
 - c) Documentation of contractor’s completion of the following:

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Coordination

- (1) Inspection of work area preparation prior to start of removal and daily thereafter
 - (2) Removal of any sheet plastic barriers
 - (3) 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
 - (4) Removal of waste materials from work area
 - (5) Decontamination of equipment
 - (6) Contractor's final inspection/final air test analysis
 - (7) Disposal / dumping records
 - (8) Bills of Lading / transportation records
2. Entry/Exit Log: Maintain a daily log documenting the dates and time of but not limited to, the following items:
- a) Visitations; authorized and unauthorized, with the following information:
 - (1) Name
 - (2) Organization
 - (3) Entry time
 - (4) Exit time
 - (5) Respiratory protection
 - b) Personnel, by name, entering and leaving the work area with the following information:
 - (1) Printed name
 - (2) Identification number
 - (3) Entry time
 - (4) Exit time
 - (5) Respiratory protection

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Coordination

3. Air Monitoring Results: Post personnel air monitoring results within 24 hours of sample collection. Post the respiratory protection requirements for the work in progress.
4. Maintain the following documentation in a location accessible to workers:
 - a) Documentation of inspections by OSHA, EPA or local authority
 - b) Respiratory Protection Program

J. SPECIAL REPORTS

1. General: Except as otherwise indicated, submit special reports directly to owner within one day of occurrence requiring special report.
2. Reporting Unusual Events: When an event of unusual and significant nature occurs at site, prepare and submit report. List chain of events, persons participating, response by contractor's personnel, evaluation of results or effects, and similar pertinent information. When such events are known or predictable in advance, advise owner in advance at earliest possible date.
3. Reporting Accidents: Prepare and submit reports of significant accidents. Record and document data and actions. For this purpose, a significant accident is defined to include events where personal injury is sustained, property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury.
4. Report Discovered Conditions: When an unusual condition of the building is discovered during the work, prepare and submit a special report indicating condition discovered.

END OF SECTION

Reference Standards and Definitions – Asbestos Abatement

I. GENERAL

A. DEFINITIONS

1. General

- a) “Indicated”: The term “indicated” refers to graphic representations, notes, or schedules. Terms such as “shown,” “noted,” “scheduled,” and “specified” are used to help the reader locate the reference. Location is not limited.
- b) “Directed”: Terms such as “directed,” “requested,” “authorized,” “selected,” “approved,” “required,” and “permitted” mean directed by the owner, requested by the owner, and similar phrases.
- c) “Regulations”: The term “regulations” includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- d) “Furnish”: The term “furnish” means supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- e) “Install”: The term “install” describes operations at the project site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- f) “Provide”: The term “provide” means to furnish and install, complete and ready for the intended use.
- g) “Project Site”: The term “project site” is the space available to the contractor for performing construction activities, either exclusively or in conjunction, with others performing other work as part of the project.
- h) “Testing Agency”: The term “testing agency” is an independent entity engaged to perform specific inspections or tests, either at the project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.
- i) “Stop Work Order”: The term “stop work order” is a written order to cease asbestos removal, encapsulation or enclosure activities. The contractor must maintain work area enclosure, pressure differential isolation and ventilation of the work area, and decontamination units during the period that a stop work order is in affect.
- j) “Project Supervisor”: This is the contractor’s representative at the work site. This person must be a competent person as defined by OSHA in 29 CFR 1926.

Reference Standards and Definitions – Asbestos Abatement

2. Definitions Relative to Asbestos Abatement:

- a) “Adequately Wet”: To sufficiently mix or penetrate with liquid to prevent the release of particulate. If visible emissions are observed coming from the asbestos-containing material (ACM), then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wetted.
- b) “Asbestos”: The asbesti-form varieties of chrysotile (serpentine), amosite (cummingtonite-grunerite), crocidolite (riebeckite), tremolite, anthophyllite, actinolite, and any of these minerals that have been chemically treated and/or altered. Materials described in the contract documents as asbestos are to be considered as asbestos.
- c) “Asbestos Containing Material (ACM)”: Any material containing more than 1% asbestos as determined using the methods specified in appendix A, Subpart F, 40 CFR part 763, section 1, Polarized Light Microscopy.
- d) “Asbestos Containing Waste Material”: Any waste that contains asbestos. This term includes filters or other materials contaminated with asbestos. This term also includes regulated asbestos containing material waste and materials contaminated with asbestos including disposable equipment and clothing.
- e) “Asbestos Debris”: Pieces of ACM that can be identified by color, texture, or composition, or dust, if the dust is determined by an accredited inspector to be ACM.
- f) “Certified Industrial Hygienist (C.I.H.)”: One certified in the practice of industrial hygiene by the American Board of Industrial Hygiene.
- g) “Competent Person”: An individual who meets the requirements of OSHA as a “competent person” for the specific activity involved in the work. The “competent person” must meet the requirements of 29 CFR 1926.32(f) and 29 CFR 1926.1101.
- h) “Filter”: A media component used to remove solid or liquid particles from air and water.
- i) “Friable Asbestos”: Any asbestos containing material that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.
- j) “Grinding”: To reduce to powder or small fragments; includes manual or mechanical chipping or drilling.
- k) “HEPA Filter”: A High Efficiency Particulate Air filter capable of trapping and retaining 99.97% of all particles of 0.3 microns in diameter.

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Reference Standards and Definitions – Asbestos Abatement

- l) “HEPA Filter Vacuum Collection Equipment (or vacuum cleaner)”: High efficiency particulate air filtered vacuum collection equipment with a HEPA filter.
- m) “Intact”: ACM that has not been crumbled, pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.
- n) “Leak-tight”: Solids or liquids cannot escape or spill out. It also means dust-tight.
- o) “Negative Pressure Enclosure (NPE)”: A pressure differential and ventilation system where the work area is maintained at a negative pressure relative to air pressure outside the work area.
- p) “Non-friable Material”: Any material that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure and has not been rendered friable.
- q) “Personal Monitoring”: Sampling of the asbestos fiber concentrations within the breathing zone of an employee.
- r) “Surfacing Material”: Material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes).
- s) “Thermal System Insulation (TSI)”: Insulation applied to pipes, fittings, boilers, breaching, tanks, ducts or other components to prevent heat loss or gain.
- t) “Time Weighted Average (TWA)”: The average concentration of a contaminant in air during a specific time period as determined by the method prescribed in Appendix A of 29 CFR part 1926.1101.
- u) “Visible Emissions”: Any emissions containing particulate material that are visually detectable without the aid of instruments. This does not include water vapor.

B. SPECIFICATION FORMAT AND CONTENT EXPLANATION

- 1. Specification Format: These specifications are organized into divisions and sections based on CSI’s MasterFormat numbering system.
- 2. Specification Content: This specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
 - a) Abbreviated Language: Language used in these specifications is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated, as the sense requires. Singular words will be

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Reference Standards and Definitions – Asbestos Abatement

interpreted as plural and plural words interpreted as singular where applicable as the context indicates.

- b) Streamlined Language: The specifications generally use the imperative mood and streamlined language. Requirements expressed in the imperative mood are to be performed by the contractor. At certain locations in the text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the contractor or by others when so noted.
 - c) INDUSTRY STANDARDS
3. Applicability of Standards: Except where more stringent requirements are indicated, applicable construction industry standards have the same force and effect as if bound or copied directly into the specifications to the extent referenced. Such standards are made a part of the specifications by reference.
 4. Publication Dates: Comply with the standards in effect as of the date of the specifications.
 5. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements, comply with the most stringent requirement. Refer to the owner before proceeding for a decision on requirements that are different but apparently equal, and where it is uncertain which requirement is the most stringent.
 - a) Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum acceptable. The actual installation may comply exactly with the minimum quantity or quality specified or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the owner for a decision before proceeding.
 6. Copies of Standards: Each entity engaged in construction on the project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the specifications.
 - a) Where copies of standards are needed to perform a required construction activity, the contractor shall obtain copies directly from the publication source.
 7. Standards which apply to asbestos abatement work or hauling and disposal of asbestos waste materials include, but are not limited, to the following:
 - a) American National Standards Institute (ANSI)

1430 Broadway
New York, New York 10018
(212) 354-3300

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Reference Standards and Definitions – Asbestos Abatement

- (1) Fundamentals Governing the Design and Operation of Local Exhaust Systems, Publication Z9.2
- (2) Practices for Respiratory Protection, Publication Z88.2
- b) American Society for Testing and Materials (ASTM)
100 Bar Harbor Drive
West Conshocken, Pennsylvania 19428-2959
(610) 832-9585
 - (1) Safety and Health Requirements Relating to Occupational Exposure to Asbestos, E849
 - (2) ASTM Standard Practice for Encapsulants for Spray or Trowel-Applied Friable Asbestos-Containing Building Materials, E1494
 - (3) ASTM Standard Practice for Visual Inspection of Asbestos Abatement Projects, E1368
8. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations are defined to mean the associated names. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the specifications.
 - a) ACIL (American Council of Independent Laboratories)
1629 K St., NW
Washington, DC 20006
(202) 887-5872
 - b) ACGIH (American Conference of Governmental Industrial Hygienists)
1330 Kemper Meadow Dr.
Cincinnati, Ohio 45240
(513) 742-2020
 - c) AIA (The American Institute of Architects)
1735 New York Ave., NW
Washington, DC 20006
(202) 626-7300
 - d) AIHA (American Industrial Hygiene Association)
2700 Prosperity Ave., Suite 250
Fairfax, Virginia 22031
(703) 849-8888
 - e) ANSI (American National Standards Institute)
11 West 42nd St., 13th Floor
New York, New York 10036
(212) 642-4900

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Reference Standards and Definitions – Asbestos Abatement

- f) ASTM (American Society for Testing and Materials)

100 Barr Harbor Drive
West Conshohocken, Pennsylvania 19428-2959
(610) 832-9585

9. Federal Government Agencies: Names and titles of federal government agencies are often abbreviated. The following acronyms or abbreviations referenced in the Specifications indicate names of agencies of the federal government. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the specifications.

- a) CFR (Code of Federal Regulations)

N. Capitol St., between G and H St., NW
Washington, DC 20402
(202) 783-3238

- b) DOT (Department of Transportation)

400 Seventh St., SW
Washington, DC 20590
(202) 366-4000

- c) EPA (Environmental Protection Agency)

401 M St., SW
Washington, DC 20460
(202) 260-2090

- d) FS (Federal Specification)

Specifications Unit (WFSIS)
7th and D St., SW
Washington, DC 20407
(202) 708-9205

- e) NIST (National Institute of Standards and Technology)

(U.S. Department of Commerce)
Gaithersburg, Maryland 20899
(301) 975-2000

- f) OSHA (Occupational Safety and Health Administration)

(U.S. Department of Labor)
200 Constitution Ave., NW
Washington, DC 20210
(202) 219-6091

END OF SECTION

I. GENERAL

A. SUMMARY

1. This section sets forth governmental regulations that 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.
 - a) Requirements include adherence to work practices and procedures set forth in applicable codes, regulations and standards.
 - b) Requirements include obtaining permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with codes, regulations, and standards.

B. CODES, REGULATIONS AND STANDARDS

1. **General Applicability of Codes, Regulations and Standards:** Except to the extent that more explicit or more stringent requirements are written directly into the specifications, all applicable codes and regulations have the same force and effect (and are made a part of the specifications by reference) as if copied directly into the specifications, or as if published copies are bound herewith.
2. **Contractor Responsibility:** The contractor shall assume full responsibility and liability for compliance with all applicable federal, state, and local regulations, including but not limited to those set forth below, 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 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.
3. **Federal requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:**
 - a) **U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), including but not limited to:**
 - (1) **Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite**
Final Rules, Title 29 CFR Part 1910, Section 1001
Final Rules, Title 29 CFR Part 1926, Section 1101

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Codes, Regulations and Standards – Asbestos Abatement

- (2) Respiratory Protection
 - Title 29 CFR Part 1910, Section 134
 - Title 29 CFR Part 1926, Section 103

- (3) Personal Protective Equipment for General Industry
 - Title 29 CFR Part 1910, Section 132
 - Title 29 CFR Part 1926, Section 95

- (4) Access to Employee Exposure and Medical Records
 - Title 29 CFR Part 1926, Section 33

- (5) Hazard Communication
 - Title 29 CFR Part 1926, Section 59

- (6) Specifications for Accident Prevention Signs and Tags
 - Title 29 CFR Part 1910, Section 145

- (7) Permit Required Confined Space
 - Title 29 CFR Part 1910, Section 146

- (8) Construction Industry
 - Title 29 CFR Part 1910, Section 1001
 - Title 29 CFR Part 1926, Section 1101

- (9) Construction Industry - General Duty Standards
 - Title 29 CFR Part 1926, Sections 20-35

- b) U. S. Department of Transportation (DOT), including but not limited to:
 - (1) Hazardous Substances
 - Title 49 CFR Parts 171 and 172

 - (2) Hazardous Material Regulations, General Awareness and Training Requirements for Handlers, Loaders and Drivers
 - Title 49 CFR Parts 171-180

 - (3) Hazardous Material Regulations, Editorial and Technical Revisions
 - Title 49 CFR Parts 171-180

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Codes, Regulations and Standards – Asbestos Abatement

- c) U. S. Environmental Protection Agency (EPA), including but not limited to:
 - (1) Asbestos Hazard Emergency Response Act (AHERA) Regulation
Title 40 CFR Part 763, Subpart E
 - (2) EPA Model Accreditation Plan, Asbestos Containing Materials Final Rule & Notice
Title 40 CFR Part 763, Subpart E, Appendix C
 - (3) National Emission Standard for Hazardous Air Pollutants (NESHAP), National Emission Standard for Asbestos
Title 40 CFR Part 61, Subpart A and Sub-part M (Revised Subpart B)
- 4. State requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:
 - a) Ohio Administrative Code, Chapters 3701-34 and 3745-20
- 5. Local requirements that govern asbestos abatement work or hauling and disposal of asbestos waste materials. Abide by all local requirements that govern asbestos abatement work or hauling and disposal of asbestos waste materials.

C. NOTICES

- 1. U.S. Environmental Protection Agency
 - a) Postmark 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 least 10 working days prior to beginning any work on asbestos-containing materials (ACM).
 - b) A copy of the notification is to be provided to the air monitoring firm at least 5 business days prior to submittal to the regional NESHAP contact.
 - c) Notification: Include the following information at a minimum in the notification sent to the NESHAP contact:
 - (1) Indication whether the notification is original or revised
 - (2) Name, address, and telephone number of owner or operator
 - (3) Name, address, and telephone number of contractor
 - (4) Type of operation (demolition or renovation)

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Codes, Regulations and Standards – Asbestos Abatement

- (5) Description of the facility or affected portion of the facility being demolished or renovated, including the size (square feet or meters), number of floors, age, and present and prior use of the facility.
- (6) Estimate of the approximate amount of RACM to be removed from the facility in terms of linear feet (linear meters) of pipe, and surface area in square feet (square meters) of other facility components. Also estimate the approximate amount of Category I and Category II non-friable ACM in the affected part of the facility that will not be removed.
- (7) For facilities in which the amount of friable asbestos materials is less than 260 linear feet (80 linear meters) on pipes and less than 160 square feet (15 square meters) or 35 cubic feet (1 cubic meter) if the length and width could not be measured.
- (8) 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.
- (9) 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.
- (10) Scheduled starting and completion dates of demolition or renovation.
- (11) 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.
- (12) 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).
- (13) Name and location of the waste disposal site where the asbestos containing waste material will be deposited.
- (14) 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.
- (15) Description of procedures to be followed in the event that unexpected RACM is found or Category II non-friable ACM becomes crumbled, pulverized, or reduced to powder.
- (16) Name, address, and telephone number of the waste transporter.

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2. Alternative Work Procedures

- a) Provide a copy of evaluation and certification of alternative work procedures (such as dry removal) to the owner and owner's representative 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.
- b) Prior written approval for dry removal must be requested in writing from the EPA per 40 CFR 61.145(c)(3)(i).

3. State & Local Agencies

- a) Send written notification as required by state and local regulations including the Ohio Department of Health (ODH) prior to beginning any work on ACM.
- b) A copy of the notification to be provided to the air monitoring firm at least 5 business days prior to submittal to ODH.
- c) Notification to ODH: include the following information, at a minimum:
 - (1) Notify the director at least ten business days before beginning the asbestos hazard abatement project. Prior notification of asbestos abatement projects shall be made on a form prescribed by the director, shall be accompanied by a fee of twenty-five dollars for each project and shall contain the following information:
 - (a) *Entity name and address.*
 - (b) *Location of abatement project.*
 - (c) *Description of abatement project.*
 - (d) *Size of project and type of asbestos material.*
 - (e) *Scheduled start-up and completion dates.*
 - (f) *Name of asbestos hazard abatement specialist in charge of project.*
 - (g) *Names and addresses of disposal sites.*

D. LICENSES

1. 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.

E. POSTING AND FILING OF REGULATIONS

1. Posting and Filing of Regulations: Post all notices required by applicable federal, state and local regulations. Maintain two (2) copies of applicable federal, state and local regulations and standards. Maintain one copy of each at job site. Keep one of each copy on file in contractor's office.

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Codes, Regulations and Standards – Asbestos Abatement

F. SUBMITTALS

1. Before Start of Work: Submit the following to the owner and a copy to the construction manager. No work shall begin until these submittals are returned with owner's approval.
 - a) Permits, Licenses, and Certificates: Submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records.
 - b) Notices: Submit notices required by federal, state and local regulations together with proof of timely transmittal to agency requiring the notice.
 - c) Permits: Submit copies of current valid permits required by state and local regulations.
 - d) Licenses: Submit copies of all state and local licenses and permits necessary to carry out the work.
 - e) Project Agreement: Submit a completed copy of the Asbestos Hazard Project Agreement (02 82 11.29) to the owner's representative.

END OF SECTION

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Asbestos Hazard Abatement Agreement

All employees working on the abatement portion of this project will be currently licensed with the Ohio Department of Health.

All air clearances will be analyzed in accordance with the National Institute of Occupational Safety and Health method 7400. A minimum of three PCM samples shall be taken. All sample results will be less than or equal to 0.01 f/cc.

If samples are to be analyzed by transmission electron microscopy (TEM), they shall be analyzed in accordance with the regulations established by United States Environmental Protection Agency, 40 CFR Part 763, Subpart E, Appendix A. The average of all samples taken will be less than or equal to 70 s/mm².

All air clearance sampling will be conducted by an Asbestos Hazard Abatement Air Monitoring Technician or Asbestos Hazard Evaluation Specialist certified by the Ohio Department of Health or a Certified Industrial Hygienist as certified by the American Board of Industrial Hygiene.

All asbestos abatement activities will be done in accordance with all applicable federal, state and local asbestos regulations.

DESCRIPTION OF WORK:

Facility:	Specific Location(s):	Type of Removal:
Quantity to be Removed:	Sq Ft:	LF:
Method of Removal:	Containment:	Neg Prsr Glv Bg Pro:

Acceptance by:

Building Owner / Representative

Contractor Representative and Date

02 82 13.13
Glovebag Asbestos Abatement

I. GENERAL

A. SUBMITTALS

1. Before start of work, have available onsite and at owner's request submit to the owner Material Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communications Standard (29 CFR 1910.1200), for all products to be utilized by the contractor for the work.

II. PRODUCTS

A. GLOVEBAG

1. Glovebag: 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, equipped for attachment to a HEPA vacuum, and that has a device to prevent the bag from collapsing during use. Glovebag is to be not more than 60 inches by 60 inches in size.

B. SHEET PLASTIC

1. 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.

C. MISCELLANEOUS MATERIALS

1. 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.
2. Spray Cement: Provide spray adhesive in aerosol cans that are specifically formulated to stick tenaciously to sheet polyethylene.
3. Wetting Materials: For wetting prior to disturbance of ACM, use either amended water or a removal encapsulant.
 - a) Amended Water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water that results in wetting of the ACM and retardation of fiber release during disturbance of the material.
 - b) Removal Encapsulant: Provide a penetrating type encapsulant designed specifically for removal of ACM. Use a material that results in wetting of the ACM and retardation of fiber release during disturbance of the material.

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Glovebag Asbestos Abatement

4. 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.

III.EXECUTION

A. GENERAL

1. Before start of work, complete the requirements of Section 02 82 16.19 Regulated Areas.

B. WORKER PROTECTION

1. 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.

C. GLOVEBAG

1. Before start of work, complete the requirements of Section 02 82 13.16.A Worker Protection and Section 02 82 13.16.B Respiratory Protection.
2. Glovebag: Remove ACM inside a glovebag according to the following procedure.
 - a) Use at least two persons to perform glovebag removal operations.
 - b) Use each glovebag only once.
 - c) Do not move glovebag once it has been mounted in place.
 - d) Do not use glovebag on surface whose temperature exceeds 150F (65.6C).
 - e) 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 rewettable fiberglass cloth, or render material intact by some other method. Place one layer of duct tape around undamaged or repaired pipe at each location where the glovebag will be attached.
 - f) Slit top of the glovebag 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 space so that the top of the glovebag will be clear of the pipe after installation.
 - g) Place necessary tools into pouch located inside glovebag.
 - h) Place a strip of duct tape along both edges of the open top slit of glovebag for reinforcement.

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Glovebag Asbestos Abatement

- i) Place the glovebag around the 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 glovebag is clear of pipe. Seal top and sides with duct tape. Next, duct tape the ends of glovebag to pipe itself, where previously covered with plastic or duct tape.
- j) Install glovebag so that it completely covers the circumference of pipe or other structures where the work is to be done.
- k) Use smoke tube and aspirator bulb to test seal. Place tube into water sleeve (two-inch opening to glovebag) squeezing bulb and filling bag with visible smoke. Remove smoke tube and twist water sleeve closed. While holding the water sleeve tightly, gently squeeze glovebag and look for smoke leaking out, especially at the top and ends of the glovebag. If leaks are found, tape close leaks using duct tape and re-test.
- l) Insert wand from garden sprayer through water sleeve. Duct tape water sleeve tightly around the wand to prevent leakage.
- m) Use a HEPA vacuum or other negative pressure generator with HEPA filtration to create a negative pressure in system.
- n) Thoroughly wet material to be worked on with amended water or removal encapsulant and allow to soak in. Wet adequately to penetrate and soak material through to substrate.
- o) One person places their hands into the long-sleeved gloves while the second person directs garden sprayer and HEPA vacuum.
- p) Cut insulation at each end of the section to be removed. Throughout this process, spray amended water or removal encapsulant on the cutting area to keep dust to a minimum.
- q) Remove insulation. Place pieces in bottom of bag without dropping.
- r) Rinse all tools with water inside the bag and place back into pouch.
- s) Using scrub brush, rags and water, scrub and wipe down the exposed pipe.
- t) 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.
- u) Owner will visually inspect glovebag prior to its collapse and removal.
- v) Remove water wand from water sleeve and collapse glovebag by removing air within it using HEPA vacuum.

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Glovebag Asbestos Abatement

- w) Remove the vacuum nozzle, twist water sleeve closed and seal with duct tape.
- x) 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 glovebag, cutting through the twisted/taped section. Contaminated tools may then be placed directly into next glovebag without cleaning. Alternatively, tool pouch with the tools can be placed in a bucket of water, opened underwater, and tools cleaned and dried.
- y) 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 glovebag from the pipe.
- z) Slip a 6 mil (0.15 mm) disposal bag over the glovebag (still attached to the pipe). Remove tape or cut bag and open the top of the glovebag and fold it down into disposal bag.
- aa) Clean all surfaces in the work area using disposable cloths wetted with water and surfactant or removal encapsulant added. When these surfaces have dried, clean with a HEPA filtered vacuum. Material adhered to a surface may require the application of additional removal encapsulant to facilitate cleaning.
- bb) Seal exposed ends of remaining pipe insulation with rewettable fiberglass cloth.
- cc) 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.

END OF SECTION

02 82 13.16.A

Worker Protection – Asbestos Abatement

I. GENERAL

A. DESCRIPTION OF WORK

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

B. WORKER TRAINING

1. 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).
2. State and Local License: All workers are to be trained, certified and accredited as required by state or local code or regulation.
3. Training: Train in accordance with 29 CFR 1926.1101. Provide training for all workers 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).

C. MEDICAL SURVEILLANCE

1. Provide a medical surveillance program for all employees who are:
 - a) Engaged in Class I, II and III work for a combined total of 30 or more days per year,
 - b) Are exposed at or above the permissible exposure limit or excursion limit, or
 - c) Before an employee can be assigned to work requiring use of a respirator.
2. Provide a medical surveillance program and physician's opinion before a respirator is assigned as required by 29 CFR 1910.134 and 29 CFR 1926.103(e)(10)
3. Provide medical examination that, at a minimum, meets OSHA requirements as set forth in 29 CFR 1926.1101. In addition, require that the physician provide an evaluation of the individual's ability to work in environments capable of producing heat stress in the worker.
4. 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.

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Worker Protection – Asbestos Abatement

D. SUBMITTALS

1. The following items must be maintained at the project location until completion of the project at which time copies of these records will be provided to the owner and construction manager:
 - a) AHERA Accreditation: 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).
 - b) State and Local License: Evidence that all workers have been trained, certified and accredited as required by state or local code or regulation.
 - c) Report from Medical Examination: For each worker who is to enter the work area, conducted within last 12 months, as part of compliance with OSHA medical surveillance requirements, stating the following:
 - (1) Name and Social Security number.
 - (2) 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.
 - (3) Any recommended limitations on the employee or on the use of personal protective equipment such as respirators.
 - (4) 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.
 - (5) 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)).
 - (6) A legible typed version of the physician's name, the physician's signature, and date of examination.

II. EQUIPMENT

A. PROTECTIVE CLOTHING

1. 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

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Worker Protection – Asbestos Abatement

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.

2. Protective Clothing: Provide each worker with the protective clothing as required by federal, state and local regulations. This includes, but is not necessary limited to hard hats, cold weather gear, gloves, boots and goggles.
3. The contractor shall provide disposable coveralls, head covers, and footwear covers for the owner and other authorized representatives who may inspect the job site.

III. EXECUTION

A. GENERAL

1. 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.
2. Each time the work area is entered, remove all street clothes in the change room of the personnel decontamination unit and put on a new disposable coverall, new head cover, and a clean respirator. Proceed through shower room to equipment room and put on work boots.

B. DECONTAMINATION PROCEDURES

1. Require all workers to adhere to the following personal decontamination procedures whenever they leave the work area:
 - a) 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:
 - (1) When exiting area, remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the equipment room.
 - (2) 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.
 - (3) Thoroughly wet body including hair and face. If using a powered air-purifying respirator (PAPR), hold blower units above head to keep canisters dry.
 - (4) 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.

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Worker Protection – Asbestos Abatement

- (5) 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 breathe.
 - (6) Carefully wash inside and outside of face piece of respirator.
- b) If using PAPR, shut down in the following sequence. First, cap inlets to filter cartridges, and then turn off blower unit. Thoroughly wash blower unit and hoses. Carefully wash battery pack with wet rag.
- (1) Shower completely with soap and water
 - (2) Rinse thoroughly
 - (3) Rinse shower room walls and floor prior to exit
 - (4) Proceed from shower to changing room and change into street clothes or into new disposable work items
- c) 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:
- (1) When exiting area, remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the equipment room.
 - (2) 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. Thoroughly wet body from neck down.
 - (3) Wet hair as thoroughly as possible without wetting the respirator filter.
 - (4) Take a deep breath, hold it and/or exhale slowly, complete wetting of hair, thoroughly wetting face, respirator and filter. While still holding breath, remove respirator and hold it away from face before starting to breathe.
 - (5) Dispose of wet filters from air purifying respirator.
 - (6) Carefully wash inside and outside of face piece of respirator.
 - (7) Shower completely with soap and water
 - (8) Rinse thoroughly
 - (9) Rinse shower room walls and floor prior to exit

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Worker Protection – Asbestos Abatement

- (10) Proceed from shower to changing room and change into street clothes or into new disposable work items
2. Within Work Area: Require that workers not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the work area.

END OF SECTION

02 82 13.16.B
Respiratory Protection – Asbestos Abatement

I. GENERAL

A. DESCRIPTION OF WORK

1. Instruct and train each worker involved in asbestos abatement of friable asbestos containing materials (ACM) in proper respirator use. 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.

B. DEFINITIONS

1. “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.
2. “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.
3. “Respirator”: A device designed to protect the wearer from the inhalation of harmful atmospheres.

II. EQUIPMENT

A. AIR PURIFYING RESPIRATORS

1. Respirator Bodies: Provide, at a minimum, powered, full-face type respirators.
2. Filter Cartridges: Provide, at a minimum, either HEPA type filters that are 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 or P100 type respirator filters. 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.
3. Non-permitted respirators. Do not use single use, disposable, quarter face, or half face respirators.

III. EXECUTION

A. GENERAL

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Respiratory Protection – Asbestos Abatement

1. Respiratory Protection Program: Comply with ANSI Z88.2, “Practices for Respiratory Protection”, and OSHA 29 CFR 1910.134 and 1926.103.
2. Require that respirators be used in the following circumstances:
 - a) During all Class I asbestos jobs.
 - b) During all Class II work where the ACM is not removed in a substantially intact state.
 - c) During all Class II and III work which is not performed using wet methods.
 - d) During all Class II and III asbestos jobs where the employer does not produce a “negative exposure assessment.”
 - e) During all Class III jobs where TSI or surfacing ACM or PACM is being disturbed.
 - f) During all Class IV work performed within regulated areas where employees performing other work are required to wear respirators.
 - g) During all work covered by this section where employees are exposed above the OSHA PEL (TWA, or excursion limit)
 - h) During emergencies where the airborne asbestos fiber concentration is not known.
3. Require that respiratory protection be used at all times that there is any possibility of disturbance of ACM whether intentional or accidental.
4. Require that a respirator be worn 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 13130.
5. Regardless of airborne fiber levels, require that the minimum level of respiratory protection used be powered, full-face air-purifying respirators with high efficiency filters.
6. Non-permitted respirators. Do not use single use, disposable, quarter face, or half face respirators.
7. Have available onsite and at owner’s request provide to the owner a copy of any negative exposure assessment used as justification for respirator use.

B. FIT TESTING

1. 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

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Respiratory Protection – Asbestos Abatement

testing. Fit types and sizes of respirator to be actually worn by each individual. Allow an individual to use only those respirators for which training and fit testing have been provided. Provide a copy of the current fit test for each abatement worker to the owner's representative.

2. On a weekly basis, check the fit of each worker's respirator by having irritant smoke blown onto the respirator from a smoke tube.
3. 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 ANSI Z88.2.

C. TYPE OF RESPIRATORY PROTECTION REQUIRED

1. Specific Respiratory Protection Requirements: Provide respiratory protection as indicated below as a minimum requirement:
 - a) Powered, Full Face Air-Purifying Respirators: Provide, at a minimum, powered, full-face air-purifying respirators.

D. SPECIFIED PERMISSIBLE EXPOSURE LIMITS

1. Permissible Exposure Limits (PEL): 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.
 - a) 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 shall not exceed 0.1 fibers per cubic centimeter.
 - b) Excursion Limit (EL): Concentration of airborne asbestos fibers to which any worker may be exposed over a sampling period of thirty (30) minutes shall not exceed 1.0 fibers per cubic centimeter.
2. 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.

E. AIR PURIFYING RESPIRATORS

1. Powered, Full Face Air Purifying Respirator: 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 HEPA or P100 elements in filter cartridges be protected from wetting during showering. Require entire exterior housing of respirator be washed each time a worker leaves the work area.

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Respiratory Protection – Asbestos Abatement

END OF SECTION

02 82 13.26

Removal of Asbestos Roofing Materials

I. GENERAL

A. DESCRIPTION OF WORK

1. Work of this section includes removal and disposal of all asbestos-containing built-up roofing material

II. TRAINING

A. NON-INTACT ROOFING:

1. Worker Training: Workers performing removal work on non-intact roofing must have completed an 8-hour training program as required by the OSHA regulation 29 CFR 1926.1101(k) covering asbestos subjects as well as training, including hands-on training, in the work practices and engineering controls specific to roofing removal work and work practices required by 29 CFR 1926.1101(g)(8). Copies of training certification shall be kept onsite and a copy of the certification is to be provided to the owner's representative.
2. Competent Person: Engage a person experienced in roofing work who has completed a 40 hr. EPA/AHERA supervisor training course as required by 29 CFR 1926.1101(o)(4)(I).
3. State and Local Requirements: All workers are to be trained, certified and accredited as required by state or local regulation.

B. INTACT ROOFING:

1. Worker Training: Workers performing removal work on intact roofing must be trained as required by the OSHA regulation 29 CFR 1926.1101(g)(11) and as set forth in the Compliance Directive CPL 2-2.63 Appendix D.
2. Competent Person: Competent Persons for work on intact roofing must be trained as required by the OSHA regulation 29 CFR 1926.1101(g)(11) and as set forth in the Compliance Directive CPL 2-2.63 Appendix D.
3. State and Local Requirements: All workers are to be trained, certified and accredited as required by state or local regulation.

III. EXECUTION

A. GENERAL

1. Critical Barriers
 - a. Shut down air handling units that draw in fresh air from any area within 30' of the roofing work. Seal all air intakes with 6 mil sheet plastic.
 - b. Provide horizontal or vertical extension to relocate the opening of air intakes outside or above the regulated area.

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Removal of Asbestos Roofing Materials

- c. Use a 20' buffer zone to isolate the work area from openings into the building.
 - d. Install HEPA filters in fresh air intakes for heating and ventilating equipment.
 - e. Install critical barriers over all openings into building, adjacent buildings, or equipment within 30 feet of the work. Do not cover building surfaces. Erect temporary screens of reinforced sheet plastic as required to prevent wind borne contaminants from migrating to any entries of building or occupied portions of the site.
 - f. Do not sand, abrade or grind roofing materials.
 - g. Use manual methods which do not render roofing material "non-intact." These include the use of spud, spade, flat-blade or slicing tools, such as axes, mattocks, pry bars, spud bars, crow bars, shovels, flat-blade knives, and utility knives, to slice, cut, strip-off, shear-under, or pry up the material.
 - h. Remove roofing materials in an intact state to the extent feasible.
2. Non-intact Built up Roofing: Perform all removal work on non-intact roofing when outside temperatures are warm enough that the bitumen in the roofing is above the phase change (glass) point. Carry out all roofing removal in a manner that will minimize pulverizing, breaking or abrading of involved materials.
- a. Use Wet Methods to remove roofing materials that are not intact, or will be rendered not intact during removal, unless wet methods are not feasible or will create safety hazards.
 - b. Non-intact Roof Membrane: Wet surface of roof with amended water. Use sufficient water to completely wet surface but not cause ponding or running of water. Cut roof membrane into sections able to fit in disposal boxes. Use rotary blade to cut roof. Do not saw. Lift sections from insulation and place in disposal boxes. Bag and dispose of as required by regulation.
 - c. Insulation in a Non-intact Roof Assembly: Wet insulation with amended water sufficiently to enable it to be removed in a crumbly damp mass. Remove by scraping with roofing hoes. Do not use powered roof rippers. Dispose of insulation as a non-asbestos waste.
 - d. Non-intact Vapor Barrier: Wet surface of vapor barrier with amended water. Use sufficient water to completely wet surface but not cause ponding or running of water. Scrape vapor barrier from roof deck with roofing hoes. Do not use powered roof rippers. Use water based solvent as required to completely remove vapor barrier and as much roofing bitumen as possible from roof deck. Use a HEPA vacuum or wet sweep into sweep shovels to pick up debris. Dispose of as required by regulation.

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3. Power Roof Cutter: When removing built-up roofs with a power roof cutter:
 - a. Continuously mist the blade of the cutting machine during use unless the competent person determines that misting substantially decreases worker safety.
 - b. Collect dust and debris resulting from the cutting operation:
 - (1) Aggregate Surface: Collect all dust resulting from the cutting operation with a HEPA dust collector or by HEPA vacuuming along cut line.
 - (2) Smooth Surface: Collect all dust resulting from the cutting operation with a HEPA dust collector, by HEPA vacuuming along cut line, or by gently sweeping and then carefully and completely wiping up the still-wet dust and debris left along the cut line
 - c. Immediately bag dust and debris resulting from the cutting operation or place in covered containers.
4. Do not drop or throw ACM that has been removed from a roof to the ground. Either carry or pass the ACM to the ground by hand, or lower it to the ground via covered, dust-tight chute, crane or hoist.
 - a. Remove intact ACM from the roof as soon as is practical, but in any event no later than the end of the work shift.
 - b. Lower non intact ACM to the ground as soon as is practical, but in any event no later than at the end of the work shift. While the material remains on the roof either keep it wet, placed in an impermeable waste bag, or wrapped in plastic sheeting.
 - c. Upon being lowered, transfer unwrapped material to a closed receptacle in such manner so as to preclude the dispersion of dust.

B. WARNING SIGNS

1. The warning signs required by this section shall bear the following information.

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

Or

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Removal of Asbestos Roofing Materials

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

C. DISPOSAL

1. Dispose of all friable materials in accordance with all federal, state and local regulations. Dispose of Category I non-friable waste in accordance with state and local regulations.
2. Pick up scrapings and debris and deposit in a disposal bag or closed impermeable container and dispose of as required by regulation.

D. AIRBORNE FIBER LEVELS:

1. Airborne Fiber Levels: Maintain airborne fiber levels less than the “Stop Action Levels” set forth in Section 02 82 11.16 Scope of the Work - Asbestos Abatement.

END OF SECTION

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Removal of Asbestos Resilient Flooring

I. GENERAL

A. SUBMITTALS

1. Before Start of Work: Make available the following to the owner.
 - a) Wetting Materials: Product data, use instructions and recommendations from manufacturer of wetting material (surfactant and/or removal encapsulant) intended for use. Include data substantiating that material complies with requirements.
 - b) NESHAP Compliance Documentation: Manufacturer's documentation for removal encapsulants proposed for use that the material, if used in accordance with manufacturer's instructions, will comply with the wetting requirements of National Emission Standard for Hazardous Pollutants (NESHAP) Asbestos Regulations (40 CFR 61, Subpart M).
 - c) NESHAP Compliance Documentation: Submit a copy to the owner and to the owner's representative of written approval from the EPA NESHAP Coordinator, in compliance with applicable requirements of National Emission Standard for Hazardous Pollutants (NESHAP) Asbestos Regulations (40 CFR 61, Subpart M), for the use of shot/bead blast equipment for dry adhesive removal.
 - d) Adhesive Removal Solvent: Use a low odor or no odor solvent only. Any adhesive removal solvent used must have a volatile organic compound (VOC) content of not more than 5% or be approved by the California Air Resources Board (CARB). Product data, use instructions and recommendations from manufacturer of adhesive removal solvent intended for use. Include data substantiating that material complies with requirements and is compatible with building materials and products to be later installed.
2. Before start of work, have available onsite and at owner's request submit to the owner and construction manager copies of Material Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200), for all surfactants and adhesive removal solvents.

II. PRODUCTS

A. MATERIALS

1. Wetting Materials: For wetting prior to disturbance of asbestos containing materials use:
 - a) Amended Water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water that results in wetting of the asbestos containing material (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.

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- b) Removal Encapsulant: Provide a penetrating-type encapsulant designed specifically for removal of ACM. Use a material that results in wetting of the asbestos containing material 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 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether mixed with five gallons (19 liters) of water.
 - c) Dishwashing detergent that contains anionic, nonionic, and amphoteric surfactants.
2. Foam or Viscous Liquid: Provide material that contains no organic materials, is non-flammable, presents no physical hazard due to reactivity, presents no acute or chronic health hazard, and does not require special skills, knowledge, or equipment for application.
 3. Tile Adhesive Removal Solvent: Provide a low or no odor slow-drying solvent intended to remove tile adhesive. Provide material that is not flammable, does not create combustible vapors and has no significant inhalation hazard. Provide materials that have less than 5% VOCs or are approved by the CARB.
 4. 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.
 5. Duct Tape: Provide duct tape in 2 inch or 3 inch (50 or 75 mm) widths as indicated, with an adhesive formulated for use on sheet polyethylene.
 6. Spray Cement: Provide, in aerosol cans, spray adhesive that is formulated for use on sheet polyethylene. Provide materials that do not contain methylene chloride.
 7. Disposal Bags: Provide 6 mil (0.15 mm) thick, leak-tight polyethylene bags labeled as required by Section 02 82 33.26, Disposal of Regulated Asbestos Containing Material.
 8. Fiberboard Drums: Provide heavy duty, leak-tight fiberboard drums with tight sealing locking metal tops.
 9. Steel Drums: Provide leak-tight, steel drums with tight-sealing, locking metal tops.
 10. Injection Molded Plastic Drums: Provide leak-tight, injection-molded plastic drums with tight sealing, locking tops.
 11. Paper board Boxes: Provide heavy-duty corrugated paperboard boxes coated with plastic or wax to retard deterioration from moisture. Provide in sizes that will easily fit in disposal bags.
 12. Polyethylene Boxes: Provide heavy-duty, leak-tight polyethylene boxes.

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B. PRIMARY RESILIENT FLOORING REMOVAL EQUIPMENT

1. Manual Spades

- a) Hand operated scraper/chisels with long handles and replaceable blades for removal of resilient flooring.

2. Powered Spades

- a) Long-handled scraper/chisels used in a full-standing position that have replaceable blades and are pneumatically or electrically-powered to move in a reciprocating (in and out) motion.
- b) Provide powered spades that are equipped with pneumatic vents and piston seals that prevent compressed air or blow by from sweeping floor.

3. Stripper Machines

- a) These are walking units with blades at the front, driven by electric motors, and move either in a reciprocating (in and out) or an oscillating orbital motion.

4. Rotary Cutters

- a) Machine with rotating discs facing flat against the floor with spring-loaded cutters that follow the profile of the floor and removes soft resilient materials by cutting them into thin strips and scraping them from the floor.

5. Shot Blast/Bead Blast Machines

- a) Machines that send steel shot at high velocity at the floor surface and are configured to provide a high-vacuum flow in the blast region to collect dust. Exhaust air is filtered through a HEPA filter. Shot is recollected, separated, and recycled continuously. This is considered DRY REMOVAL, and must have agency approval in writing before used.

C. THERMAL EQUIPMENT WITH AUTOMATIC CONTROL

1. Thermal Equipment with Automatic Control

- a) Equipment utilizing controlled infrared radiant heat to make the resilient floor tiles and adhesive soft and pliable for removal.

D. HIGH PRESSURE WATER JET

1. High Pressure Water Jet

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- a) Tools using very high-pressure water jets to hydraulically lift tiles.

E. OTHER TECHNOLOGIES APPLIED TO THE WORK

1. Rotary Grinders/Surfacers

- a) Machine with discs facing flat against the floor that removes hard materials with a grinding action.
- b) Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

2. Surfacers/Planers/Scarifiers

- a) Machine with a series of small cutters freewheeling on axles mounted on a drum so that the cutters contact the floor surface with a flailing action.

III. EXECUTION

A. RESILIENT FLOOR COVERINGS

- 1. Preparation: Prior to beginning the removal of any resilient floor covering, complete the following.
 - a) Remove appliances and furniture from the work area.
- 2. Seal Floor Penetrations: Before using wet methods to remove resilient flooring, seal openings and penetrations in the floor to prevent water leakage.
 - a) Remove surface mounted junction boxes (doghouses) from raceway system.
 - b) Remove hatch and trench covers that are covered with resilient flooring. Seal opening with plywood. Seal edges of plywood to floor with urethane foam caulk. Remove resilient flooring from cover in a later operation during wet removal of flooring.
 - c) Seal openings with a wooden or plywood plug. Seal with urethane foam caulk.
 - d) Remove flooring material in the immediate area of floor penetrations with a hand spade or scraper.
 - e) Remove adhesive by hand scraping as necessary to permit installation of seals.
 - f) Remove any adhesive residue from slab where cover on openings and penetrations must seal to floor to accomplish a watertight assembly. Remove this residue by abrasion using dampened, clean, sharp, cutting sand and a hand-held rubbing stone

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as necessary. Use minimum wetting required to permit removal. Use caution to prevent water leakage into opening or penetration.

- g) Cover sealed plywood hatch assemblies with 6 mil (0.15 mm) sheet plastic. Seal plastic to floor with spray glue or urethane caulk.
 - h) Cover sealed openings with sheet plastic. Seal plastic to floor with spray glue or urethane caulk.
3. Remove Resilient Flooring: Use the three-step process described in the following sections:
- a) First Step: "Removal of Resilient Tile Floor Covering" and/or "Removal of Resilient Sheet Flooring" This step involves removal of tiles or the wear layer of sheet flooring using a powered spade or stripper machine.
 - b) Second Step: "Removal of Heavy Adhesive Residue" and/or "Removal of Residual Backing" This step involves the use of a rotary cutter to remove the bulk of these residual materials. As an alternative, hand scraping can be used for this purpose.
 - c) Third Step: "Removal of Adhesive Residue" After completion of the first two steps, there will be a thin residue of adhesive left on the floor. This is removed using a shot/bead blast machine. If the thickness of adhesive residue is too thick to permit effective use of the shot/bead blast machine, repeat the second and third steps.
 - d) At the completion of all work, leave the substrate in such a state as to comply with all requirements and recommendations of manufacturer of replacement flooring.

B. STEP ONE - REMOVAL OF RESILIENT TILE FLOOR COVERING

1. Remove resilient tile floor covering using the following procedure.
- a) General
 - (1) Remove binding strips or other restrictive molding from doorways, walls, etc., clean and dispose of as non-asbestos waste. Dispose of any materials that have glue or floor mastic on them as asbestos containing waste.
 - b) Wet Floor
 - (1) Wet floor with amended water, removal encapsulant, or detergent solution, so that entire surface is wet. Do not allow to puddle or to run off to other areas. If a removal encapsulant is used, use in strict accordance with manufacturer's instructions. Cover with sheet polyethylene to allow humidity to release tile from floor. Allow time for humidity and water or removal encapsulant to loosen tiles prior to removal.

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- (2) Keep floor continuously wet throughout removal operation.
 - (3) Remove tiles using a manual or powered spade or stripping machine. Continuously mist floor in area where machine is working with amended water, removal encapsulant or detergent solution. Wet any debris generated as necessary to keep continuously wet. Keep floor where tile has been removed continuously wet until after completion of heavy adhesive residue removal.
- c) Debris and Waste
- (1) Pick up whole tiles, stack, place in boxes or wrap in felt, and place in labeled disposal bags. Tiles may be placed directly into durable leak-tight containers.
 - (2) Shovel broken tiles and debris into cardboard boxes that are placed in a disposal bag, or place directly in steel, leak-tight drums.
 - (3) Place bagged waste in a second disposal bag during decontamination and dispose of waste as required by Section 02 82 33.26, Disposal of Regulated Asbestos Containing Material.

C. STEP ONE - REMOVAL OF ADHERED SHEET RESILIENT FLOORING

1. Use the following procedure to remove adhered resilient sheet flooring.
 - a) General
 - (1) Remove binding strips or other restrictive molding from doorways, walls, etc., clean and dispose of as non-asbestos waste. Dispose of any materials that have glue or floor mastic on them as asbestos containing waste.
 - b) Wet Floor
 - (1) Wet floor with amended water, removal encapsulant, or detergent solution so that entire surface is wet. Do not allow to puddle or to run off to other areas. If a removal encapsulant is used, use in strict accordance with manufacturer's instructions.
 - (2) Keep floor continuously wet throughout removal operation.
 - (3) Remove wear layer using a manual or powered spade, or stripping machine. Continuously mist floor in area where machine is working with amended water, removal encapsulant or detergent solution. Wet any debris generated as necessary to keep continuously wet. Keep floor where wear layer has been removed continuously wet until after completion of heavy residue removal.

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c) Debris and Waste

- (1) Shovel broken pieces of wear layer and debris into cardboard boxes that are placed in a disposal bag, or placed directly into steel, leak-tight drums.
- (2) Place bagged waste in a second disposal bag during decontamination and dispose of waste as required by Section 02 82 33.26, Disposal of Regulated Asbestos Containing Material.

2. Manual Removal

- a) Make a series of parallel cuts, with a knife, 4 to 8 inches (100 to 200 mm) from each other, parallel to the wall, keeping cut lines wet.
- b) Start at the end of the room farthest from the entrance door. Pry up the corner of the first strip, separating the backing layer. As the strip is being removed, spray a constant mist of the amended water into the delamination nip point to minimize any airborne dust particles. When done properly, any felt remaining on the floor and on the back of the strip will be thoroughly wet. Peel the strip by pulling upward at an angle that permits the best separation.

c) Debris and Waste

- (1) Roll the strip tightly as it is removed. Tie or tape securely and place in a disposal bag or closed impermeable container for disposal.
- d) If the foam inner-layer adheres to the backing, spray amended water into the delamination nip point while peeling the foam inner-layer from the floor.
- e) Place all flooring strips and felt scrapings into disposal bags immediately, while still wet. Close full bags tightly and seal securely for disposal.
- f) Keep floor where wear layer has been removed continuously wet until after completion of heavy residue removal.

D. STEP TWO - REMOVAL OF HEAVY ADHESIVE RESIDUE

1. Remove the heavy residue of adhesive left after removal of resilient tile flooring using the following procedure. If the residual adhesive is sufficiently thin that a shot/bead blast machine removal can effectively remove the mastic, this step may be skipped and step three started.

a) Dampen Floor

- (1) Dampen floor by misting with amended water, removal encapsulant, or detergent solution so that entire surface is wet. Do not allow to puddle or to

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run off to other areas. If a removal encapsulant is used, use in strict accordance with manufacturer's instructions.

- (2) Keep floor continuously damp throughout removal operation.

b) Adhesive Removal

- (1) Begin removal at a point farthest from the entrance to the work area. Work of this step may proceed concurrently with work of removal of tile.
- (2) Remove heavy residue of adhesive backing using a rotary cutting machine. Continuously mist floor in area where machine is working with amended water, removal encapsulant or detergent solution. Wet any debris generated as necessary to keep continuously wet.

c) Disposal and Debris

- (1) Pick up scrapings and debris and deposit in a disposal bag or closed impermeable container and dispose of as required by Section 02 82 33.26, Disposal of Regulated Asbestos Containing Waste.

d) Wet vacuum standing water with HEPA wet/dry vacuum.

e) Mop floor with amended water, removal encapsulant, or liquid detergent solution to remove all debris and residue.

f) Continue the above steps until the adhesive is sufficiently reduced in thickness that it can be effectively removed with shot/bead blast equipment.

E. STEP TWO - REMOVAL OF RESIDUAL BACKING MATERIAL

1. Remove any residual felt or rubber backing remaining adhered to the floor after removal of the wear layer of adhered vinyl sheet flooring by using the following procedure.

a) Wetting

- (1) Thoroughly wet residual backing with amended water, removal encapsulant, or detergent solution. Wait several minutes to allow solution to soak into felt.

b) Backing Removal

- (1) Concrete floor: Re-wet the backing if the solution has not completely penetrated, if drying occurs or if dry felt is exposed during scraping. Pick up the scrapings as they are removed from the floor and place in a disposal bag or impermeable container.

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- (2) Wood floor: Wet residual felt, but do not soak or flood wood floors with detergent solution. Excessive water can damage wood floors. Do not use a rotary cutter on wood floors. Use manual scraping only.

F. STEP THREE - REMOVAL OF ADHESIVE RESIDUE (SHOT/BEAD BLAST)

After removal of resilient flooring and heavy residue of adhesive, mastic, or backing material, remove any remaining adhesive residue from the floor using the following procedure. Use of shot/bead blast is considered DRY REMOVAL and agency approval must be obtained in writing prior to use.

1. Remove residue from floor using a shot/bead blast machine with dust collection equipment attached to an HEPA-filtered vacuum cleaner.
2. If the previous work did not reduce the thickness of adhesive sufficiently to allow effective removal by the shot/bead blast machine, repeat the second step.
3. Remove residue at walls and other hard to reach locations with a shot/bead blast edging machine or using dampened, clean, sharp, cutting sand and a hand-held rubbing stone.
4. Continue this operation until there is no residue of adhesive on the floor.
5. After removal of all residue, rinse area with clear, clean water using a hand sprayer.
6. Wet vacuum standing water with HEPA wet/dry vacuum.
7. Continue with the above steps until the entire room is complete.
8. Allow floor to dry and vacuum up any remaining dust or dirt using a vacuum equipped with a HEPA filter and metal floor tool (no brush).

G. STEP THREE - REMOVAL OF ADHESIVE RESIDUE (SLURRY REMOVAL)

After removal of resilient flooring and heavy residue of adhesive, mastic, or backing material, remove any remaining adhesive residue from the floor using the following procedure.

1. Remove residue of adhesive from floor using slurry removal in a manner that keeps the floor in the area of the work continually wet with a slurry of sand and water.
2. Place cutting sand (enough to cover an approximate 6' x 6' (1800 mm x 1800 mm) area) into a container and add amended water to dampen the sand (20 pounds (9 kg) of sand to ½ gallon (2 liters) of amended water).
3. Place sand over a 6' x 6' (1800 mm x 1800 mm) area and wet remove the existing adhesive residue using a terrazzo floor machine. Keep sand under rubbing stones when operating the machine. The sand and sub-floor must be continuously kept wet.

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4. Replace cutting sand periodically as needed to maintain adequate cutting and cleaning of floor. Add sand periodically as required.
5. Occasionally push away cutting sand from the sub-floor with a wall or floor scraper to check for complete removal.
6. Remove adhesive around the edge of the room with dampened, clean, sharp, cutting sand and a hand-held rubbing stone.
7. Wet scrape sand into a pile using a stiff-bladed floor or wall scraper and place sand and adhesive residue in a disposal bag or other impermeable container and dispose of as required by Section 02 82 33.26, Disposal of Regulated Asbestos Containing Material.
8. Rinse area with clear, clean water using a hand sprayer.
9. Wet-vacuum standing water with HEPA wet/dry vacuum.
10. Continue with the above steps until the entire room is complete.
11. Allow sub-floor to dry and vacuum up any remaining dirt or sand using a vacuum equipped with a HEPA filter and metal floor tool (no brush).

H. STEP THREE - REMOVAL OF ADHESIVE RESIDUE (ADHESIVE SOLVENT)

This method is not to be used unless authorized, in writing, by the owner.

After removal of resilient flooring and heavy residue of adhesive, mastic, or backing material, remove any remaining adhesive residue from the floor using the following procedures.

1. Use solvents in accordance with manufacturers' instructions.
2. Saturate adhesive with removal solvent and allow adhesive to soften.
3. Remove by scraping or wet sanding, or wet scrub with floor cleaning machine with abrasive pad.
4. Mop floor with removal solvent as necessary to completely remove all adhesive residue.
5. Clean floor after completion of removal by wet mopping with amended water. Mop at least three times, allowing a drying time between each mopping.
6. Encapsulate cleaned floor with one coat of an encapsulant. Use an encapsulant that has been determined not to prevent the bond of new resilient flooring. Follow manufacturer's recommendations for new floor covering installation.

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7. Dispose of all rags, plastic sheet, etc. in accordance with requirements of Section 02 82 33.26, Disposal of Regulated Asbestos Containing Material.
- I. WORK AREA CLEARANCE
1. After completion of all resilient flooring and adhesive removal work and prior to removal of critical barriers, decontamination units, and shut down of pressure differential and ventilation system, complete project decontamination and clearance in accordance with Section 02 82 33.16, Project Decontamination and Clearance Testing.

END OF SECTION

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Temporary Pressure Differential and Air Circulation System

I. GENERAL

A. MONITORING

1. Continuously monitor and record the pressure differential between the work area and the building outside of the work area.

B. QUALITY ASSURANCE

1. Monitor pressure differential at personnel and equipment decontamination units with a differential pressure meter. Meter shall be equipped with a warning buzzer that will sound if pressure differential drops below 0.02 inch [0.5 mm] of water.

II. PRODUCTS

A. HEPA FILTERED FAN UNITS

1. 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.
2. 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:
 - a) Factory-sealed to prevent asbestos containing dust from being released during use, transport, or maintenance.
 - b) Arranged to provide access to and replacement of all air filters from intake end.
 - c) Mounted on casters or wheels.
3. Fans: Rate capacity of fan according to usable air-moving capacity under actual operating conditions.
4. HEPA Filters: Provide units whose final filter is a HEPA type with the filter media completely sealed on all edges with a structurally rigid frame.
 - a) Provide units with a continuous rubber gasket located between the filter and the filter housing to form a tight seal.
 - b) 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 particles.
 - c) Provide filters that are marked with the name of the manufacturer, serial number, airflow rating, efficiency and resistance, and the direction of test airflow.

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- d) Pre-filters that 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:
 - (1) First-stage, low-efficiency type (e.g., effective for particles 100 um and larger)
 - (2) Second-stage, medium efficiency type (e.g., effective for particles down to 5 um)
 - (3) Provide units with pre-filters installed either on or in the intake grid of the unit and held in place with special housings or clamps.
5. Instrumentation: Provide units equipped with:
 - a) Magnehelic gauge or manometer to measure the pressure drop across filters, and indicate when filters have become loaded and need to be changed.
 - b) 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.
 - c) Elapsed time meter to show the total accumulated hours of operation.
6. Safety and Warning Devices: Provide units with the following safety and warning devices:
 - a) Electrical (or mechanical) lockout to prevent fan from operating without a HEPA filter.
 - b) Automatic shutdown system to stop fan in the event of a rupture in the HEPA filter or blocked air discharge.
 - c) 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).
 - d) Audible alarms if unit shuts down due to operation of safety systems.
7. 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.
8. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - a) HEPA filtered Fan Units: The following machines are standard 2000 CFM machines used in typical asbestos abatement jobs.

"Aero-Clean 2000"
Aerospace America, Inc.

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900 Truman Parkway
P.O. Box 189
Bay City, Michigan 48707
(517) 684-2121

“HEPA-AIRE 1990 and HEPA-AIRE 2000”
Abatement Technologies
3305 Breckinridge Blvd. #118
Deluth, Georgia 30136
(800) 634-9091 or (404) 925-2761

Global Consumer Services, Inc.
4615-1U East Industrial St.
Sims Valley, California 93063
(805) 579-0230

Micro-Trap or Alumina II
M-Tec Corp.
1300 West Steel Rd.
Unit #2
Morrisville, PA 19067
(215) 295-8208

- b) Large Capacity: The following are large capacity 5000-6000 CFM machines used on large asbestos abatement jobs.

“HEPA-AIRE 5000”
Abatement Technologies
3305 Breckinridge Blvd. #118
Deluth, Georgia 30136
(800) 634-9091 or (404) 925-2761

- c) Hazardous Locations: The following are pneumatically powered machines for use in asbestos abatement jobs in hazardous locations where electric motors are prohibited.

“HEPA-AIRE PNEUMATIC”
Abatement Technologies
3305 Breckinridge Blvd. #118
Deluth, Georgia 30136
(800) 634-9091 or (404) 925-2761

III. EXECUTION

A. PRESSURE DIFFERENTIAL ISOLATION

1. Isolate the work area from 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.
2. 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

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Temporary Pressure Differential and Air Circulation System

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:

- a) 0.02 inches (0.75 mm) of water
3. 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:
- a) Establish required air circulation in the work area, personnel and equipment decontamination units.
 - b) Establish isolation by increased pressure in adjacent areas or as part of seals where required.
 - c) Exhaust a sufficient number of units from the work area to develop the required pressure differential.
 - d) The required number of units is the number determined above plus one additional unit.
 - e) Vent HEPA filtered fan units to outside of building unless authorized by owner.
 - f) Mount units to exhaust directly or through disposable ductwork.
 - g) Use only new ductwork except for sheet metal connections and elbows.
 - h) Use ductwork and fittings of same diameter or larger than discharge connection on fan unit.
 - i) Use inflatable, disposable plastic ductwork in lengths not greater than 100 feet (30 meters).
 - j) Use spiral wire-reinforced flex duct in lengths not greater than 50 feet (15 meters).
 - k) Arrange exhausts as required to inflate duct to rigidity sufficient to prevent flapping.
 - l) 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.
4. Isolation of Elevators: Erect seals with an air space at doors to elevators. Pressurize this space with HEPA-filtered air so that it is at a pressure greater than the work area.
- a) Fabricate seal by first sealing door with duct tape and 6 mil (0.15 mm) polyethylene. Construct a barrier from 1/2" (13mm) 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"

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- (76 mm) from face of door. Seal barrier with 6 mil (0.15 mm) sheet plastic and duct tape.
- b) 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 the work area.
 - c) 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 airflow while still maintaining required air pressure.
5. Isolation of chases and enclosed stairs: Pressurize chases and enclosed stairs with HEPA filtered air so that it is at a pressure greater than the work area.
- a) 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 the work area.
6. Ductwork that must be kept operating and is located in the work area is to be isolated from the work area by an enclosure forming an annular space around the duct that is positively pressurized with HEPA filtered air.
- a) Wrap the duct with 6 mil (0.15 mm) polyethylene. Seal all polyethylene seams with spray glue and duct tape.
 - b) Enclose wrapped duct with two layers of polyethylene. Fabricate inner layer from 6 mil (0.15 mm) polyethylene with all seams sealed with spray glue and duct tape. Arrange outer layer to support inner layer. Fabricate out of reinforced sheet plastic with seams sealed with spray glue and duct tape and reinforced with staples. Support outer layer with a framework fabricated from 2" x 4"s (51 mm x 102 mm) at 24" (610 mm) on center. Enclosures less than 2'-6" in diameter may be reinforced with box strapping in lieu of wood framing.

B. AIR CIRCULATION IN THE WORK AREA

1. 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.
2. 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.
3. Determining the Air Circulation Requirements: The airflow 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:

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- a) 4 air changes per hour
4. Determine number of units needed to achieve required air circulation according to the following procedure:
- a) Determine the volume in cubic feet of the work area. 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.
 - b) Air Circulation Required (CFM) =
$$\frac{\text{Volume of Work Area}}{60} \times \text{Number of Air Changes per Hour}$$
 - c) Divide the air circulation requirement (CFM) above by the capacity of the HEPA filtered fan unit(s) used. Capacity of a unit for purposes of this section is the capacity in cubic feet per minute with fully loaded filters (pressure differential that causes loaded filter warning light to come on).
 - d) Number of Units Needed =
$$\frac{\text{Air Circulation Requirement (CFM)}}{\text{Capacity of Unit with Loaded Filters}}$$
 - e) Add one (1) additional unit as a backup in case of equipment failure or machine shutdown for filter changing.

C. EXHAUST SYSTEM

1. Pressure differential isolation and air circulation in the work area are to be accomplished by an exhaust system as described below.
 - a) Exhaust all units from the work area to meet air circulation requirement of this section.
 - b) 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.
 - 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.
 - d) Vent to outside of building unless authorized by the owner.
 - e) Air Handling Unit Exhaust: The exhaust plume from air handling units should be located away from adjacent personnel and intakes for HVAC systems.

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- f) Decontamination Units: Arrange work area and decontamination units so that the majority of make up air comes through the decontamination units. Use only one, personnel or equipment, decontamination unit at the same time; and seal the other so that make up air passes through only the unit in use.
- g) Supplemental Makeup Air Inlets: Provide where required for proper air flow through the work area in location 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), off the floor (preferably near the ceiling), and away from barriers that separate the work area from occupied clean areas. Cover with flaps to automatically re-seal if the pressure differential system should shut down. Spray flap and around flap opening with spray adhesive. Use adhesive that forms contact bond when it dries.

D. AIR CIRCULATION IN DECONTAMINATION UNITS

1. Pressure Differential Isolation: Continuously maintain the pressure differential required for the work area in the:
 - a) Personnel Decontamination Unit: Across the shower room with the equipment room at a lower pressure than the clean room.
 - b) Equipment Decontamination Unit: Across the holding room with the wash room at a lower pressure than the clean room.
2. Air Circulation: Continuously maintain air circulation in decontamination units at same level as required for work area.
3. 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 airflow velocity must be sufficient to provide visible indications of air movement into the work area. The velocity of airflow within the enclosure must be adequate to remove airborne contamination from each worker's breathing zone without disturbing the asbestos containing material.

E. USE OF THE PRESSURE DIFFERENTIAL AND AIR CIRCULATION SYSTEM

1. General: Each unit shall be serviced by a dedicated minimum 115V-20A circuit with ground fault circuit interrupter (GFCI) supplied from temporary power supply.
2. Air Flow Tests: Air flow patterns will be checked before removal operations begin, at least once per operating shift, and any time there is a question regarding the integrity of the enclosure. The primary test for airflow is to trace air currents with smoke tubes or other visual methods. Flow checks are made at each opening and at each doorway to demonstrate that air is being drawn into the enclosure and at each worker's position to show that air is being drawn away from the workers' location and toward the HEPA filtration unit.
3. Demonstrate condition of equipment for each HEPA filtered fan unit and pressure differential monitoring equipment including proper operation of the following:

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- a) Squareness of HEPA filter
 - b) Condition of seals
 - c) Proper operation of all lights
 - d) Proper operation of automatic shut down
 - e) Proper operation of alarms
 - f) Proper operation of magnehelic gauge
 - g) Proper operation and calibration on pressure monitoring equipment
4. Demonstrate operation of the pressure differential system to the owner will include, but not be limited to, the following:
- a) Plastic barriers and sheeting move lightly in toward work area
 - b) Curtain of decontamination units move lightly in toward work area
 - c) There is a noticeable movement of air through the decontamination unit
 - d) Use smoke tube to demonstrate air movement from clean room through shower room to equipment room
 - e) Use smoke tubes to demonstrate a definite motion of air across all areas in which work is to be performed
 - f) 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, ductwork or outside.
 - g) Modify the pressure differential system as necessary to demonstrate successfully the above
5. Use of System during Abatement Operations
- a) 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.
 - b) 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.

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Temporary Pressure Differential and Air Circulation System

- c) Do not shut down air pressure differential system during encapsulating procedures. Supply sufficient pre-filters to allow frequent changes.
 - d) 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.
 - e) 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 airflow patterns should be re-tested before work begins again.
 - f) At completion of abatement work, allow fan units to run to remove airborne fibers that may have been generated during abatement work, and to cleanup and purge the work area with clean makeup air.
6. Dismantling the System
- a) When a final inspection and the results of final air tests indicate that the work 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.

END OF SECTION

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Temporary Enclosures – Asbestos Abatement

I. PRODUCTS

A. SHEET PLASTIC

1. 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.
2. 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. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick, frosted or black as indicated.

B. MISCELLANEOUS MATERIALS

1. 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.
2. Spray Cement: Provide spray adhesive in aerosol cans that is specifically formulated to stick tenaciously to sheet polyethylene.

II. EXECUTION

A. SEQUENCE OF WORK

1. Carry out work of this section sequentially. Complete each of the following activities in accordance with requirements before proceeding to the next.
 - a) Provide emergency exits and emergency lighting
 - b) Control access
 - c) Provide respiratory and worker protection
 - d) Provide critical barriers
 - e) Prepare area
 - f) Provide primary barriers
 - g) Provide isolation areas as required
 - h) Provide secondary barrier

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Temporary Enclosures – Asbestos Abatement

B. GENERAL

1. **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.
2. 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 02 82 33.16 Project Decontamination and Clearance Testing. Perform all such required cleaning or decontamination at no additional cost to owner.
3. Construct enclosures to provide an airtight seal around ducts and openings into ventilation systems and around penetrations for electrical conduits, telephone wires, water lines, drain pipes, etc. Construct enclosures to be both airtight and watertight except for those openings designed to provide entry and/or airflow control.
4. **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.
5. **Shape:** The enclosure may be any shape that optimizes the flow of ventilation air past the worker(s).
6. **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.
7. **Barrier Supports:** Provide frames as necessary to support all unsupported spans of sheeting.
8. **Openings:** It is not necessary that the structure is airtight; openings may be designed to direct airflow. 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.
9. Place all tools, scaffolding, staging, etc. necessary for the work in the area to be isolated prior to completion of work area isolation.
10. **Areas within an Enclosure:** Each enclosure consists of a work area, a decontamination area, and a waste storage area. The work area where the asbestos removal operations occur are to be separated from both the waste storage area and the decontamination area by physical curtains, doors, and/or airflow patterns that force any airborne contamination back into the work area.

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Temporary Enclosures – Asbestos Abatement

11. 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.
12. 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.
 - a) If fan providing positive pressure fails for any reason, immediately stop asbestos removal work and mist the area to reduce airborne fiber levels. Do not re-start asbestos removal work until authorized by the owner.
13. Inspection Windows: Install inspection windows in locations as directed by the owner. Each inspection window is to have a 24-inch x 24-inch (610 x 610 mm) viewing area fabricated from 1/4” (6.35 mm) acrylic or polycarbonate sheet. Install window with top at 6’6” (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.

C. EMERGENCY EXITS

1. Provide emergency exits and emergency lighting as set forth below:
 - a) Emergency Exits: At each existing exit door from the work area, provide the following means for emergency exiting.
 - (1) Arrange exit door so that it is secure from outside the work area but permits exiting from the work area.
 - (2) Mark outline of door on primary and critical barriers with luminescent paint at least 1” (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 1’2” (50.8 mm) wide.

D. CONTROL ACCESS

1. If the building will have occupants in addition to abatement personnel, isolate the work area to prevent entry by building occupants into work area or surrounding controlled areas.
2. Locked Access: Arrange work area so that the only access into work area is through lockable doors to personnel and equipment decontamination units.

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- 3. Visual Barrier: Where the work area is immediately adjacent to or within view of occupied areas, provide 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.
- 4. 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.
- 5. Access. Limit access to regulated areas to authorized persons as defined by OSHA, and to the owner, project supervisor or representatives authorized by one of these entities.
- 6. Provide warning signs at each door leading to work area reading as follows:

Legend

Notation

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

- a) 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

- b) Provide spacing between respective lines at least equal to the height of the respective upper line.

E. ALTERNATE METHODS OF ENCLOSURE

- 1. Alternate methods of containing the work area may be recommended to the owner for approval. Do not proceed with any such method(s) without prior written approval of the owner.
- 2. Notification: 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 which has been the subject of required evaluation and certification; provide a copy of such evaluation and certification to the owner’s representative.

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3. Use a control method that encloses, contains or isolates the processes or source of airborne asbestos dust, or otherwise captures or redirects such dust before it enters the breathing zone of employees.
4. Certification: Submit a certification from a certified industrial hygienist (CIH) or licensed professional engineer, who is also qualified as a project designer, who has evaluated the work area, the projected work practices and the engineering controls. The certification must state that the planned control method is adequate to reduce direct and indirect employee exposure to below the PEL under worst-case conditions of use, and that the planned control method will prevent asbestos contamination outside the regulated area, as measured by clearance sampling which meets the requirements of EPA's Asbestos in Schools rule issued under AHERA, or perimeter monitoring which meets the criteria of OSHA 1926.1101. This must be determined in accordance with the portion of Section 02 82 11.16 Scope of Work – Asbestos Abatement that describes the owner's monitoring of the project.

F. RESPIRATORY AND WORKER PROTECTION

1. Before proceeding beyond this point, comply with the following:
 - a) Provide worker protection per Section 02 82 13.16.A Worker Protection – Asbestos Abatement
 - b) Provide respiratory protection per Section 02 82 13.16.B Respiratory Protection – Asbestos Abatement
 - c) Provide personnel decontamination unit per Section 02 82 16.23 Decontamination Units – Asbestos Abatement

G. CRITICAL BARRIERS

1. 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.
2. 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.
3. Provide sheet plastic barriers at least 6 mil (0.15 mm) in thickness as required to completely seal openings from the work area into adjacent areas. Seal the perimeter of all sheet plastic barriers with duct tape or spray cement.
4. 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 by the owner.

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- a) Plywood squares held in place so that the plywood clamps the plastic to the wall. Locate plywood squares at each end, corner and at maximum 4 feet (1.22 m) on centers; or
 - b) 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 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.
5. Provide Pressure Differential System per Section 02 82 16.13 Temporary Pressure Differential and Air Circulation Systems.
- a) Clean housings and ducts of all over-spray materials prior to erection of any critical barrier that will restrict access.

H. PREPARE AREA

1. Scaffolding: If fixed scaffolding is to be used to provide access, HEPA vacuum and wet clean area prior to scaffolding installation.
2. 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.
3. Remove all general construction items, such as cabinets, casework, door and window trim, moldings, ceilings, trim, etc., which cover the surface of 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.
4. Clean all surfaces in work area with a HEPA filtered vacuum or by wet wiping prior to the installation of primary barrier.
5. Cleaning and Sealing Surfaces: After cleaning with water and a HEPA vacuum, surfaces of stationary objects are to 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.

I. PRIMARY BARRIER

1. 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.
 - a) Sheet Plastic: Protect surfaces in the work area with two (2) layers of plastic sheeting on floor. Perform work in the following sequence:

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- (1) All seams in the sheeting should overlap, be staggered and not be located at corners or wall-to-floor joints.
- (2) Cover floor of work area with 2 individual layers of clear polyethylene sheeting, each at least 6 mil (0.15 mm) in thickness, and turned up the walls at least 12 inches (305 mm). Form a sharp right angle bend at junction of floor and wall so that there is no radius that 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.
- (3) Cover sheet plastic in areas where scaffolding is to be used with a single layer of 1/2-inch (13 mm) plywood. Wrap edges and corners of each sheet with duct tape. At completion of abatement work, wrap plywood 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.
- (4) 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 with duct tape.
- (5) Elevator: Cover walls, floor and ceiling of elevator with 2 layers of 6 mil (0.15 mm) polyethylene. Arrange entry to work area so that elevator door is in a positively pressurized space outside the clean room of the decontamination unit. At completion of work, clean elevator as set forth in Section 13130. Refer to Section 13010 for additional requirements for protection of elevator.
- (6) Stairs and Ramps: Do not cover stairs or ramps with unsecured sheet plastic. Where stairs or ramps are covered with plastic, provide 3/4-inch (19.1 mm) exterior grade plywood treads securely held in place, over plastic. Do not cover rungs or rails with any type of protective materials.
- (7) 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.

J. ISOLATION AREA

1. Maintain isolation areas between the work area and the adjacent building area:
 - a) In locations shown on the plans.
 - b) In unoccupied rooms located between work area and adjacent occupied portions of the building.

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- c) In locations where separation between work area and occupied portions of building is formed by sheet plastic and/or temporary barriers.
 - d) The floor below the work area.
2. 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:
- a) Installing critical barriers in unoccupied space.
 - b) Erecting a second Critical Barrier a minimum of 3 feet (1.0 m) away from work area.

K. STOP WORK

- 1. If the critical or primary barrier falls or is breached in any manner, stop asbestos removal work immediately and comply with “stop work” requirements of Section 02 82 11.16 Scope of Work – Asbestos Abatement. Do not start work until authorized by the owner.

L. EXTENSION OF WORK AREA

- 1. 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 specifications and decontaminate it as described in Section 02 82 33.16 Project Decontamination and Clearance Testing.

M. SECONDARY BARRIER

- 1. Utilize a secondary layer of plastic as a drop cloth to protect the primary layer from debris generated by the asbestos abatement work as specified in the appropriate work sections.

END OF SECTION

02 82 16.19
Regulated Areas – Asbestos Abatement

I. GENERAL

A. DESCRIPTION OF WORK

1. Work of this section consists of preparing a regulated area for glovebag work.

II. EQUIPMENT

A. PRODUCTS

1. HEPA Filter Vacuum Cleaners

- a) Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include but are not limited to, the following:

Nilfisk of America, Inc.
225 Great Valley Parkway
Malvern, Pennsylvania 19355
(800) 645-3475

Minuteman International
111 South Route 53
Addison, Illinois 60101
(708) 627-6900

Pullman-Holt (White) Corp.
PO Box 16647
Tampa, Florida 33617
(813) 645-3475

2. Plastic Sheet

- a) Plastic 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.

III. EXECUTION

A. SECURING WORK AREA

1. Secure work area from access by occupants, staff or users of the building. Accomplish this where possible, by locking doors, windows, or other means of access to the area, by scheduling work for periods of time that the building is unoccupied, or by constructing temporary wood stud and plywood barriers.

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Regulated Areas – Asbestos Abatement

B. DEMARCATION OF REGULATED AREA

1. Demarcation. Demarcate the regulated area with a sheet plastic drop cloth, signs and barrier tape. Configure the regulated area in a manner that minimizes the number of persons within the area and protects persons outside the area from exposure to airborne concentrations of asbestos.

a) Drop Cloth: Cover floor in vicinity of work area and six (6) feet beyond, with 6 mil (0.15 mm) polyethylene drop sheet. Where work is adjacent to wall, extend drop sheet up wall and secure at ceiling with duct tape. This drop sheet demarcates the boundary of the regulated area.

b) Signs: Post warning signs that carry the following legends:

(1) First Sign: Provide warning signs at each locked door leading to the controlled area reading as follows:

Legend	Notation
KEEP OUT	3 inch (76.2 mm) Block

(2) Second Sign: Immediately inside the locked door and outside the controlled area 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

c) Barrier Tape: Delineate area with 3 inch (76.2 mm) wide polyethylene ribbon with the printed warning, "CAUTION ASBESTOS REMOVAL". Install this ribbon at between 3 and 4 feet (0.91 and 1.22 meters) above the floor.

C. SCHEDULING

1. Work is to be carried out after building occupants have left.

D. GENERAL PROCEDURES

1. The following precautions and procedures have application to work of this section. Workers must exercise caution to avoid release of asbestos fibers into the air.

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Regulated Areas – Asbestos Abatement

- a) Setup and management of the controlled area is to be under the supervision of an OSHA competent person as described in Section 02 82 11.19 Coordination – Asbestos Abatement.
- b) Before start of work comply with requirements for worker protection in Section 02 82 13.16.A, and respiratory protection in Section 02 82 13.16.B.
- c) Do not allow eating, drinking, smoking, chewing tobacco or gum, or applying cosmetics in the regulated area.
- d) Shut down any air handling equipment that brings air into or out of the regulated area.
- e) Clean any existing dust or debris from the floor and walls, and other surface in the immediate location of the work, prior to commencing work by damp mopping or by use of a HEPA filtered vacuum.
- f) Cover floor in vicinity of work area and six (6) feet (1.82 meters) beyond, with 6 mil (0.15 mm) polyethylene drop sheet. Where work is adjacent to wall, extend drop sheet up wall and secure at ceiling with duct tape. This drop sheet demarcates the boundary of the regulated area.
- g) Seal all openings, supply and exhaust vents, and convectors of the work area with 6 mil (0.15 mm) polyethylene sheeting secured and completely sealed with duct tape.
- h) Perform the work per the appropriate specification section while on plastic drop sheet.
- i) Immediately remove any asbestos containing debris which collects on the drop sheet either by using a HEPA vacuum or by spraying with amended water or removal encapsulant, collecting with wet paper towels, placing in a disposal bag while still wet, and cleaning surface of plastic sheet with wet paper towels.
- j) Complete the following at completion of work in an area before stepping off drop sheet.
 - (1) While standing on plastic sheet, thoroughly HEPA vacuum ladder and any tools used and pass to worker standing off sheet.
 - (2) The worker standing off of the sheet, thoroughly HEPA vacuum the worker standing on the sheet.
 - (3) The worker standing on the sheet, thoroughly HEPA vacuum all surfaces of the plastic sheet, bags, and any other items on the sheet, including the worker's feet.

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Regulated Areas – Asbestos Abatement

- k) If moving to the next work area in the same secured area, the worker on the drop sheet is to put on clean foot covers. This should be accomplished by placing each foot, in turn, off of the sheet as the foot cover is put on. Remove the clean foot covers at the next work area while standing on the sheet. Dispose of the used foot covers, along with the plastic sheet, at completion of work in that area. Do not reuse foot covers to move off of the sheet.
 - l) If the workday is complete or if the next work area is in another secured area, all workers remove protective clothing, turning them inside out while doing so. Worker on the sheet steps with each foot off the sheet as the foot covers are removed.
 - m) Fold sheet and all its contents toward the center.
 - n) Place the sheet in a properly labeled disposal bag.
 - o) Neck down the bag and collapse it with the HEPA vacuum.
 - p) Twist the bag shut, bend over and seal with duct tape by wrapping around bag neck at least 3 times.
 - q) Clean all surfaces of the work area by use of a HEPA filter vacuum until no visible residue remains.
2. At completion of work, require all workers to complete wet decontamination procedures in accordance with Section 02 82 13.16.A Worker Protection.

END OF SECTION

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Decontamination Units

I. GENERAL

A. DESCRIPTION OF WORK

1. Provide Personnel Decontamination Facility. Require that the personnel decontamination unit be the only means of ingress and egress for the work area.

II. PRODUCTS

A. MATERIALS

1. 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.
2. 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.
3. Spray Adhesive: Provide spray adhesive in aerosol cans that is specifically formulated to stick tenaciously to sheet polyethylene.
4. 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 gallon stainless or galvanized steel with welded seams, copper or lead with soldered seams, or a seamless liner of minimum 60 mil (1.5 mm) thick.
5. 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.
6. Shower Head and Controls: Provide a factory-made showerhead producing a spray of water that 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.
7. 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.
 - a) Primary Filter - Passes particles 20 microns and smaller
 - b) Secondary Filter - Passes particles 5 microns and smaller
8. Hose Bib: Provide heavy bronze angle type with wheel handle, vacuum breaker, and 3/4 inch (19.05 mm) National Standard male hose outlet.

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Decontamination Units

9. Shower Stall: 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 and pump water from reservoir through filters to a drain. Mount filters inside shower stall on back wall beneath hose bib.
10. 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.

III. EXECUTION

A. PERSONNEL DECONTAMINATION UNIT

1. 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 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. Provide temporary lighting within decontamination unit as necessary to reach a lighting level of 100 foot candles (1076 lumens / square meter).
2. 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.
 - a) 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.
 - b) Locate it so that access to work area from changing room is through shower room.
 - c) Separate changing room from the building by a sheet plastic flapped doorway.
 - d) 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.
 - e) 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 02 82 16.16 Temporary Enclosures – Asbestos Abatement.

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Decontamination Units

- f) Maintain floor of changing room dry and clean at all times. Do not allow overflow water from shower to wet floor in changing room.
 - g) Damp wipe all surfaces twice after each shift change with a disinfectant solution.
 - h) Provide posted information for all emergency phone numbers and procedures.
3. Drying Room: Provide a drying room as an airlock and a place for workers to dry after showering.
- a) 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.
 - b) Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 - c) Separate this room from the changing room and shower room with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 - d) Separate from changing room by a sheet plastic flapped doorway.
 - e) Provide a continuously adequate supply of disposable bath towels.
4. 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.
- a) 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.
 - b) Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 - c) Separate this room from the drying room with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 - d) Provide splash-proof entrances to drying room with doors arranged in the following configuration:
5. At each entrance to the shower room, attach two overlapping flaps of elastomeric membrane material, fastened at the top and sides. Overlap the flaps a minimum of 6 inches (152 mm) in a direction that presents a shingle-like configuration to the water stream from the shower. Overlap bottom by 1-1/2 inch (39 mm) minimum. Arrange so

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Decontamination Units

that any air movement out of the work area will cause the flaps to seal against the doorframe.

- a) Provide showerhead and controls.
 - b) Provide temporary extensions of existing hot and cold water and drainage, as necessary for a complete and operable shower.
 - c) Provide a soap dish and a continuously adequate supply of soap and maintain in sanitary condition.
 - d) Arrange so that water from showering does not splash into the changing or equipment rooms.
 - e) 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.
 - f) Provide flexible hose showerhead.
 - g) Pump waste water 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.
 - h) Provide hose bib.
6. 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.
- a) Separate this room from the work area by a 6 mil (0.15 mm) polyethylene flapped doorway.
 - b) Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 - c) Separate this room from the shower room and work area with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 - d) 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.
7. 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, add an intermediate

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Decontamination Units

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.

8. Decontamination Sequence: Require that all workers adhere to the following sequence when entering or leaving the work area.
 - a) 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.
 - b) Any additional clothing and equipment left in equipment room needed by the worker are put on in the equipment room.
 - c) Worker proceeds to work area.
9. Exiting Work Area
 - a) Before leaving the work area, require the worker to remove all gross contamination and debris from overalls and feet.
 - b) The worker then proceeds to the equipment room and removes all clothing except respiratory protection equipment.
 - c) Extra work clothing such as boots, hard hats, goggles, and gloves are to be stored in contaminated end of the equipment room.
 - d) Disposable coveralls are placed in a bag for disposal with other material.
 - e) Require that decontamination procedures found in Section 02 82 13.16.A Worker Protection – Asbestos Abatement are followed by all individuals leaving the work area.
 - f) After showering, the worker moves to the changing room and dresses in either new coveralls for another entry or street clothes if leaving.

B. CONSTRUCTION OF THE DECONTAMINATION UNITS

1. 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.
2. 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.
3. 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.

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Decontamination Units

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 (1.22 meters) between entrance and exit of any room. Provide a minimum of three feet (0.91 meters) between doors to airlocks.

4. 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”.
5. 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.

C. CLEANING OF DECONTAMINATION UNITS

1. Clean debris and residue from inside of decontamination units on a daily basis or as needed. Damp wipe or hose down all surfaces after each shift change. Clean debris from shower pans on a daily basis.
2. 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.

D. SIGNS

1. Post an approximately 20 inch 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.

a) Legend

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

- b) Provide spacing between respective lines at least equal to the height of the respective upper line.

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Decontamination Units

2. Post an approximately 10 inch 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 (3/4 inch Block):
 - a) Legend

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Decontamination Units

NO FOOD, BEVERAGES OR TOBACCO PERMITTED
ALL PERSONS SHALL DON PROTECTIVE
CLOTHING (COVERINGS) BEFORE ENTERING THE WORK AREA
ALL PERSONS SHALL SHOWER IMMEDIATELY AFTER LEAVING
WORK AREA AND BEFORE ENTERING THE CHANGING AREA

END OF SECTION

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Materials and Equipment – Asbestos Abatement

I. GENERAL

A. SUMMARY

1. This section includes administrative and procedural requirements governing the contractor's selection of products for use in the project.

B. DEFINITIONS

1. Definitions used in this article are not intended to change the meaning of other terms used in the specifications, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.
 - a) "Products" are items purchased for incorporation in the work, whether purchased for the project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - b) "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature that is current as of the date of the specifications.
 - c) "Foreign Products" as distinguished from "domestic products," are items substantially manufactured (50 percent or more of value) outside the United States and its possessions. Products produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens of, nor living within, the United States and its possessions are also considered to be foreign products.
 - d) "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the work.
 - e) "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

C. QUALITY ASSURANCE

1. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
2. Compatibility of Options: When the contractor is given the option of selecting between two or more products for use on the project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

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Materials and Equipment – Asbestos Abatement

- a) The contractor is responsible for providing products and construction methods that are compatible with products and construction methods to be installed after completion of the work of this contract.

D. PRODUCT DELIVERY, STORAGE, AND HANDLING

1. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
 - a) Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
 - b) Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - c) Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - d) Inspect products upon delivery to ensure compliance with the specifications and to ensure that products are undamaged and properly protected.
 - e) Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
 - f) Store heavy materials away from the project structure in a manner that will not endanger the supporting construction.
 - g) Store products subject to damage by the elements above ground, under cover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

II. PRODUCTS

A. PRODUCT SELECTION

1. General Product Requirements: Provide products that comply with the specifications, that are undamaged and, unless otherwise indicated, new at the time of installation.
 - a) Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.

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Materials and Equipment – Asbestos Abatement

- b) Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
2. Product Selection Procedures: The specifications and governing regulations govern product selection. Procedures governing product selection include the following:
 - a) Proprietary Specification Requirements: Where specifications name only a single product or manufacturer, provide the product indicated. No substitutions will be permitted.
 - b) Semi-proprietary Specification Requirements: Where specifications name two or more products or manufacturers, provide one of the products indicated. No substitutions will be permitted.
 - c) Nonproprietary Specifications: When specifications list products or manufacturers that are available and may be incorporated in the work, but do not restrict the contractor to use of these products only, the contractor may propose any available product that complies with specification requirements. Comply with specification provisions concerning “substitutions” to obtain approval for use of an unnamed product.
 - d) Descriptive Specification Requirements: Where specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Specifications requirements.
 - e) Performance Specification Requirements: Where specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated.
 - f) Compliance with Standards, Codes, and Regulations: Where specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.

III. EXECUTION

A. INSTALLATION OF PRODUCTS

1. Comply with manufacturer’s instructions and recommendations for installation of products in the applications indicated.

END OF SECTION

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Removal of Asbestos Contaminated Materials

I. GENERAL

A. RELATED DOCUMENTS:

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

B. SUMMARY OF WORK:

1. Work of this section includes removal and disposal of all non-Asbestos-Containing Material including but not limited to:
 - a) Ceiling system and supports
 - b) Removal of all carpeting from within the work area

II. PRODUCTS

A. MATERIALS

1. Unlabeled Clear Bags: Provide clear 6 mil (0.15 mm) thick leak-tight polyethylene bags with no label.
2. Disposal Bags: Provide disposal bags as described in Section 02 82 33.26, "Disposal of Regulated Asbestos Containing Material"

III. EXECUTION

A. SEQUENCE

1. For Class I or II asbestos work areas, before beginning work of this section comply with:
 - a) 02 82 16.13, Temporary Pressure Differential and Air Circulation System
 - b) 02 82 16.23, Decontamination Units
 - c) 02 82 16.16 Temporary Enclosures
 - d) 02 82 13.16.A, Worker Protection - Asbestos Abatement
 - e) 02 82 13.16.B, Respiratory Protection
2. For Class III or IV asbestos work areas, before beginning work of this section comply with:
 - a) 02 82 16.19, Regulated Areas
 - b) 02 82 13.16.B, Respiratory Protection

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Removal of Asbestos Contaminated Materials

B. CEILING SYSTEM:

1. Remove sufficient ceiling tiles to gain access to top of ceiling system. Mist top of tiles with amended water. Wet sufficiently to soak debris thoroughly, but not cause dripping. Remove ceiling tiles and dispose of tiles as asbestos-contaminated materials.
2. Support System: Remove hangers, tracks, T-bars, etc. Decontaminate in Wash Down Station. Wrap in clear 6 mil (0.15 mm) sheet plastic. Dispose of as non-asbestos waste.

C. CARPETING:

1. Deface carpeting with a contrasting spray paint before the work. Coat lightly enough that wetting will not be retarded.
2. Thoroughly wet asbestos-contaminated carpeting to be removed to reduce fiber dispersal into the air. Wet carpet prior to cutting, rolling or any other activity that could disturb dust in or under the carpet. Accomplish wetting by a fine spray (mist) of amended water or encapsulant. Saturate material completely without causing excess dripping. Allow time for water or encapsulant to penetrate material thoroughly. Spray material repeatedly during the work process to maintain a continuously wet condition. Spraying amended water or encapsulant on carpeting during cutting or rolling to minimize dispersal of asbestos fibers into the air.

USE THE FOLLOWING IF THE CARPET IS GOING TO BE SIMPLY ROLLED UP INTO LARGE ROLLS.

3. Cut seams in the carpeting and roll up into rolls of carpeting that are no wider than factory width of carpeting. Roll or fold padding as necessary. Remove dust and debris from floor after removal of carpeting and padding by HEPA vacuuming followed by wet wiping.
4. Wrap the rolled carpeting in two layers of 6 mil sheet plastic. Label and dispose of in accordance with requirements of specification Section 02 82 33.26 "Disposal of Regulated Asbestos-Containing Material."

USE THE FOLLOWING IF THE CARPET IS GOING TO BE CUT INTO SMALL PIECES AND PLACED IN ASBESTOS DISPOSAL BAGS.

5. Cut carpeting into three foot wide strips. Cut strips into short enough lengths to fit in asbestos disposal bags when rolled up. As carpeting and padding is removed, simultaneously pack material while still wet into disposal bags, 6 mil (0.15 mm) minimum thickness. Seal bags, clean outside and move to Wash Down Station adjacent to Material Decontamination Unit. Remove dust and debris from floor after removal of carpeting and padding by HEPA vacuuming followed by wet wiping.

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Removal of Asbestos Contaminated Materials

D. AIRBORNE FIBER LEVELS:

1. Airborne Fiber Levels: Maintain airborne fiber levels less than the “Stop Action Levels” set forth in Section 02 82 11.16, “Scope of Work - Asbestos Abatement.”

END OF SECTION

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Project Decontamination and Clearance Testing

I. GENERAL

A. SUMMARY

1. Work of this section includes the decontamination of air in the work area which has been, or may have been, contaminated by 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.
2. Work of this section includes the cleaning, decontamination, and removal of temporary facilities installed prior to abatement work, including:
 - a) Primary and critical barriers
 - b) Decontamination unit
 - c) Pressure differential system
3. 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.

B. DESCRIPTION OF REQUIREMENTS

1. General: Decontamination of the work area following asbestos abatement.
2. The work is a two step procedure with two cleanings of the primary barrier plastic, prior to its removal, and the room surfaces.

C. CLEARANCE AIR SAMPLING BY THE OWNER

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) Aggressive sampling procedures as described below may be followed.
 - b) PCM samples may be secured as indicated below. TEM sampling may also be conducted.
 - c) Work Area Clearance: Upon meeting the clearance requirements, decontamination can be initiated.

D. CLEARANCE SAMPLING BY THE OWNER

1. Clearance air samples will be taken using sampling techniques as follows:

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Project Decontamination and Clearance Testing

- a) Clearance sampling will be conducted in accordance with the guidelines specified in OAC 3701-34.
- b) 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.
- c) In work areas where a dirt floor or exposed fibrous glass insulation is in the space, but outside the work area, maintain a critical barrier to prevent disturbance of these surfaces during sampling.

E. SCHEDULE OF CLEARANCE AIR SAMPLES BY OWNER

1. Sample cassettes: Samples will be collected on 25 mm. cassettes as follows:
 - a) PCM: 0.8 micrometer mixed cellulose ester, or
 - b) TEM: 0.45 micrometer mixed cellulose ester or 0.40 micrometer polycarbonate, with 5.0 micron mixed cellulose ester backing filter.
2. 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.
3. Sampling sensitivity
 - a) PCM: Based on a limit of detection (LOD) of 7 fibers/mm² on the filter (approximately 5 fibers counted in 100 fields) and a 95% confidence limit, a sample volume of sufficient size that a single sample indicates compliance with the limit values given below. A sample must be at or below the LOD to indicate that it is at or below the limit value. Note: This is different from quantifying a concentration that is a stricter requirement and would need a larger sample volume.
 - (1) Clearance samples: A limit value of 0.01 f/cc.
 - b) TEM: analytical sensitivity as set forth in the analytical method used or the AHERA regulation.
4. PHASE CONTRAST MICROSCOPY
 - a) In each work area after completion of all cleaning work, a minimum of 5 samples will be taken and analyzed as follows:

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Project Decontamination and Clearance Testing

Sample Location	Number of Samples	Limit Value (fibers/cc)	Approximate Volume (liters)	Rate (liters/minute)
Inside Work Area	3	0.01	1,200	16.0
Field Blank	2	0.01	0	Open for 30 Seconds

- b) Analysis: Fibers on each filter will be measured using the NIOSH Method 7400 entitled published in the NIOSH Manual of Analytical Methods, or the OSHA Reference Method (ORM) (29 CFR 1926.1101, Appendix A).
- c) Fibers referred to in this section include fibers, regardless of composition, as counted by the phase contrast microscopy method used.
- d) Release Criteria: Decontamination of the work site is complete when every work area sample is at or below the detection limit above. If any sample is above the detection limit, then the decontamination is incomplete and re-cleaning is required.

F. TRANSMISSION ELECTRON MICROSCOPY (ALTERNATE METHOD)

- 1. In each work area after completion of all cleaning work, a minimum of 13 samples may be taken and analyzed as follows:

Sample Location	Number of Samples	Analytical Sensitivity (structures/cc)	Approximate Volume (liters)	Rate (liters/minute)
Inside Work Area	5	0.005	1,199-3,800	1-10
Outside Work Area	5	0.005	1,199-3,800	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

- 2. Analysis will be performed using the analytical method set forth in the AHERA Regulation 40 CFR Part 763, Appendix A.
- 3. Asbestos Structures referred to in this section include asbestos fibers, bundles, clusters or matrices, as defined by method of analysis.
- 4. Release Criteria: Decontamination of the work site is complete if either of the following two sets of conditions is met:

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Project Decontamination and Clearance Testing

- a) Work area samples are below filter background levels
 - (1) All work area sample volumes are greater than 1,199 liters for a 25-mm sampling cassette.
 - (2) The average concentration of asbestos of the five work area samples does not exceed the filter background level of 70 structures per square millimeter of filter area.
- b) Work area samples are not statistically different from outside samples
 - (1) All sample volumes except for blanks are greater than 560 liters for a 25 mm. sampling cassette.
 - (2) The average asbestos concentration of the three blanks is below the filter background level of 70 structures per square millimeter of filter area.
 - (3) Average asbestos concentrations in work area samples are not statistically different from outside samples, as determined by the Z-test calculation found in 40 CFR Part 763, Subpart E, Appendix A (Z is less than or equal to 1.65)
5. If these conditions are not met, then the decontamination is incomplete. Repeat the cleaning procedures of this section.
6. 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.

G. LABORATORY TESTING BY THE OWNER

1. Phase Contrast Microscopy by the Owner
 - a) The services of a third party will be employed by the owner to perform analysis of the air samples. A microscope and technician will be set-up at the job site, so that reports on air samples can be obtained immediately. The contractor will have access to all air monitoring tests and results upon request.
2. Transmission Electron Microscopy by the Owner (Alternate Method)
 - a) Samples will be sent by overnight courier for analysis by transmission electron microscopy. Samples will not be carried on weekends; so that samples shipped on Friday will arrive on the following Monday. Verbal results will normally be available during the 5th working day after receipt of samples by the 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 contractor upon request.

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II. EXECUTION

A. START OF WORK

1. Previous Work: During completion of the asbestos abatement work specified in other sections, secondary barriers of polyethylene sheeting will have been removed and disposed of along with any gross debris generated by the asbestos abatement work.
2. Visual Inspection: Perform visual inspections of the work area along with the project supervisor at each step of the decontamination process.
 - a) Follow inspection procedures in EPA Purple Book.
3. Start of Work: Work of this section begins with the cleaning of the primary barrier. At start of work, the following will be in place:
 - a) Primary Barrier: Two layers of polyethylene sheeting on floor and one layer on 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 and equipment in operating condition.
 - e) Pressure Differential System: In operation.

B. FIRST CLEANING

1. First Cleaning: Carry out a first cleaning of all surfaces of the work area including: items of remaining sheeting, tools, scaffolding and/or staging by use of damp-cleaning and mopping, and/or a high efficiency particulate air (HEPA) filtered vacuum. 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.
2. Contractor's Testing: At the completion of the above cleaning, visually inspect all surfaces. Re-clean if any dust, debris, etc. is found. At completion of this inspection, sweep entire work area including walls, ceilings, ledges, floors and other surfaces in the work area with exhaust from forced-air equipment. Do not direct forced-air equipment at any seal in any critical barrier. If any debris or dust is found, repeat the cleaning. Continue this process until no debris dust or other material is found while sweeping all surfaces with forced-air equipment.

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Project Decontamination and Clearance Testing

After a visual inspection, wait for a period of time long enough for the HEPA-filtered fan units operating in the work area to provide 96 air changes to allow HEPA filtered fan units to clean 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 96-air change period.

C. SECOND CLEANING:

1. **Second Cleaning:** Carry out a second cleaning of all surfaces in the work area in the same manner as the first cleaning.
2. **Contractor's Testing:** At the completion of the above cleaning, visually inspect all surfaces. Re-clean if any dust, debris, etc. is found. At completion of this inspection, sweep entire work area including walls, ceilings, ledges, floors and other surfaces in the work area with exhaust from forced-air equipment. Do not direct forced-air equipment at any seal in any critical barrier. If any debris or dust is found, repeat the cleaning. Continue this process until no debris dust or other material is found while sweeping all surfaces with forced-air equipment.
3. After a visual inspection, again wait for a period of time long enough for the HEPA-filtered fan units operating in the work area to provide 96 air changes to allow HEPA filtered fan units to clean 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 96-air change period.
4. **Visual inspection:** Before the application of any sealer to abated surfaces as a lock-back, perform a visual inspection to determine if all debris and residue has been removed. Perform visual inspection with the owner or its representative. When the area is visually clean, and if after sweeping of all surfaces, no debris, residue, dust or other material is found, complete the certification at the end of this section. Visual inspection is not complete until confirmed in writing, on the certification, by project supervisor. After this visual inspection is passed, a clear lock-back sealant can be applied and the work area decontamination process can be initiated.
5. **Sealing of substrate:** Perform sealing of substrate or installation of spray-applied finishes or fireproofing, where required, at this time. Maintain pressure differential system in operation during encapsulation work. Perform work only after surfaces to be covered with sealer have met the requirements for a visual inspection in this section.

D. VISUAL INSPECTION

1. After final cleaning, perform a complete visual inspection of the entire work area including, but not limited to: all surfaces, ceiling, walls, floor, decontamination unit, all plastic sheeting, and seals over ventilation openings, doorways, windows, and other openings. Look for debris from any source, residue on surfaces, dust or other matter. During visual inspection, sweep entire work area including walls, ceilings, ledges, floors, and other surfaces in the room with exhaust from forced air equipment. If any debris, residue, dust or other matter is found, repeat final cleaning and continue decontamination

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procedure from that point. When the area is visually clean, and if after sweeping of all surfaces, no debris, residue, dust or other material is found, complete the certification at the end of this section. Visual inspection is not complete until confirmed in writing, on the certification, by the owner.

2. Temporary lighting: Provide a minimum of 100 foot candles (1075 lumens / square meter) of lighting on all surfaces in the areas to be subjected to visual inspection. Provide hand held lights providing 150 foot candles (1600 lumens / square meter) at 4 feet (1.25 meter) capable of reaching all locations in work area.
3. Lifts: Provide ladders, scaffolding, and lifts as required to provide access to all surfaces in the area to be subjected to visual inspection. Access is to allow touching of all surfaces.

E. CLEARANCE AIR SAMPLING BY OWNER

1. Phase Contrast Microscopy (PCM): After the work area is found to be visually clean, and after primary and secondary barriers have been removed, air samples will be taken and analyzed by the owner in accordance with the procedure for phase contrast microscopy set forth herein.
 - a) If release criteria are not met, repeat final cleaning and continue decontamination procedure from that point.
 - b) If release criteria are met, the owner may continue with the clearance air testing by transmission electron microscopy.
 - c) If owner does not utilize TEM analysis, and the release criteria for PCM are satisfied, remove work area isolation in accordance with requirements of this section.
2. Transmission Electron Microscopy (TEM) (Alternate Method): After the work area is found to be visually clean and PCM air sampling completed, TEM air samples may be collected and analyzed by the owner in accordance with the procedure for transmission electron microscopy set forth herein.
 - a) If release criteria are not met, repeat final cleaning and continue decontamination procedure from that point.
 - b) If release criteria are met, remove work area isolation in accordance with requirements of this section.

F. REMOVAL OF WORK AREA ISOLATION

1. After all requirements of this section have been met:

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Project Decontamination and Clearance Testing

- a) Shut down and remove the pressure differential system. Seal HEPA filtered fan units, HEPA vacuums and similar equipment with 6 mil (0.15 mm) 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, are found, then the entire area affected shall be decontaminated as specified in Section 02 82 33.19 Cleaning and Decontamination Procedures – Asbestos Abatement.
- d) Remove all equipment, materials and debris from the work site.
- e) Dispose of all asbestos-containing waste material in the designated roll-off box provided by the owner.

G. SUBSTANTIAL COMPLETION OF ABATEMENT WORK

1. Asbestos abatement work is complete upon meeting the requirements of this section including submission of the Certificate of Visual Inspection.

H. CERTIFICATE OF VISUAL INSPECTION

1. Following this section is a Certificate of Visual Inspection. This certification is to be completed by the contractor and certified by the owner.

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Project Decontamination and Clearance Testing

CERTIFICATION OF VISUAL INSPECTION

Date _____ Project Name _____
EEI Project # _____ Location _____
Client _____ Client # _____

Contractor: _____

Containment/ regulated area: _____

Contractor scope of work: _____

In accordance with Emerald Environmental's Specifications for Asbestos Abatement, Section 02 82 33.16 Project Decontamination and Clearance Testing, and/or Ohio Department of Health's Asbestos Hazard Abatement Rules, Chapters 3701-34-06 or 3701-34-10, 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.

BY:

Signature _____ Date _____

Name _____ Title _____

OWNER CERTIFICATION

The owner and/or the owner's representative hereby certifies that it has accompanied the contractor on the contractor's visual inspection and verifies that this inspection has been thorough and to the best of its knowledge and belief, the contractor's certification above is a true and honest one.

BY:

Signature _____ Date _____

Name _____ Title _____

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Encapsulation of Asbestos Containing Material

I. GENERAL

Drawings and general provisions of the Contract, including General and Supplementary Conditions and all items listed in the Table of Contents apply to this section.

A. DESCRIPTION OF WORK

1. The work includes:
 - a) The sealing of all surfaces from which asbestos containing materials have been removed with one (1) coat of bridging encapsulant.
 - b) The sealing of the ends of any exposed asbestos containing materials with two (2) coats of penetrating encapsulant and one (1) coat of bridging encapsulant.

B. SUBMITTALS

1. **Product Data:** Have available onsite and at owner's request submit one copy of the manufacturer's technical information including label analysis and application instructions for each material proposed for use.
2. **Delivery and Storage:** Deliver materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label, and the following information:
 - a) Name or title of material
 - b) Manufacturer's stock number and date of manufacture
 - c) Manufacturer's name
 - d) Contents by volume for major constituents
 - e) Thinning instructions
 - f) Application instructions

C. JOB CONDITIONS

1. Apply encapsulating materials only when environmental conditions in the work area are as required by the manufacturer's instructions.

D. QUALITY ASSURANCE

1. **Testing:** Test material to be encapsulated using methods set forth in ASTM Proposed Specification P-189 "Specification for Encapsulants for Friable Asbestos Containing Building Materials".

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Encapsulation of Asbestos Containing Material

E. PERFORMANCE GUARANTEE

1. Have available onsite and at owner's request submit a written Performance Guarantee, executed by the manufacturer and co-signed by the contractor, agreeing to repair/replace any encapsulant which has deteriorated to a condition where it would not perform effectively for its intended purposes due substantially to defective materials or workmanship and not due to abuse by occupants, improper maintenance, unforeseeable ambient exposures or other causes beyond anticipated conditions and manufacturer's or contractor's control.

II. PRODUCTS

- A. Provide a penetrating or bridging type encapsulant specifically designed for application to asbestos containing material.
 1. Draft Standards: Product shall be rated as acceptable for use intended when tested in accordance with draft ASTM Proposed Specification P-189.
 2. Fire Safety: All materials used shall have a flame spread of less than 25 when dry when tested in accordance with ASTM E-84.
 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to the following:
 - a) Penetrating Encapsulants
 - (1) International Protective Coatings Corp. "Serpiflex Concentrate",
 - (2) Foster "32-60" Asbestos Removal Encapsulant,
 - (3) Fiberlock Technologies "A-B-C" Asbestos Binding Compound, or equal.
 - b) Bridging Encapsulant
 - (1) International Protective Coatings Corp. "Serpiflex Concentrate",
 - (2) Foster "32-80" Bridging Encapsulant,
 - (3) Fiberlock Technologies "Lag-Kote" Bridging Encapsulant, or equal.

III. EXECUTION

A. GENERAL

1. Prior to applying any encapsulating material, ensure that application of the sealer will not cause the base material to fail and allow the sealed material to fall of its own weight or separate from the substrate.
2. Do not commence application of encapsulating materials until all removal work within the work area has been completed.

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Encapsulation of Asbestos Containing Material

B. WORKER PROTECTION

1. 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.
2. In addition to protective breathing equipment required by OSHA requirements or by this specification, use painting pre-filters on respirators to protect the dust filters when organic solvent based encapsulants are in use.

C. SEALING EXPOSED EDGES

1. Seal edges of ACM exposed by removals up to an inaccessible spot such as a sleeve, wall penetration, etc. with two (2) coats of encapsulant.
 - a) Prior to sealing, permit the exposed edges to dry completely to permit penetration of the sealer.

D. ARCHITECTURAL FINISH AND FIREPROOFING

1. Examine existing conditions: Determine if the friable ACM to be encapsulated remains sufficiently bonded to receive the encapsulation process and if encapsulation process will effectively prevent release of asbestos fibers from the material.
2. Encapsulants used on fireproofing materials must have an Underwriters Laboratories classification and be listed in the current edition of the UL Fire Resistance Directory.
3. Before start of work on an architectural finish complete the work of the following:
 - a) Section 02 82 13.16.A Worker Protection – Asbestos Abatement
 - b) Section 02 82 13.16.B Respiratory Protection – Asbestos Abatement
 - c) Section 02 82 16.16 Temporary Enclosures – Asbestos Abatement
 - d) Section 02 82 16.23 Decontamination Units – Asbestos Abatement
4. Comply with all manufacturer's instructions for particular conditions of installation in each case. Consult with manufacturer's technical representative for conditions not covered.
5. Encapsulate all surfaces in full compliance with manufacturer's procedures.
6. At completion of encapsulation and before removal of work area enclosures and pressure differential system, decontaminate space in accordance with requirements of Section 02 82 33.16 Project Decontamination and Clearance Testing.
7. At completion of work, submit manufacturer's record of inspection of completed work and manufacturer's performance guarantee executed by both manufacturer and contractor.

E. HIGH TEMPERATURE PIPES

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Encapsulation of Asbestos Containing Material

1. Apply one coat of high temperature bridging encapsulant to the surface of all high temperature pipes where asbestos containing pipe insulation was removed.

F. DRYING ENCAPSULATED SURFACES

1. General: Following encapsulation work allow the HEPA filtered fan units to operate for a sufficient length of time that all encapsulated surfaces dry thoroughly. Use oscillating fans as necessary to assure circulation of air in all parts of the work area during this period. During period of drying, operate temporary pressure differential and air circulation system as an exhaust system to as great an extent as possible.
2. For encapsulation projects, do not start the work of Section 02 82 33.16 Project Decontamination and Clearance Testing until all encapsulated surfaces are completely dry.

END OF SECTION

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Disposal of Regulated Asbestos Containing Materials

I. GENERAL

A. SUMMARY

1. This section describes the disposal of regulated asbestos containing materials (RACM). Disposal includes packaging and landfilling of RACM.

B. SUBMITTALS

1. Before Start of Work: Have available onsite and at owner's request submit the following to the owner with a copy to the construction manager.
 - a) Copy of state or local license for waste hauler.
 - b) Name and address of landfill where RACM are to be buried. Include contact person and telephone number.
 - c) Chain of custody form and form of waste manifest proposed.
2. Submit owner's original manifests and disposal site receipts to owner.
3. 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 owner with a copy to the construction manager within 35 days of departure from facility.

II. PRODUCTS

A. MATERIALS

1. Disposal Bags: Provide 6 mil (0.15 mm) thick, leak-tight polyethylene bags labeled with three labels with text as follows:

- a) Provide, in accordance with 29 CFR 1910.1200(f), the following:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
BREATHING AIRBORNE FIBERS IS
HAZARDOUS TO YOUR HEALTH

- b) Provide, in accordance with 49 CFR parts 171 and 172, the following:

RQ-ASBESTOS WASTE
CLASS 9
NA2212-PG III

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Disposal of Regulated Asbestos Containing Materials

- c) 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 and 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.

III. EXECUTION

A. SEQUENCE

1. Comply with the following sections during all phases of this work:
 - a) Section 02 82 13.16.A, Worker Protection - Asbestos Abatement
 - b) Section 02 82 13.16.B, Respiratory Protection – Asbestos Abatement

B. GENERAL

1. All waste is to be hauled by a waste transporter with all of the required licenses from all state and local authorities with jurisdiction.
2. 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.
3. Load all adequately wetted RACM in disposal bags or leak-tight containers. All materials are to be contained in one of the following:
 - a) Two 6 mil (0.15 mm) disposal bags
 - b) Two 6 mil (0.15 mm) disposal bags and a fiberboard drum
 - c) Sealed steel drum with no bag
4. Protect interior of truck or dumpster with critical and primary barriers as described in Section 02 82 16.16 Temporary Enclosures – Asbestos Abatement.
5. Carefully load containerized waste in fully enclosed dumpsters, trucks or other appropriate vehicles for transport. Exercise care before and during transport, to insure that no unauthorized persons have access to the material.
6. 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:

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Disposal of Regulated Asbestos Containing Materials

DANGER
ASBESTOS DUST HAZARD
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

7. Do not store containerized materials outside of the work area. Take containers from the work area directly to a sealed truck or dumpster.
8. Do not transport bagged materials on open trucks. Label drums with same warning labels as bags. Treat drums that have been contaminated as regulated asbestos containing material and dispose of in accordance with this specification.
9. At disposal site unload containerized waste:
 - a) Sealed plastic bags may be carefully unloaded from the truck. If bags are broken or damaged, return to work site for re-bagging. Clean entire truck and contents using procedures set forth in Section 02 82 33.16 Project Decontamination and Clearance Testing.
10. Retain receipts from landfill or processor for materials that were disposed.
11. At completion of hauling and disposal of each load, submit copy of waste manifest, chain of custody form, and landfill receipt to owner.

END OF SECTION

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Removal of Asbestos Contaminated Materials

I. GENERAL

A. RELATED DOCUMENTS:

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

B. SUMMARY OF WORK:

1. Work of this section includes removal and disposal of all non-Asbestos-Containing Material including but not limited to:
 - a) Ceiling system and supports
 - b) Removal of all carpeting from within the work area

II. PRODUCTS

A. MATERIALS

1. Unlabeled Clear Bags: Provide clear 6 mil (0.15 mm) thick leak-tight polyethylene bags with no label.
2. Disposal Bags: Provide disposal bags as described in Section 02 82 33.26, "Disposal of Regulated Asbestos Containing Material"

III. EXECUTION

A. SEQUENCE

1. For Class I or II asbestos work areas, before beginning work of this section comply with:
 - a) 02 82 16.13, Temporary Pressure Differential and Air Circulation System
 - b) 02 82 16.23, Decontamination Units
 - c) 02 82 16.16 Temporary Enclosures
 - d) 02 82 13.16.A, Worker Protection - Asbestos Abatement
 - e) 02 82 13.16.B, Respiratory Protection
2. For Class III or IV asbestos work areas, before beginning work of this section comply with:
 - a) 02 82 16.19, Regulated Areas
 - b) 02 82 13.16.B, Respiratory Protection

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Removal of Asbestos Contaminated Materials

B. CEILING SYSTEM:

1. Remove sufficient ceiling tiles to gain access to top of ceiling system. Mist top of tiles with amended water. Wet sufficiently to soak debris thoroughly, but not cause dripping. Remove ceiling tiles and dispose of tiles as asbestos-contaminated materials.
2. Support System: Remove hangers, tracks, T-bars, etc. Decontaminate in Wash Down Station. Wrap in clear 6 mil (0.15 mm) sheet plastic. Dispose of as non-asbestos waste.

C. CARPETING:

1. Deface carpeting with a contrasting spray paint before the work. Coat lightly enough that wetting will not be retarded.
2. Thoroughly wet asbestos-contaminated carpeting to be removed to reduce fiber dispersal into the air. Wet carpet prior to cutting, rolling or any other activity that could disturb dust in or under the carpet. Accomplish wetting by a fine spray (mist) of amended water or encapsulant. Saturate material completely without causing excess dripping. Allow time for water or encapsulant to penetrate material thoroughly. Spray material repeatedly during the work process to maintain a continuously wet condition. Spraying amended water or encapsulant on carpeting during cutting or rolling to minimize dispersal of asbestos fibers into the air.

USE THE FOLLOWING IF THE CARPET IS GOING TO BE SIMPLY ROLLED UP INTO LARGE ROLLS.

3. Cut seams in the carpeting and roll up into rolls of carpeting that are no wider than factory width of carpeting. Roll or fold padding as necessary. Remove dust and debris from floor after removal of carpeting and padding by HEPA vacuuming followed by wet wiping.
4. Wrap the rolled carpeting in two layers of 6 mil sheet plastic. Label and dispose of in accordance with requirements of specification Section 02 82 33.26 "Disposal of Regulated Asbestos-Containing Material."

USE THE FOLLOWING IF THE CARPET IS GOING TO BE CUT INTO SMALL PIECES AND PLACED IN ASBESTOS DISPOSAL BAGS.

5. Cut carpeting into three foot wide strips. Cut strips into short enough lengths to fit in asbestos disposal bags when rolled up. As carpeting and padding is removed, simultaneously pack material while still wet into disposal bags, 6 mil (0.15 mm) minimum thickness. Seal bags, clean outside and move to Wash Down Station adjacent to Material Decontamination Unit. Remove dust and debris from floor after removal of carpeting and padding by HEPA vacuuming followed by wet wiping.

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Removal of Asbestos Contaminated Materials

D. AIRBORNE FIBER LEVELS:

1. Airborne Fiber Levels: Maintain airborne fiber levels less than the “Stop Action Levels” set forth in Section 02 82 11.16, “Scope of Work - Asbestos Abatement.”

END OF SECTION

Handling of Lighting Ballasts and Lamps Containing Mercury

I. GENERAL

A. SUMMARY

1. Contractor to remove and package all fluorescent and/or high intensity discharge (HID) lamps and ballasts, including any compact fluorescent lamps. The ballasts are of the electronic or magnetic type. Magnetic ballasts are to be assumed to be PCB containing and treated as such regardless of the presence of the "NO PCB" statement. Although a PCB capacitor may not be present in the "NO PCB" ballasts, manufacturers of these ballasts have found PCBs present in the asphalt used to embed the components of those ballasts. Light fixtures may be visibly stained, presumably from previous PCB containing ballasts. Those fixtures are to be properly disposed of by the contractor. Electronic ballasts are to be disposed of as hazardous waste due to lead content or they can be recycled. Magnetic ballasts are to be disposed of as regulated waste. If required by the disposal/recycling facility, all ballasts are to be segregated by type (magnetic or electronic) and packaged appropriately by the contractor.

Compact fluorescent lamps (CFLs) may be either the screw-in (replacement for incandescent lamps) or pin type. The ballast for the screw-in type is integral with the lamp. The ballast for the pin type is usually enclosed in the fixture. Contractor is to remove and dispose of any separate ballasts associated with the pin type CFLs in addition to disposing of the lamp itself.

2. Contractor shall also be responsible for the removal and proper disposal/recycling of battery back-up emergency lights and exit signs. Exit signs that are not battery back-up type but that contain printed circuitry boards shall also be disposed/recycled due to the lead solder used in their construction. Contractor shall also be responsible for the proper removal, packaging, transportation and disposal of the motor starter capacitors located in the Univents throughout the building. All packaging, transportation and disposal and/or recycling shall be the contractor's responsibility. Waste staging, transportation and disposal shall be completed as required under Section 02 81 16.

Fluorescent and HID lamps are regulated as either universal or hazardous waste and must be disposed of either through a mercury recycler or shipped to a hazardous waste treatment and disposal site. Lamps must be intact and packaged to minimize breakage. Lamps may not be crushed or broken onsite.

Quantities shown below are an estimate based on visual inspection of the facility. Actual number of lamps and fixtures present may be different. Contractor is responsible for packaging and disposal of all fluorescent and HID lamps, lamp ballasts and batteries onsite, regardless of actual numbers found.

- 832 ± 4' fluorescent lamps
- 104 ± 8' fluorescent lamps
- 379 ± Ballasts (inclusive of all types)
- 4 ± Exterior HID Lamps Including Ballast and or Transformers

B. DEFINITIONS

Handling of Lighting Ballasts and Lamps Containing Mercury

“Fluorescent Lamps” are low intensity discharge lamps that contain mercury and are commonly used in commercial and industrial lighting. Fluorescent lamps include tubes, circular and compact fluorescent lighting products, whether they use separate or integral ballast.

“High Intensity Discharge or HID Lamps” include mercury, metal halide and high-pressure sodium lamps that contain mercury.

“Ballasts” include both magnetic and electronic ballasts used to regulate the current and power to the fluorescent and HID lamps. Magnetic ballasts may or may not include capacitors containing PCBs.

“Polychlorinated Biphenyls” or “PCBs” are a class of chemical compounds regulated by the EPA and require special disposal or recycling. PCBs may be contained within a capacitor inside the lamp ballasts.

“Electronic Ballasts” are non-magnetic ballasts that incorporate printed circuitry to regulate the power and current for fluorescent lamps. The printed circuit boards use leaded solder which may cause the ballast to be classified as a hazardous waste.

C. SUBMITTALS

1. The following shall be submitted in sufficient detail to show full compliance with the specifications:
2. SD-08 Statements
 - a) Remediation Contractor Qualifications:

Provide a summary based on the contractor’s prior experience in lamp and ballast removal projects. The contractor’s experience shall be similar in nature and extent to ensure the capability to perform this project in a satisfactory manner.

- b) Health & Safety Officer Qualifications:

The HSO must be able to identify lamp types used in the workplace and select an appropriate control strategy for limiting exposure. He/she must have the authority to take prompt corrective actions, including work stoppage, to eliminate or mitigate the adverse conditions and minimize employee exposure. In addition, the contractor’s HSO shall have a working knowledge of pertinent Federal, State and local health regulations and shall be familiar with the appropriate environmental and personnel monitoring equipment and techniques. The HSO shall be continuously onsite during all operations covered by this contract and be responsible for the Site Safety Plan’s implementation.

The contractor shall submit the name, qualifications (education summary and documentation) and all related work experience of the HSO, and any alternates, prior to the commencement of work.

Handling of Lighting Ballasts and Lamps Containing Mercury

c) Remediation Contractor Personnel Qualifications:

The contractor shall have available certification that all workers involved in the actual remediation for this project have received training in hazardous waste operations as they pertain to handling of lamps and ballasts.

D. SUBMITTALS AFTER THE START OF THE PROJECT

1. Laboratory analytical data

Prior to the transportation and disposal of the waste that has been generated during the course of this project; the contractor shall submit all laboratory analytical data to the owner with a copy to the construction manager.

2. Waste disposal records

For hazardous waste disposals, submit signed manifests to the owner with copies to the construction manager. Signed manifests must state that hazardous waste has been properly disposed in an approved hazardous waste landfill. The specific landfill must be approved by the owner prior to the shipment of any waste material.

For non-hazardous waste, submit signed manifests, bills of lading and certificates of receipt or trip tickets indicating the landfill and the weight or volume of materials delivered to the owner with copies to the construction manager.

II. EXECUTION

A. HEALTH AND SAFETY REQUIREMENTS

The contractor shall provide Hazcom training for all personnel involved in the removal, cleaning, packaging and transportation of waste lamps and ballasts. At a minimum, such training shall cover the ingredients commonly found in fluorescent and HID lighting products, PCBs and lead (from solder in the electronic ballasts).

Personal protective equipment, including safety glasses, cut-resistant gloves and chemical-resistant gloves shall be provided as needed. Respirators and appropriate cartridges for protection against dust, mercury and organic solvents (as appropriate) shall be available for use if required or determined to be advisable by the contractor's Health and Safety Officer.

B. REMOVAL ACTIVITIES

It is not the intention of this specification to dictate the specific decontamination procedures for this scope of work. It will be the responsibility of the contractor to establish the means and methods for collection and removal of mercury, lead and PCB contaminated equipment and debris. The contractor shall establish specific remediation techniques for this project. These techniques must be submitted to the owner with copies to the construction manager prior to the start of the project, if requested. The contractor shall specify the tools,

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Handling of Lighting Ballasts and Lamps Containing Mercury

equipment and materials to be used along with the sequence of cleaning activities if multiple cleaning solutions are to be used.

Lamps shall be removed from fixtures intact and not intentionally broken. Intact lamps shall be segregated by size and type and packaged appropriately in anticipation of being recycled. Packages will be sealed on all open edges with packing tape. Nothing other than lamps is to be packaged with the lamps. Lamp packages shall be stacked neatly according to size and shrink wrapped prior to transport. Lamp packages must be labeled with one of the following phrases: "Universal Waste – Lamps", "Waste Lamps" or "Used Lamps". Lamps shall be stored in a secure area and access to the lamps shall be limited to trained personnel.

The contractor will take every effort to avoid lamp breakage. Additional disposal costs for broken lamps will be the contractor's responsibility. Scrap from broken lamps shall be collected and stored in an appropriate, labeled container for recycling or disposal. Personnel cleaning up broken lamps shall have received appropriate Hazcom training and be provided with appropriate protective equipment, including cut-resistant gloves and (if necessary) respirators with mercury-absorbent cartridges.

Ballasts shall be segregated according to type (magnetic and electronic ballasts) and packaged into open-top drums. Drums shall not be loaded to over 500 pounds. Any magnetic ballast shall be considered to be a PCB ballast.

Fixtures contaminated with tar or asphalt from existing or prior ballasts shall be considered as PCB-contaminated unless cleaned or tested for PCB content. PCB-contaminated fixtures shall be containerized and segregated for disposal. Materials used to clean PCB-contaminated fixtures shall also be containerized and segregated for disposal.

C. PACKAGING REQUIREMENTS

Packaging of lamps, ballasts and other equipment shall meet all DOT and EPA requirements for proper transportation of materials for disposal and/or recycling, as appropriate. Specific packaging requirements include, but are not limited to the following descriptions. All packaging is the responsibility of the contractor. The owner, and EEI, (as their representative) shall have "stop work" authority to prohibit shipment of wastes if improperly packaged.

1. Mercury-containing lamps (including fluorescent and HID)

Intact (non-broken) mercury-containing lamps must be packed in strong outer packagings with all seams and joints sealed with self-adhesive, pressure-sensitive tape which will prevent the escape of mercury from the package. No broken lamps may be shipped in the same package with intact lamps. Lamps should be segregated according to size and type (linear fluorescent, circular, HID, compact, etc.)

HID lamps may also be shipped as part of an intact fixture, on a skid, stretch-wrapped to the skid.

2. Ballasts and Univalent capacitors

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Ballasts and capacitors are to be packaged in steel drums, not more than 500 pounds per drum. Ballasts are to be segregated according to type (magnetic or electronic) so that they can be properly identified on the shipping papers. Capacitors are to be shipped with the magnetic ballasts.

3. Battery-backup emergency and exit lighting

Emergency and exit lighting fixtures are to be packaged in strong outer packagings, and may be co-mingled. Very large fixtures may be shipped on a skid, stretch-wrapped to the skid.

D. SHIPPING PAPERS REQUIREMENTS

Lamps intended for recycle may be shipped as universal wastes to either a recycling or disposal site. Broken lamps may only be shipped as hazardous waste to an appropriate disposal site. Broken lamps may NOT be shipped to a recycler unless that recycler is also an approved hazardous waste disposal site. Magnetic ballasts and Univent capacitors must be shipped as a DOT hazardous material to an appropriate recycling or disposal site. Electronic ballasts and exit/emergency lighting shall be shipped as either hazardous or universal waste, depending on whether shipped to a disposal or recycler.

Prior to any shipment, Contractor wishing to sign manifests, bills of lading or other transportation documents on behalf of the Owner, must obtain specific, written authorization from the Owner. Any contractor signing transportation documents accepts full liability for certification that the shipment meets DOT and EPA requirements for proper description, packaging, marking and labeling.

E. DISPOSAL

Prior to disposal, the contractor will confirm by analytical testing whether or not waste (other than lamps and/or ballasts) must be handled as hazardous waste or as non-hazardous waste. Material will be staged and segregated in such a manner as to minimize the volume/weight of potentially hazardous waste.

1. Non-Hazardous Waste from Demolition/Renovation Activities

Collect non-hazardous waste in a covered dumpster or vacuum container and dispose of the waste at an appropriate landfill.

2. Hazardous Waste from Demolition/Renovation Activities

Collect hazardous waste in a covered dumpster, drums, or vacuum container and dispose of the waste at a properly licensed hazardous waste landfill. The landfill must be approved by the owner prior to the initial shipment of waste to the landfill. Submit to the owner documentation that the disposal site is approved for hazardous waste disposal by the USEPA and State regulatory agencies. Submit one copy of the completed manifest, signed and dated by the initial transporter in accordance with 40 CFR 262.

F. CLEAN-UP

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PCB-contaminated fixtures may be cleaned using cloth or rags and hexane. Contaminated cloth or rags shall be containerized and segregated for disposal.

Upon completion of the cleanup of broken lamps, visually inspect and if necessary clean all surfaces within the work area. Remove and dispose of all solid waste used for protection and cleanup as non-hazardous waste, unless in the contractor's opinion the level of contamination of these materials would indicate disposal as hazardous waste.

Upon completion of removal, disposal and cleanup operations, the owner may at its option inspect and/or test the work area for evidence of remaining contamination. If so indicated, the owner may require additional cleanup by the contractor.

END OF SECTION