

**Section 02080 Site Work – Asbestos Abatement**

**PART 1 – GENERAL**

**1.1 General Conditions and Related Work**

- 1.1.1 This section forms a part of the Contract Document and should be read in conjunction with all other Sections and Divisions in order to comply with the requirements of the General Conditions of the Contract.
- 1.1.2 It is the intent that work performed as outlined in this section will result in the removal and disposal of all asbestos-containing materials, existing asbestos-contaminated materials and materials that become contaminated by asbestos as a result of the work specified by this Section. The referenced materials include, but are not limited to, vinyl floor tiles and drywall joint compound.
- 1.1.3 Although not part of the scope of work, Contractors should be aware that asbestos-containing window glazing on the south and east exterior windows and asbestos-containing texture coat on the exterior south and east soffits are present at the building. Should these materials be disturbed or likely to be disturbed during the work, the Contractor shall notify the Environmental Consultant and the client immediately.
- 1.1.4 Dispose of all waste as specified in applicable sections of the specifications document.
- 1.1.5 The Environmental Consultant may perform area and personal air sampling to verify effectiveness of dust suppression methods and adequacy of the respirators used by the Contractor. Contractor's personnel shall co-operate with the Environmental Consultant in collecting air samples.
- 1.1.6 This project and all work associated with it is regulated by Ontario Regulation 278/05, The Occupational Health and Safety Act and other applicable regulations.
- 1.1.7 Provide all equipment, material, services, supervision and labour required or specified to complete the scope of work of this project as described in the Contract and Specifications Documents.

**1.2 Description of Work**

- 1.2.1 **Before submitting a bid, confirm the scope of work of the project by visiting the site and reading the entire Contract documents. The information and any drawings presented should not be used as the only basis for submitting a bid.**
- 1.2.2 **Work Area 1: West Section of Terminal (Washrooms, Boiler Room, Staff Room, Control Room, Administration Area), Ground Floor :** Work in this area shall be carried out following Type 2 Removal Operation procedures (Sub-section 3.2) as follows:
  - 1.2.2.1 Pre-clean the work area including floors, walls, ceilings, conduits, wires, cables, duct openings, and all other equipment and items present in the work area using vacuum units equipped with HEPA filters and wetting techniques.
  - 1.2.3 Clean and protect all equipment, gauges, sprinkler systems and wiring present and passing through the work area but not scheduled for removal.
  - 1.2.4 Clean and protect all sensors and pneumatic controls and lines. Reinstall such items to an as found condition if removed to facilitate asbestos cleanup and removal operations.
  - 1.2.5 Maintain the fire alarm and other life/safety systems in operation. Immediately advise the Consultant in case the systems are damaged during the execution of the work.
  - 1.2.6 Protect emergency, fire protection, telephone, computer and surveillance systems and all associated wiring, and all building services not scheduled for removal.
    - 1.2.6.1 The Contractor shall be responsible for providing their own temporary lighting using ground fault panels. The level of lighting shall be acceptable to the Consultant. Coordinate with property owners while planning this phase of work, if required.
    - 1.2.6.2 Erect upper and critical seals as required prior to the start of abatement activities.

- 1.2.6.3 Ensure that the work area is separated from the rest of the building as required. Separate the asbestos removal work areas from other areas in the building by erecting a Type 2 enclosure constructed of polyethylene sheeting and wood stud frames. Use two (2) layers of fibre reinforced poly sheeting on all surfaces not scheduled for removal.
- 1.2.6.4 **Remove all of the drywall that contains asbestos-containing drywall joint compound within the boundaries of Work Area 1. The Contractor shall wet the asbestos-containing drywall joint compound and use hand held tools for removal operations. The drywall shall be disposed of as asbestos waste.**
- 1.2.6.5 All waste generated in the work area shall be double bagged using asbestos labelled yellow bags and disposed of as asbestos waste.
- 1.2.6.6 Following the final cleaning phase, OHE Consultants will complete a post-abatement verification inspection of the work area to verify the effectiveness of the abatement procedures.
- 1.2.6.7 The contractor will be responsible for re-cleaning the work area in case of failure of the post-abatement verification inspection.
- 1.2.7 Dispose of all waste as specified in applicable sections of the specifications document.
- 1.2.8 Restart all the systems present in the Work Areas which were shut down to accommodate the asbestos removal project. Ensure that the systems are operating in a manner that is similar to their operations prior to the asbestos abatement project.
- 1.2.9 Return each of the areas to an as found condition.
- 1.2.10 **Work Area 2: East Section of the Bus Terminal, Ground Floor (Former Restaurant, Convenience Store, East Administration Offices):** Work in this area shall be carried out following Type 2 Removal Operation procedures (Sub-section 3.2) as follows:
- 1.2.10.1 Pre-clean the work area including floors, walls, ceilings, conduits, wires, cables, duct openings, and all other equipment and items present in the work area using vacuum units equipped with HEPA filters and wetting techniques.
- 1.2.11 Clean and protect all equipment, gauges, sprinkler systems and wiring present and passing through the work area but not scheduled for removal.
- 1.2.12 Clean and protect all sensors and pneumatic controls and lines. Reinstall such items to an as found condition if removed to facilitate asbestos cleanup and removal operations.
- 1.2.13 Maintain the fire alarm and other life/safety systems in operation. Immediately advise the Consultant in case the systems are damaged during the execution of the work.
- 1.2.14 Protect emergency, fire protection, telephone, computer and surveillance systems and all associated wiring, and all building services not scheduled for removal.
- 1.2.14.1 The Contractor shall be responsible for providing their own temporary lighting using ground fault panels. The level of lighting shall be acceptable to the Consultant. Coordinate with property owners while planning this phase of work, if required.
- 1.2.14.2 Erect upper and critical seals as required prior to the start of abatement activities.
- 1.2.14.3 Ensure that the work area is separated from the rest of the building as required. Separate the asbestos removal work areas from other areas in the building by erecting a Type 2 enclosure constructed of polyethylene sheeting and wood stud frames. Use two (2) layers of fibre reinforced poly sheeting on all surfaces not scheduled for removal.
- 1.2.15 **Remove all of the drywall that contains asbestos-containing drywall joint compound within the boundaries of Work Area 2. The Contractor shall wet the asbestos-containing drywall joint compound and use hand held tools for removal operations. The drywall shall be disposed of as asbestos waste.**
- 1.2.16 **Remove and dispose of all asbestos-containing vinyl floor tiles present in the Convenience Store within the boundaries of Work Area 2. The Contractor shall wet the asbestos-**

**containing vinyl floor tiles and use hand held tools for removal operations. The vinyl floor tiles shall be disposed of as asbestos waste.**

- 1.2.16.1 All waste generated in the work area shall be double bagged using asbestos labelled yellow bags and disposed of as asbestos waste.
- 1.2.16.2 Following the final cleaning phase, OHE Consultants will complete a post-abatement verification inspection of the work area to verify the effectiveness of the abatement procedures.
- 1.2.16.3 The contractor will be responsible for re-cleaning the work area in case of failure of the post-abatement verification inspection.
- 1.2.17 Dispose of all waste as specified in applicable sections of the specifications document.
- 1.2.18 Restart all the systems present in the Work Areas which were shut down to accommodate the asbestos removal project. Ensure that the systems are operating in a manner that is similar to their operations prior to the asbestos abatement project.
- 1.2.19 Return each of the areas to an as found condition.

### **1.3 Definitions**

- 1.3.1 **Abatement:** Procedures to control fibre release from asbestos containing building materials. Includes encapsulation, enclosure, and removal.
- 1.3.2 **Amended Water:** Water containing a wetting agent or surfactant that is added for the purpose of reducing water surface tension to allow proper wetting of asbestos material.
- 1.3.3 **Asbestos:** The term includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite, and any of these that have been chemically treated and/or altered.
- 1.3.4 **Airlock:** A system for ingress or egress without permitting air movement between a contaminated area and an uncontaminated area, consisting of two curtained doorways at least 6 feet apart.
- 1.3.5 **Area Monitoring:** Sampling of asbestos fibre concentrations within the asbestos control area and outside the asbestos control area which is representative of the airborne concentrations of asbestos fibers which may reach the breathing zone.
- 1.3.6 **Asbestos Work/Control Area:** An area where asbestos removal operations are performed which is isolated by physical boundaries to prevent the spread of asbestos dust, fibers, or debris.
- 1.3.7 **Air Monitoring:** The process of measuring the asbestos fibre content of a specific volume of air in a stated period of time.
- 1.3.8 **Asbestos Containing Material (ACM):** Any material analyzed and found to contain 0.5 percent more asbestos either alone or mixed with other fibrous or nonfibrous materials.
- 1.3.9 **Asbestos Fibers:** For this specification, asbestos fibers are those fibers 5 microns or longer having an aspect ratio of at least 3:1.
- 1.3.10 **Authorized Visitor:** The building Owner or his representative, persons of any regulatory or other agency having jurisdiction over the project and the asbestos abatement Environmental Consultant or his representative.
- 1.3.11 **Barrier:** Any surface that closes up the work area to prevent the movement of fibres.
- 1.3.12 **Curtained Doorway:** A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, constructed by placing two overlapping sheets of rip-proof plastic over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway. The free bottom edge of the plastic sheets shall be weighted to ensure proper closure. The plastic sheets shall overlap by no less than 1.5 meters.

- 1.3.13 Critical Barrier: One or more layers of plastic sealed over all openings into a regulated area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a regulated area from migrating to an adjacent area.
- 1.3.14 Contractor/Supervisor: An individual who supervises asbestos abatement work and has the proper qualifications and training as specified in this document.
- 1.3.15 Disposal: Procedures necessary to transport and deposit the asbestos contaminated material stripped and removed from the building, piping, and equipment in an approved waste disposal site in compliance with the applicable environmental regulations.
- 1.3.16 Demolition: The razing, removing or wrecking of any building component, assembly or system together with any associated handling operations.
- 1.3.17 Decontamination Area: An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.
- 1.3.18 Dioctylphthalate (DOP) Test: A test method that uses Dioctylphthalate aerosol to challenge a HEPA filter-equipped negative pressure unit to determine its integrity and effectiveness to filter out asbestos fibres.
- 1.3.19 Emery 3004 – a compound (a poly-alpha olefin) that may be substituted for DOP in HEPA filter testing.
- 1.3.20 Encapsulant: A liquid material which can be applied to asbestos containing material and which controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant). A third type of encapsulant (removal encapsulant) is a penetrating encapsulant and is designed to be applied during the removal of asbestos-containing materials to minimize the release of fibres.
- 1.3.21 Disposal Bag: A 0.15 mm 6 mil thick, leak-tight plastic bag, pre-labeled as containing asbestos waste and used for transporting asbestos waste from containment to disposal site.
- 1.3.22 Disturbance: Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM.
- 1.3.23 Encapsulation: Procedures necessary to coat all asbestos-containing materials with an encapsulate to control the possible release of asbestos fibers into the ambient air.
- 1.3.24 Enclosure: All herein specified procedures necessary to complete enclosure of all asbestos containing material behind airtight, impermeable, permanent barriers.
- 1.3.25 Equipment Room: A contaminated area or room which is part of the worker decontamination enclosure system, with storage for contaminated clothing and equipment.
- 1.3.26 Friable Asbestos Material: Material that when dry can be crumbled, pulverized or powdered by hand pressure and includes material that is crumbled, pulverized or powdered.
- 1.3.27 Filtration System for Water: A multistage system for filtering water from the decontamination shower and wastewater. The system is usually manufactured with two filters: a primary filter and a secondary filter. The primary filter collects and retains particles that are 20 microns or larger and the secondary filter removes particles that are 5 microns or larger.
- 1.3.28 Glove Bag System: A portable asbestos abatement system designed for the isolation of an object from which materials containing asbestos are to be removed.
- 1.3.29 HEPA Filter Equipment: High efficiency particulate air filtered vacuuming equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall be capable of trapping and retaining at least 99.97 percent of 0.3 micrometer diameter particles.
- 1.3.30 Negative Pressure Fan System: An air purifying fan system located within or outside the isolated work area, which draws air out of the work area through a HEPA filter and discharges this air directly to the exterior of the building, thus keeping the static air pressure in the work area lower

than in adjacent areas and preventing infiltration of contaminated air from work area to adjacent areas. This system shall be equipped with an alarm to warn of system breakdown, shall maintain a minimum pressure differential of 0.02" water gauge relative to adjacent areas outside of work areas and shall be equipped with an instrument to continuously monitor and automatically record pressure differences.

- 1.3.31 Non-friable Asbestos Material: Material that contains asbestos in which the fibers have been locked in by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not release fibers during any appropriate use, handling, demolition, storage, transportation, processing, or disposal.
- 1.3.32 Negative Pressure Respirator: A respirator in which the air inside the respiratory inlet covering is negative during inhalation in relation to the air pressure of the outside atmosphere and positive during exhalation in relation to the air pressure of the outside atmosphere.
- 1.3.33 Powered Air Purifying Respirator (PAPR): A full-face mask into which filtered air is pumped at approximately 100 – 150 litres per minute (4 – 6 cubic feet per minute). The PAPR consists of a full-face mask, a battery pack, an air pump, high efficiency filter and hoses.
- 1.3.34 Personal Monitoring: Sampling of asbestos fibre concentrations within the breathing zone (within 12 inches of the mouth) of an employee.
- 1.3.35 Personnel: Supervisors, Contractor employees, subcontractor employees.
- 1.3.36 Positive Pressure Respirator: A respirator that maintains a positive pressure inside the facepiece during inhalation and exhalation in relation to the atmospheric pressure.
- 1.3.37 Shower Room: A room between the clean room and the equipment room in the worker decontamination enclosure system, with hot and cold or warm running water and arranged for complete showering during decontamination. The shower room comprises an airlock between contaminated and clean areas.
- 1.3.38 Supplied-air respirator – an accepted respirator and air-supply hose with a hood/helmet, a tight fitting facepiece that is supplied with compressed breathing air from a compressed breathing air system.
- 1.3.39 Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.
- 1.3.40 Tape-Sealed Polyethylene Sheets: Rip-proof polyethylene sheets or polyethylene sheets of type and thickness as specified, sealed with tape along the edges, around objects, over cuts and in other locations as required to provide a continuous polyethylene membrane to protect underlying surfaces from water damage and damage by sealant and to prevent the escape of asbestos fibres through the sheeting into a clean area.
- 1.3.41 Wet Cleaning: The process of eliminating asbestos from building surfaces and objects by using cloths, mops, or other cleaning tools dampened with water.
- 1.3.42 Work Decontamination Enclosure System: A decontamination system for workers, consisting of a clean room, a shower room, and an equipment room. One entrance to the clean room shall be outside of the contaminated area. One entrance to the equipment room shall be connected directly to the contaminated area.
- 1.3.43 Work: Includes all labour, supervision, materials and equipment required for the complete execution of the project as specified in the contract.

#### **1.4 Work Schedule**

- 1.4.1 It is the responsibility of the Contractor to provide the necessary manpower and work shifts to meet the schedule as specified below:
- 1.4.2 The detailed schedule and the start date for the project will be determined by the City of Peterborough and the project management team.

1.4.3 The Contractor shall, at no extra cost to the owner, be responsible for the completion of work required or scheduled to be performed on weekends, holidays and after regular hours and shall be carried out as required to meet the schedule specified.

1.4.4 In all situations where the Contractor fails to meet the specified schedule, the Contractor shall pay all costs of inspection and air monitoring by the Environmental Consultant.

### **1.5 Submittals**

1.5.1 All submittals must be received by the Environmental Consultant or his representative before the work is allowed to commence.

1.5.2 The Contractor shall submit the following:

1.5.2.1 Proof that the Contractor has made arrangement for the transport and disposal of asbestos waste. The proof shall be satisfactory to the Environmental Consultant.

1.5.2.2 Name of the landfill.

1.5.2.3 A copy of the weight scale or waste manifest/bill of lading (once received).

1.5.2.4 Proof satisfactory to the Environmental Consultant that each Supervisor scheduled to work on the project has successfully completed an approved asbestos abatement course and can provide an up to date training certificate issued by a competent entity.

1.5.2.5 References that each and every supervisor had supervised a minimum of 7 other asbestos removal projects of similar size and scope. One supervisor shall remain on site while asbestos removal or cleanup is being carried out.

1.5.2.6 Copies of Insurance certificates and Workplace Safety and Insurance Board status.

1.5.2.7 D.O.P test results and performance data for negative air unit systems.

1.5.2.8 Proposed work schedule.

1.5.2.9 Work force expected to be present on site daily.

1.5.2.10 Proposed number of shifts.

1.5.2.11 Layouts of proposed platforms and hoardings for the Environmental Consultant's review and approval.

1.5.2.12 Layout of proposed waste and worker decontamination facilities and asbestos work area enclosures

1.5.2.13 Proof that all workers have received Workplace Hazardous Material Information System (WHMIS) training.

1.5.2.14 A WHMIS information package containing documentation addressing test results, flammability and fire data and Material Safety Data Sheets (MSDSs) for products, chemicals and materials used on site during the course of the asbestos abatement project.

1.5.2.15 Notice of Project form issued by the Ministry of Labour.

1.5.2.16 Proof satisfactory to the Environmental Consultant that each worker scheduled to work on the project has successfully completed an approved asbestos abatement course and can provide an up to date training certificate issued by a competent entity.

1.5.2.17 Proof satisfactory to the Environmental Consultant that each worker scheduled to work on the project has been fit tested for the appropriate respirator to be used.

1.5.2.18 Code of practice for respiratory protection.

1.5.2.19 Pressure differential monitoring data – to be submitted on a daily basis.



**1.6 Quality Assurance**

- 1.6.1 Ensure that work progresses according to schedule.
- 1.6.2 Ensure that work complies with all the requirements of the applicable regulations, guidelines and manuals.
- 1.6.3 Ensure that no water runoff or airborne asbestos material contaminates areas outside the asbestos removal work area enclosures. The Environmental Consultant has been given authorization by the Owner to stop any work where contamination of areas outside enclosures are suspected. The Contractor shall be responsible for all costs to rectify the problem.
- 1.6.4 Use only skilled and qualified workers for all trades required to work on this project.
- 1.6.5 Only the asbestos abatement Contractor, and never the Environmental Consultant, is responsible for the following:
  - 1.6.6 Safety programs and precautions required by applicable regulations for the work being performed.
  - 1.6.7 Control over the acts and omissions of the Contractor's workers, agents, subcontractors and other employees of the Contractor required to perform work on the project.
  - 1.6.8 Control over construction techniques, methods, means or procedures.

**1.7 Regulations**

- 1.7.1 The Contractor shall comply with all local, provincial and federal requirements relating to asbestos and other work being carried out.
- 1.7.2 In case of conflict among the above mentioned requirements or with these specifications, the more stringent requirements shall apply.
- 1.7.3 Perform work following the requirements of the various regulations in effect at the time the work is being carried out.
- 1.7.4 The regulations shall include, but are not limited to:
  - 1.7.4.1 Ontario Occupational Health and Safety Act.
  - 1.7.4.2 Ontario Regulation 278/05, Regulation Respecting Asbestos on Construction Projects and in Building and Repair Operations.
  - 1.7.4.3 Ontario Ministry of Environment Regulation 347 (as amended) for the disposal of asbestos waste made under the Environmental Protection Act.
  - 1.7.4.4 Regulations respecting the Handling, Offering for Transport and Transportation of Dangerous Goods.
  - 1.7.4.5 Regulations for Construction Projects Ontario Regulation 213/91 made under the Occupational Health and Safety Act.
  - 1.7.4.6 WHMIS Regulations.

**1.8 Supervision**

- 1.8.1 The Contractor shall provide a trained and qualified shift supervisor for each and every shift during which asbestos removal and clean up is being carried out. The Owner reserves the right to stop all work if this requirement is not complied with, at no additional charge to the Owner.
- 1.8.2 The qualification of the supervisor shall meet the requirements specified under Section 1.5 Submittals above.
- 1.8.3 The shift supervisor shall have the authority to make decisions and take actions with respect to production, manpower and equipment.
- 1.8.4 Obtain approval from the Owner of his representative before replacing supervisory personnel.

1.8.5 At the request of the Owner or his representative, the Contractor shall, without asking for explanation, replace supervisory personnel with 2 days from receiving the Owner's written request.

**1.9 Notifications**

1.9.1 The Contractor shall be responsible for immediately notifying the following, orally and in writing, prior to any work on this project commencing:

1.9.1.1 Ontario Ministry of Labour, Construction Health and Safety branch closest to the location of the project.

1.9.1.2 The land fill site which agreed to accept the waste as per the requirements of regulation 347 (as amended).

1.9.1.3 The Fire Marshall, in cases were the execution of the work will result in blocking building exists or when turning off, removing or temporarily altering fire alarms.

**1.10 Proscriptions**

1.10.1 The use of motorized lift equipment in the work area is not allowed.

1.10.2 The use of compressed air for removal or clean up of asbestos dust and debris from any surface is not allowed.

1.10.3 Smoking, eating, drinking or chewing is not allowed in the work area.

1.10.4 Unauthorized persons or persons not using proper personal protective equipment shall not be allowed to enter the work area.

1.10.5 No entry into the work area shall be permitted to any person who has facial hair growth that prevents the establishment of a proper seal between the respirator and the skin.

1.10.6 The use of torches, propane-fired heaters and other open flames shall not be permitted in the asbestos removal work area.

**1.11 Equipment and Material Protection and Replacement**

1.11.1 Before starting the removal operations, the Contractor shall perform a survey to document existing damage in all areas where asbestos removal will be carried out or in areas where transportation of waste will take place.

1.11.2 The Contractor shall be responsible for protecting all equipment and materials within, and in the vicinity of, the work area.

1.11.3 The Contractor shall be responsible for replacing all equipment and materials that become damaged as a result of the work being carried out by the Contractor at no additional cost to the owner.

**1.12 Worker and Visitor Protection**

1.12.1 Instruct all personnel (workers and visitors) in all aspects of work procedures and protective equipment before allowing entry into the asbestos abatement work areas.

1.12.2 A competent person (as defined by the Occupational Health and Safety Act) shall provide all the training and instructions.

1.12.3 Instructions and training shall include, but shall not be limited to, the following:

1.12.4 Entry and exit from asbestos abatement work areas.

1.12.5 Work practices and personal hygiene.

1.12.6 The use, cleaning and care of respirators and protective clothing.



- 1.12.7 Protective measures and work procedures.
- 1.12.8 Asbestos work area entry and exit procedures shall be posted in the clean room of the decontamination unit.
- 1.12.9 Respiratory Protection:
- 1.12.10 All personnel required to wear respirators shall be fit tested either by a qualitative or quantitative fit testing method.
- 1.12.11 Each worker or visitor required to enter an asbestos abatement work area shall be provided with a personally issued respirator that is:
- 1.12.12 Appropriate for the work that is being carried out.
- 1.12.13 Acceptable to the Ministry of Labour, Occupational Health and Safety Division.
- 1.12.14 The worker shall be responsible for wearing a respirator that is issued by the Contractor.
- 1.12.15 The following criteria, as outlined in Table 1, shall be followed when selecting an appropriate respirator:

**Table 1: Respirators**

Column 1		Column 2
Work Category		Required respirator
<b>Type 1 Operations</b>		
Worker requests that the employer provide a respirator to be used by the worker, as described in paragraph 12 of section 14		Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter
<b>Type 2 Operations</b>		
Work described in paragraph 1 of subsection 12 (3)		One of the following: <ul style="list-style-type: none"> <li>- Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter</li> <li>- Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter</li> <li>- Negative pressure (demand) supplied air respirator equipped with a full-facepiece</li> <li>- Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)</li> </ul>
Work described in paragraphs 2 to 7 and 9 to 11 of subsection 12 (3)		Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter
<b>Type 3 Operations</b>		
Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable material containing asbestos by means of power tools, if the tool is attached to a dust collecting device equipped with a HEPA filter as described in paragraph 8 of subsection 12 (3)	Material is not wetted	One of the following: <ul style="list-style-type: none"> <li>- Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter</li> <li>- Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter</li> <li>- Negative pressure (demand) supplied air respirator equipped with a full-facepiece</li> <li>- Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)</li> </ul>
Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable material containing	Material is wetted to control spread of fibre Material is not wetted	Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter Pressure demand supplied air respirator equipped with a half mask

Table 1: Respirators (continued)

Column 1		Column 2
Work Category		Required respirator
<b>Type 3 Operations</b>		
asbestos by means of power tools, if the tool is not attached to a dust collecting device equipped with a HEPA filter as described in paragraph 5 of subsection 12 (4)	Material is wetted to control spread of fibre	One of the following: <ul style="list-style-type: none"> <li>- Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter</li> <li>- Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter</li> <li>- Negative pressure (demand) supplied air respirator equipped with a full-facepiece</li> </ul>
		- Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)
Work with friable material containing asbestos, as described in paragraphs 1 to 4 and 6 of subsection 12 (4)	Material is not wetted	Pressure demand supplied air respirator equipped with a full facepiece
Work with friable material, as described in paragraphs 1 to 4 and 6 of subsection 12 (4), that contains a type of asbestos other than chrysotile	Material was applied or installed by spraying, and is	Pressure demand supplied air respirator equipped with a half mask
Work with friable material, as described in paragraphs 1 to 4 and 6 of subsection 12 (4), that contains only chrysotile asbestos	wetted to control spread of fibre	One of the following: <ul style="list-style-type: none"> <li>- Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter</li> <li>- Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter</li> <li>- Negative pressure (demand) supplied air respirator equipped with a full-facepiece</li> <li>- Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)</li> </ul>
Work with friable material containing asbestos, as described in paragraphs 1 to 4 and 6 of subsection 12 (4)	Material was not applied or installed by spraying, and is wetted to control spread of fibre	One of the following: <ul style="list-style-type: none"> <li>- Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter</li> <li>- Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter</li> <li>- Negative pressure (demand) supplied air respirator equipped with a full-facepiece</li> <li>- Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)</li> </ul>

- 1.12.16 Respiratory protection systems shall be certified by the National Institute for Occupational Safety and Health (NIOSH), the British Standards Institution or any other testing agency that is acceptable to the Ministry of Labour.
- 1.12.17 Respirator shall be stored in a clean location such as the clean room of the decontamination unit. This room can also be used for charging PAPR batteries.
- 1.12.18 The procedures specified by the equipment manufacturer shall be followed while using and maintaining the respirators.
- 1.12.19 Respirators shall be cleaned and inspected at the end of each shift. All damaged and deteriorated parts found during the inspection shall be replaced before the respirator is used again.
- 1.12.20 Appropriate combination cartridges shall be used if substances other than asbestos are to be handled inside the asbestos removal work area.
- 1.12.21 Used filters shall be tested and replaced as specified by the manufacturer or as specified below. The more stringent testing and replacement protocol shall be followed.
- 1.12.22 Cartridges for negative pressure respirators should be replaced every 16 hours of actual usage
- 1.12.23 Cartridges for PAPRs should be replaced every 8 hours.
- 1.12.24 Cartridges shall be treated as asbestos waste and shall be disposed of accordingly after usage inside an asbestos removal work area.
- 1.12.25 Protective Clothing:
- 1.12.26 The Contractor shall provide every worker and authorized visitor with full body disposable coveralls.
- 1.12.27 All personnel shall wear the protective coveralls before they are allowed to enter into the asbestos removal work area.
- 1.12.28 Coveralls shall be equipped with head covering (hood), foot covering and tight fitting cuffs at the neck, ankles and wrists.
- 1.12.29 The disposable coveralls shall be made up of materials that does not readily permit the penetration of asbestos fibers.
- 1.12.30 Disposable coveralls shall be immediately repaired (using duct tape) or replaced once torn.
- 1.12.31 Coveralls shall be disposed of as asbestos waste once they are worn inside an asbestos abatement area.
- 1.12.32 Workers are allowed to wear reusable protective clothing provided that the clothing is left in the equipment room until the end of the asbestos abatement project. The clothing shall then be disposed of as asbestos waste.
- 1.12.33 Safety shoes, hard hats and additional body protection equipment shall be used as necessary to meet the requirements of applicable safety regulations.

### **1.13 Inspections**

- 1.13.1 The asbestos abatement Environmental Consultant will be present on site to carry out quality control inspections for the entire duration of the project. The inspections will be performed inside and outside the work areas.
- 1.13.2 The purpose of the inspections is to ensure that the work is being carried out following the requirements and procedures outlined in the specifications documents and applicable regulations.
- 1.13.3 The Environmental Consultant will issue written instructions to the asbestos abatement Contractor throughout the duration of the project. The instructions will authorize the Contractor to proceed to next phase of work. The general phases of work will consist of the following: Pre-cleaning, set-up

and preparation of the work area, removal of specified materials, clean-up of work area and tear down of containment.

- 1.13.4 The Contractor shall not proceed to the next phase of work without obtaining authorization from the Environmental Consultant.
- 1.13.5 The Environmental Consultant has been given authorization by the Owner to order a shutdown of work in case contamination of areas adjacent to controlled work areas has occurred.
- 1.13.6 In all non-controlled areas where it is determined by the Environmental Consultant (through visual inspection or air monitoring) that contamination has leaked, the Contractor shall be responsible to the complete isolation and cleaning of such areas under the direction of the Environmental Consultant and at no extra charge to the Owner.
- 1.13.7 The Environmental Consultant has been given authorization by the Owner to ensure that the Contractor adheres to specified procedures and materials and to inspect for completion and final cleanliness. Any additional work (including labour and material charges) specified by the Environmental Consultant to achieve completion of work to the level specified shall be carried out by the Contractor at no additional charge to the Owner.
- 1.13.8 The Contractor shall ensure that all equipment and materials to be used on the project are acceptable to the Environmental Consultant. Unacceptable materials and equipment shall be replaced by the Contractor at no additional charge to the Owner.
- 1.13.9 The Contractor shall be responsible for all additional inspection charges which are carried out as a result of a failure by the Contractor to meet set criteria relating to schedule, health and safety and quality.

#### **1.14 Air Monitoring**

- 1.14.1 Air samples will be collected by the Environmental Consultant (on behalf of the owner) from the start of work until the completion of the tear down operations, both inside and/or outside the controlled work areas.
- 1.14.2 The objective of air monitoring is to detect defects in the containment of controlled areas and to ensure that any contamination of building spaces beyond the controlled areas is discovered and rectified immediately.
- 1.14.3 Any contamination of areas outside the limits of the controlled work areas (as determined by air monitoring) shall be contained and shall be thoroughly cleaned to the Environmental Consultant's satisfaction. The Contractor shall be responsible for all additional charges associated with such work.
- 1.14.4 Air monitoring will be carried out following procedures specified in the latest edition of the National Institute for Occupational Safety and Health (NIOSH) method 7400A. The samples will be analyzed by the Phase Contrast Microscopy (PCM) technique as specified in NIOSH method 7400A. A Fibrous Aerosol Monitor (FAM) may also be used.
- 1.14.5 The Contractor shall cooperate with the Environmental Consultant during air monitoring and shall:
- 1.14.6 Provide workers to wear the sampling equipment for up to the duration of an entire shift.
- 1.14.7 Ensure that the workers exercise care and avoid damaging the Environmental Consultant's equipment.
- 1.14.8 Ensure that the samples and equipment are not tampered with.
- 1.14.9 The Contractor shall be responsible for charges associated with re-sampling due to tampering with the air samples.
- 1.14.10 The Contractor shall be responsible for repair or replacement charges of testing equipment that become damaged due to the actions of the Contractor forces.
- 1.14.11 The maximum allowable concentration of airborne fibres outside an asbestos work area is 0.05 fibres per cubic centimetre (fibre/cc).

- 1.14.12 PCM or FAM results equal to or greater than the specified level will indicate asbestos contamination of these perimeter areas.
- 1.14.13 The contaminated areas shall be isolated, contained and cleaned to the satisfaction of the Environmental Consultant.
- 1.14.14 The maximum allowable concentration of airborne fibres inside an asbestos work area is 2.5 fibres/cc.
- 1.14.15 Clearance air samples will be collected inside the work area after it is visually inspected by the Environmental Consultant, authorization is given to spray a lock-down agent and the lock-down agent is allowed to completely dry-up.
- 1.14.16 Air samples will be analyzed by the PCM method. The area will be considered clean and clear for public occupancy only if the fibre levels are less than 0.01 fibres/cc.
- 1.14.17 In case the fibre levels are equal to or greater than 0.01 fibres/cc, the Contractor shall be responsible for re-cleaning the asbestos work area and re-applying the lock-down agent. This process will have to be repeated until the fibre levels are below the specified limit.
- 1.14.18 The Contractor shall be responsible for all charges associated with additional air monitoring which can only be carried out by the Environmental Consultant.
- 1.14.19 Clearance air sampling will be carried out using aggressive sampling procedures as specified in O. Reg. 278/05, S.18(6).
- 1.14.20 The exhaust from forced air equipment (such as a 1 horsepower leaf blower) is directed towards ledges, ceilings, floors, walls and other surfaces in the room before the sampling pumps are started.
- 1.14.21 The forced air equipment will be operated for a period of 5 minutes for every 1,000 square feet of floor space.
- 1.14.22 The 20" fan(s) is then located in the middle of the room, placed on slower speed and directed towards the ceiling.
- 1.14.23 One 20" fan will be employed for every 10,000 cubic feet of room space.
- 1.15 Waste Transport and Disposal**
- 1.15.1 All asbestos-containing and asbestos-contaminated materials shall be disposed of as prescribed by Ontario Regulation 347 (as amended), Waste Management Regulation, made under the Environmental Protection Act and the provincial and federal regulations for the Transportation of Dangerous Goods.
- 1.15.2 All wash water generated from decontamination activities shall be treated as asbestos waste and shall be disposed of accordingly.
- 1.15.3 All non-asbestos containing waste generated during demolition activities inside an asbestos work area shall be treated as asbestos waste.
- 1.15.4 Non-porous materials that can be washed and properly cleaned can be disposed of as clean waste.
- 1.15.5 All sharp asbestos-contaminated materials (such as hangers, T-bars, wood, etc) that could rip or damage a 6mil polyethylene waste disposal bag shall be disposed of in a sealed solid asbestos waste container.
- 1.15.6 The waste must be stored and transported in an enclosed, lockable waste bin.
- 1.15.7 Every vehicle used for the transportation of asbestos waste shall display a Class 9 Label.



- 1.15.8 Both sides of the vehicle used for the transportation of asbestos waste and every waste bag and container shall display the word CAUTION in letters not less than 10 cm in height and the words:
- CONTAINS ASBESTOS FIBRES**
- Avoid Creating Dust
- Asbestos May Be Harmful to Your Health
- Wear Approved Protective Equipment
- 1.15.9 The transport vehicle must be properly equipped to deal with asbestos waste spills. Equipment shall include, but not limited to, respiratory protective equipment, disposable protective clothing, 6 mil polyethylene bags, shovel and broom and wetting agent.
- 1.15.10 For asbestos waste of unknown material or an asbestos type other than Chrysotile, the words Asbestos, Blue, Product Identification Number 2212 must be displayed on every waste container.
- 1.15.11 For Chrysotile asbestos, the words Asbestos, White, Product Identification Number 2590 must be displayed on every waste container.
- 1.15.12 The Contractor shall submit to the Environmental Consultant a copy of the shipping document and weight receipt for every shipment of asbestos waste.

## PART 2 - FACILITIES AND PRODUCTS

### 2.1 **Equipment**

- 2.1.1 Provide equipment that is suitable for intended use as specified by the proper standards. All equipment used on the project shall be clean and in good state of repair.
- 2.1.2 Airless Sprayer: Equipment used for the application of amended water to saturate asbestos-containing materials before removal.
- 2.1.3 Electrical Components and Equipment: supplied by the Contractor for performance of work on this project shall meet the requirements of the Canadian Standards Association (CSA) for use as installed.
- 2.1.4 Electrical Power Cords: Use single length power cords. If single length will not reach work area, use waterproof connectors to connect separate lengths. Use heavy duty cords in high traffic areas or in areas where abrasion of cords is expected. Only grounded electrical cords will be allowed.
- 2.1.5 Ground Fault Panel: use an electrical panel that is installed by a licensed electrician and is equipped with the following:
- 2.1.5.1 Ground fault circuit interrupts (breaker type) of sufficient capacity to supply all lights and equipment to be used in the work area.
- 2.1.5.2 Breakers shall have 5mA ground fault protection.
- 2.1.5.3 Main switch disconnect, test buttons and reset switches and circuit breaker lights.
- 2.1.5.4 Proper enclosure to prevent the penetration of moisture, dust and debris.
- 2.1.6 Temporary Lighting: Provide illumination as required in all work areas to perform the work safely and adequately. Illumination can be achieved by the use incandescent or fluorescent lamps. All lamps shall be protected by grounded guard cages or tempered glass enclosures.
- 2.1.7 Fine Atomizing Spray Nozzle: an airless sprayer nozzle that is designed to deliver no less than 1 gallon per minute of fine spray of water or lock-down agent.
- 2.1.8 Flexible Ducting: Tubing used for the exhaust of negative air units. The tubing is made up of plastic with metal reinforcement and is of a diameter that is equal to the exhaust port of a negative air unit.
- 2.1.9 Garden Sprayer: a metal or plastic pressure-can hand pump equipped with a hose and a metal wand. The pump is used to spray a fine mist of liquid on surfaces in a work area.
- 2.1.10 Glove Bag: The glove bag shall meet the following requirements if it will be used more than once:
- 2.1.10.1 Shall be a Safety-T-Strip trade product with a configuration suitable to fit the work at hand.
- 2.1.10.2 Shall have an internal ziplock feature for sealing the waste at the bottom of the bag.
- 2.1.10.3 Shall be secured around the material being removed using the securing device supplied with the bag. The securing device consists of a 1 inch reusable nylon straps with a metal tightening buckle for sealing the ends of the bag.
- 2.1.10.4 Shall be made of polyvinyl chloride (10 mil) minimum thickness with integral gloves and valve ports.
- 2.1.10.5 Shall be equipped with reversible double pull zipper with protective flaps to facilitate installation and progressive movement on pipes.
- 2.1.10.6 If it will not be used more than once, the glove bag shall meet the following requirements:
- 2.1.10.6.1 Shall be made of polyvinyl chloride or equivalent plastic bag with a minimum thickness of 6 mil.
- 2.1.10.6.2 Shall be equipped with two gloves projecting inward and valves for attaching a vacuum hose or a metal wand.

- 2.1.10.6.3 Shall have a pouch for storing tools and enough space to accommodate the storage of removed materials and to allow for proper sealing of the bag. The bag shall also be labelled with warning signs to identify the content of the bag.
- 2.1.11 HEPA Filtered Negative Air Unit: A portable air handling system which is used to create negative air pressure differential by the extracting the air directly from the work area and discharging it to the exterior of the area. The unit shall be equipped as follows: Fan, HEPA filter, pre-filters, pressure differential gauge, cabinet, high/low switch, on/off switch.
- 2.1.11.1 The fan shall have a capacity of 1500 cubic feet per minute. The fan shall be considered to have 80% of the rated of air flow unless tested and certified by a company specializing in such measurements and subject to the approval of the Environmental Consultant.
- 2.1.11.2 Each unit shall have a HEPA filter installed as a final filter in the unit. A tight seal shall be established between the filter and the filter housing through the use of a rubber gasket. Each filter shall be clearly marked with the serial number, direction of air flow, efficiency, air flow rating, name of manufacturer and resistance and shall bear UL586 label.
- 2.1.11.3 Each unit shall have an on/off switched located on the exterior of the cabinet. The unit shall also be equipped with overload protection and components such as cabinet, fan, motor, etc shall be grounded.
- 2.1.11.4 Each unit shall have a pressure differential gauge to monitor the filter loading and to indicate when the filters needs to be changed. The unit shall also have a time meter to indicate the total accumulated hours of operation.
- 2.1.11.5 Each unit shall have the following warning and safety devices: a means for preventing the unit from operating without a HEPA filter; auto shutoff system to stop the fan in case of HEPA filter failure such as rupture of the filter or blockage of air flow through the filter.
- 2.1.11.6 Provide units with pre and intermediate filters installed at the intake of the unit and secured in place with clamps or special filter housings. Two pre-filters are required: the first pre-filter shall be of the low efficiency type and shall be 98% efficient for particles 100 microns and larger; the second pre-filter shall be of the medium efficiency type and shall be 95% efficient for particles down to 5 microns.
- 2.1.11.7 The cabinet of the unit shall be constructed of durable material able to withstand rough handling during removal work. The cabinet shall have wheels and shall be designed to allow access to the inside of the unit from the intake side for maintenance and replacement of filters. The unit shall be factory sealed to prevent the escape of dust and debris during transport and use.
- 2.1.12 HEPA Vacuum: A vacuum unit equipped with HEPA filter and designed so that all discharged air passes through the filter. Shall be equipped with all attachments, tools and fittings to facilitate the performance of the work.
- 2.1.13 Pressure Differential Monitoring Unit: An instrument designed to measure the difference in pressure between the interior and exterior of a work area. As a minimum, the instrument shall consist of the following: a continuous recoding wheel chart or tape; a gauge with a range from 0 to 0.1 inches water; sensor tubing and wall clamps; wall mounting devices, low limit and high limit audible alarm; and auto reset.
- 2.1.14 Power Washer: A piece of equipment capable of delivering an airless stream of liquid (water) at a pressure between 1200 and 2500 psi. Typically used for cleaning of work area surfaces and equipment and for saturating materials scheduled for removal before work start to reduce the creation of dust.
- 2.1.15 Scaffolding: Select, erect and use scaffolding in a manner that is in compliance with all applicable occupational health and safety regulations.
- 2.1.15.1 Types of scaffolding allowed consist of suspension or standing types such as cantilever, metal tube and coupler, pole or outrigger or tubular welded frame.
- 2.1.15.2 Provide non-skid surfaces and/or foot boards on all scaffolds where foot traffic is anticipated.

- 2.1.15.3 Provide an abrasive non-slip surfaces on rungs of metal ladders.
- 2.1.16 Water Service Components and Equipment: supplied by the Contractor for performance of work on this project shall be temperature and pressure rated for operation of the temperature and pressure encountered.
- 2.1.16.1 Hot water heater to be used for supplying water to the shower shall be:
- 2.1.16.1.1 ULC rated electric hot water heater.
- 2.1.16.1.2 Appropriately sized for the project.
- 2.1.16.1.3 Powered from the ground fault panel.
- 2.1.16.1.4 Equipped with a relief valve that is piped to a drip pan secured to the water heater.
- 2.1.16.2 Supply water to each working area and decontamination unit using pipes having a pressure rating greater than the pressure of the water distribution system. Provide fittings as necessary to allow connecting to existing systems and other temporary facilities.
- 2.1.16.3 The shower provided for the decontamination facility shall be of the walk through type. The shower pan shall be a waterproof, one piece pan constructed from stainless or galvanized steel with welded seams, copper or lead with soldered seams or fibreglass reinforced with wood. The shower head shall be adjustable for spray size and intensity. The shower shall be supplied with separate hot and cold water. The control for water temperature, flow and shut off shall be located inside the shower.
- 2.1.16.4 Multi-stage cascade filter units shall be provided on drain lines from any water source carrying asbestos-contaminated water from the work area including the shower. The units shall be provided with a primary and a secondary disposal filter elements. The primary filter shall allow the passage of particles that are 20 microns and smaller. The secondary shall allow the passage of particles that are 5 microns and smaller. The units shall be connected so that the water passes the primary filter first and the discharge of the primary filter passes through the secondary filter.
- 2.2 Materials**
- 2.2.1 Materials destined for use on this project shall be undamaged, shall comply with the requirements of the contract and specifications and shall be unused at the time of installation unless otherwise indicated.
- 2.2.2 Asbestos Waste Container: An impermeable container that is dust-tight and impervious to asbestos waste. Shall be made of new material only and shall be labelled as required by applicable regulations with a pre-printed cautionary asbestos warning label. The container shall (depending on the nature of the waste material) be comprised of the following:
- 2.2.2.1 A 6 mil thick leak-tight polyethylene bag labelled as required and placed inside another 6 mil sealed polyethylene bag (in case the waste does not contain any sharp objects).
- 2.2.2.2 A 6 mil sealed polyethylene bag positioned inside or outside a heavy duty leak tight solid sealed container of sufficient strength to prevent perforation of the container during handling (in case the waste contains sharp objects).
- 2.2.3 Caulking: Acrylic polymer sealant that is non-staining.
- 2.2.4 Drop Sheets: Sheets made up of polyethylene of size and type appropriate to the work. To be placed under an area where work is being carried out.
- 2.2.5 Encapsulant: Type 1 penetrating Class A water based encapsulant conforming to CGSB 1-GP-205M and approved by the Fire Marshall and having a flame spread and smoke development ratings both less than fifty.
- 2.2.6 Felts: 1/16" thick and 36" to 72" wide non-coated, standard cellulose building felt.

- 2.2.7 Rip-Proof (Fibre Re-enforced) Polyethylene Sheeting: 8 mil fibre re-enforced fabric (bonded on both sides with polyethylene sheeting) made up from 5 mil weave and 2 layers of 1.5 mil poly laminate. Provide new material only in maximum size sheets (to fit work) to minimize joints.
- 2.2.8 Fire Extinguisher: Provide type "ABC" dry chemical fire extinguishers of a combination of extinguishers suitable for the type of exposure in each case.
- 2.2.9 First Aid Supplies: Provide and maintain first aid supplies on the project site as required by applicable regulations and construction industry recommendations.
- 2.2.10 Flame Resistant Polyethylene Sheeting: a layer of polyethylene sheeting that conforms to the requirements of the NFPA Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films. Provide new material only in 6 mil thickness and in maximum size sheets (to fit work) to minimize joints.
- 2.2.11 Foam: Polyurethane expanding foam of low density.
- 2.2.12 Lock Down Sealant: a clear, non-staining, water dispersible type, slow drying sealant that is used for the purpose of trapping residual dust. The sealer shall remain sticky on the surface for an 8 hour period as a minimum. The product shall have flame spread and smoke development ratings of less than 50 for both. The sealant shall be compatible with replacement insulation or fireproofing and shall be capable of withstanding service temperature of substrate.
- 2.2.13 Polyethylene Sheeting: A 6 mil minimum (unless otherwise specified) thickness polyethylene film in maximum sheet size to minimize seems and black, frosted or clear as required to meet specifications.
- 2.2.14 Protective Coveralls: Full body coveralls complete with hoods and shoe coverings, made up of a material which does not permit penetration of asbestos fibres and is disposable.
- 2.2.15 Spray Cement: Specifically formulated spray adhesive in spray cans devised to stick to polyethylene sheets.
- 2.2.16 Tape: 2" to 3" widths reinforced tape (cloth or fibreglass reinforced) appropriate for sealing polyethylene sheets under dry and wet conditions.
- 2.2.17 Wetting Agent: A mixture of water and a surfactant used for wetting asbestos-containing materials before removal to minimize the release of fibres during disturbance of the material.

### **2.3 Platforms**

- 2.3.1 Work in certain areas of the project will require the use of platforms. Unless otherwise specified, work platforms for this project shall be erected as follows:
- 2.3.1.1 Set up a support structure of metal, wood or equivalent scaffolding above which the work platform will be positioned.
- 2.3.1.1.1 Place one layer of rip proof polyethylene sheeting over scaffold board.
- 2.3.1.1.2 Place one layer of plywood sheets over the rip proof poly and fasten in place using nails.
- 2.3.1.1.3 Ensure that the plywood is of sufficient thickness and is capable of supporting the weight of all personnel and equipment expected to be present on the platform. Comply with the requirements of applicable Occupational Health and Safety Acts and Regulations.
- 2.3.1.1.4 Prevent water leakage from the platform by taping and caulking the seams between the plywood sheets and by instating a minimum of two layers of rip proof poly over the plywood sheets.
- 2.3.1.1.5 Isolate the platform from the occupied areas through the use of plywood walls.
- 2.3.1.2 The bases of the support structure shall be adequately sized and rated to protect the floors. The Contractor shall be responsible for rectifying any damages caused by the support structure and the platform.

- 2.3.1.3 Ensure that the support structure is set up in a manner that will not interfere with activities that are regularly carried out in the space.
- 2.3.1.4 Ensure that the existing lighting levels are maintained under the platform by using temporary fluorescent light fixtures.
- 2.3.1.5 Install air tight and water tight escape hatches for every 500 square feet of platform. The hatches shall be designed to allow for quick egress from the work area in case of an emergency and shall be supplied with emergency lighting.

## **2.4 Decontamination Enclosure Systems**

- 2.4.1 Decontamination enclosure systems shall be constructed before any other work commences. The decontamination systems shall include one system for workers decontamination and another system for equipment and waste decontamination.
- 2.4.2 Enclosure System for Worker Decontamination: This enclosure system shall consist of a clean room, a shower room and an equipment and access room.
  - 2.4.2.1 Clean Room: A clean room shall be constructed between the clean occupied areas and the shower room. The clean room shall have:
    - 2.4.2.1.1 A storage space for clean personal protective equipment.
    - 2.4.2.1.2 Hangers, hooks and secures lockers for workers use and for safe storage of personal belongings.
    - 2.4.2.1.3 A mirror to aid workers in fittings respiratory equipment before entry into the contaminated areas.
    - 2.4.2.1.4 Airlocks on the shower side and the clean occupied area side.
    - 2.4.2.1.5 A lockable wood door on the occupied area side to prevent unauthorized entry into the work areas.
    - 2.4.2.1.6 An area of 100 square feet (minimum) or shall be based on a criteria of 10 square feet per worker, whichever is greater.
  - 2.4.2.2 Shower Room: A shower room shall be constructed between the clean room and the equipment and access room. The shower room shall have:
    - 2.4.2.2.1 A shower unit of the walk through type for every 8 workers.
    - 2.4.2.2.2 Airlocks on the clean room side and the equipment and access room side.
    - 2.4.2.2.3 Clean towels, soap and shampoo supplied by the Contractor for use by the workers.
    - 2.4.2.2.4 A constant supply of hot and cold running water with individual controls within the shower units to regulate water temperature and flow rate.
    - 2.4.2.2.5 Individual hot and cold shut-off valves with access from the clean room of the decontamination enclosure.
    - 2.4.2.2.6 Containers for disposing of used respirator filters and hooks for hanging respirators located on the clean side of the shower.
    - 2.4.2.2.7 Watertight piping and sealed drip pans.
    - 2.4.2.2.8 Sump pumps for removing shower waste waster. Pump the waste waster through the filter systems specified before discharging into sanitary sewer drains.
    - 2.4.2.2.9 Power switches and outlets that are ground fault protected. Sump pumps power switches shall be located on both sides of the shower unit.
  - 2.4.2.3 Equipment and Access Room: An equipment and access room shall be constructed between the shower room and the contaminated work areas. The equipment and access room shall have:
    - 2.4.2.3.1 Airlocks on the shower side and the contaminated area side.
    - 2.4.2.3.2 An area of not less than 100 square feet to allow one worker enough space to undress comfortably.



- 2.4.2.3.3 Facilities for storing personal protective equipment and clothing which will be used again inside the contaminated areas.
- 2.4.3 Enclosure System for Equipment and Waste Decontamination: This enclosure system shall consist of a transfer room, a holding room and a cleaning room.
- 2.4.3.1 Transfer Room: A transfer room shall be constructed between the clean occupied areas and the holding room. The room shall have a lockable wood door on the occupied area side to prevent unauthorized entry into the work areas. It shall have airlocks on the clean occupied area side and the holding room side. The size of the transfer room should be large enough to facilitate double bagging of waste bags or to house the largest piece of equipment used.
- 2.4.3.2 Holding Room: A holding room shall be constructed between the transfer room and cleaning room. The room shall have airlocks on the transfer room side and the cleaning room side. The size of the transfer room should be large enough to facilitate double bagging of waste bags or to house the largest piece of equipment used inside the asbestos work areas.
- 2.4.3.3 Cleaning Room: A cleaning room shall be constructed between the holding room and the contaminated area. The room shall have airlocks on the holding room side and the contaminated area side. The size of the cleaning room should be large enough to facilitate washing and cleaning of waste bags, containers and equipment and for double bagging of waste bags.
- 2.4.3.4 This enclosure system shall not be used by workers exiting the contaminated area as a replacement for the workers decontamination enclosure system.
- 2.4.4 Construction of Decontamination Enclosure Systems: Enclosures shall be constructed using suitable framing to fit the area. Alternatively, existing rooms can be used subject to the approval of the Environmental Consultant.
- 2.4.4.1 Use 2"x4" studs at 16" o/c to the construct the walls and ceilings frames. The interior side of the frame shall be covered by one layer of rip proof polyethylene sheeting.
- 2.4.4.2 Cover the exterior side of the frame located inside the contaminated area with plywood sheets. All plywood sheets joints shall be sealed with duct tape. Cover the plywood sheets with two independently sealed layers of rip proof polyethylene sheeting. Cover the exterior side of the frame which are not located inside the contaminated area or in an occupied area with 1 layer of rip proof polyethylene sheets. The exterior side of the frame located in an occupied area shall be covered with painted drywall sheets installed over one layer of rip proof polyethylene sheeting.
- 2.4.4.3 The floor of the decontamination enclosure system shall be protected with two independently sealed layers of rip proof poly sheets. The poly sheets used on the floor shall overlap with the poly sheets installed on the walls.
- 2.4.4.4 Separate the various rooms of the decontamination enclosure systems by curtained doorways constructed using two flap doors which are of the same dimensions as the openings. The flaps shall be made up of two layers of rip proof polyethylene sheets. Fasten the two sheets together and reinforce all edges with duct tape. The top and one side of each flap shall be secured to the enclosure frame. Attach a weight to the bottom of each of the flaps. Mark the opening between the two flaps using pieces of duct tape configured in the shape of a directional arrow.

## PART 3 - EXECUTION

### 3.1 *Type 1 Removal Operation*

- 3.1.1 Initial Preparation and Isolation of Work Areas: Unless otherwise specified, work carried out as part of this phase shall proceed as follows:
- 3.1.1.1 Carry out a survey of the work areas to compile an inventory of existing damages and provide a copy to the Environmental Consultant.
- 3.1.1.2 The Contractor is responsible for moving materials and objects which are present in the work areas.
- 3.1.1.3 Prevent the spread of dust from the work area using measures appropriate to the work to be done.
- 3.1.1.3.1 Shut off, lock out and seal all ventilation duct vents with the application of one layer of 6 mil (0.15mm) thick clear polyethylene sheet sealed with tape.
- 3.1.1.3.2 Use FR polyethylene drop sheets over all flooring in work areas where dust and contamination cannot otherwise be thoroughly cleaned. This does not apply if work involves the removal of asbestos-containing floor tiles.
- 3.1.1.3.3 Use one layer of 6 mil (0.15 mm) thick clear polyethylene sheets to cover walls.
- 3.1.1.3.4 Separate parts of the building required to remain in use from the work area by polyethylene drop sheets at the perimeter of the work area.
- 3.1.1.3.5 Separate the work area with clearly visible warning signs advising of the hazards of asbestos dust and that entry is restricted to authorized trained personnel wearing personal protective equipment.
- 3.1.1.3.6 Erect scaffolding or platforms where necessary to perform the removal work. All platforms that exceed 25 feet in height will require the submission of a shop drawing stamped by a professional engineer for approval by the inspector within a minimum of 5 days prior to commencing the work. Guard rails shall be provided around all platforms or scaffolding where practicable. Cover the floor area of the scaffold or platform with one layer of FR polyethylene. Extend the floor of scaffolding or platform under an item being removed to act as a receptacle. Polyethylene sheeting shall be suitably braced and/or restrained so that billowing or failure of the polyethylene sheeting or taped joints does not occur.
- 3.1.2 Entry and Exit Procedures from Asbestos Removal Work Areas: the following general procedures shall be adhered to when entering into and exiting from asbestos abatement work areas:
- 3.1.2.1 Work Area Entry Procedures:
- 3.1.2.1.1 Every worker and visitor planning to enter the work area should remove all street clothing and should store them in a designated clean change room.
- 3.1.2.1.2 The person shall then put on disposal coverall with head covering, respirators with clean filters and foot covering and shall proceed to the work area.
- 3.1.2.2 Work Area Exit Procedures:
- 3.1.2.2.1 Each worker shall decontaminate their protective clothing, boots and respirator by first HEPA vacuuming and then by damp wiping using soap and water.
- 3.1.2.2.2 The removed disposable coveralls shall be disposed of as asbestos waste in a 0.15 mm (6 mil) labelled waste bag. Respirator filter inlets shall be sealed in tape or disposed of as asbestos waste.
- 3.1.3 Asbestos Removal Procedures
- 3.1.3.1 Asbestos Removal shall not commence until:
- 3.1.3.1.1 The work area is effectively separated from clean areas of the building.
- 3.1.3.1.2 Warning signs are posted outside the removal work areas.

- 3.1.3.1.3 All surfaces which are not possible to clean are sealed with polyethylene sheeting and tape.
- 3.1.3.1.4 Arrangements have been made for waste disposal, landfill site operator has been contacted and storage bin is on site.
- 3.1.3.1.5 Tools equipment and materials are on hand and in the work area.
- 3.1.3.1.6 Facilities for the washing of hands and face are available for workers leaving the work area.
- 3.1.3.2 Before beginning work remove visible dust from surfaces in the work area where dust is likely to be disturbed during the course of the work. Use HEPA vacuum, or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate. Do not use compressed air to clean up or remove dust from any surface.
- 3.1.3.3 Wet materials containing asbestos to be cut, ground, abraded, drilled, or otherwise disturbed with amended water. Use garden type low velocity fine mist sprayer. Perform work in a manner to reduce dust creation to lowest levels practicable. Spray asbestos material repeatedly during the work process to minimize asbestos fibre release.
- 3.1.3.4 Additional cement board removal procedures.
  - 3.1.3.4.1 Cement board shall be removed intact where possible.
  - 3.1.3.4.2 When not possible to remove intact, the board shall be cut with hand saws where necessary and dust shall be collected with a HEPA vacuum cleaner nozzle held under the cut area.
  - 3.1.3.4.3 Drop sheets shall be used no more than 0.5 metres below the cutting location and shall be constructed in such a manner that any dust not removed by the HEPA vacuum is collected.
- 3.1.3.5 Remove material in sections as intact as possible.
- 3.1.3.6 Frequently during the work and immediately after completion of the work, clean up dust and waste containing asbestos using a HEPA vacuum or by damp wiping.
- 3.1.4 Final Clean
  - 3.1.4.1 When removal is complete, clean the entire work area by HEPA vacuuming and wet wiping.
  - 3.1.4.2 The work area shall be deemed clean by the Inspector when there is no visible residue, dirt, film, stain, or discolouration resulting from either asbestos removal or cleaning activities.
  - 3.1.4.3 After completion of the initial cleaning and after the Inspector has passed the visual inspection, spray sealant on all surfaces in the work area, including, but not limited to:
    - 3.1.4.3.1 where asbestos material has been removed.
    - 3.1.4.3.2 polyethylene sheeting used on walls, floors and ceilings.
  - 3.1.4.4 Sealant should be sprayed using a garden reservoir type low velocity fine mist sprayer. The sprayer cannot be used if the nozzle is partially obstructed, or if a uniform fine mist spray cannot be obtained.
  - 3.1.4.5 After the area is declared clean and written approval to proceed has been received from the Inspector:
    - 3.1.4.5.1 Dismantle boundaries and isolating barriers as asbestos waste. Drop sheets shall be wetted and folded to contain dust and then placed in waste bags.
    - 3.1.4.5.2 Immediately before their removal from the work area, and disposal, clean each filled labelled waste bag using damp cloths or HEPA vacuum and place in second clean clear polyethylene waste bag.
    - 3.1.4.5.3 Dispose of waste as per procedures specified in subsection 1.15 Waste Transport and Disposal.
  - 3.1.4.6 Repair or replace objects damaged in the course of the work. Re-establish objects moved to temporary locations in the course of the work, in their proper positions. Re-secure mounted objects removed in the course of the work in their former positions.

### 3.2 ***Type 2 Removal Operation: For Work In Enclosures***

3.2.1 Initial Preparation and Isolation of Work Areas: Unless otherwise specified, work carried out as part of this phase shall proceed as follows:

3.2.1.1 Carry out a survey of the work areas to compile an inventory of existing damages and provide a copy to the Environmental Consultant.

3.2.1.2 The Contractor is responsible for moving materials which are present in the work.

3.2.1.3 Prevent the spread of dust from the work area using measures appropriate to the work to be done.

3.2.1.3.1 Shut off, lock out and seal all ventilation duct vents with the application of one layer of 6 mil (0.15 mm) thick clear polyethylene sheet sealed with tape.

3.2.1.3.2 Clean all moveable objects within proposed work area using a HEPA vacuum.

3.2.1.3.3 Clean fixed casework, plant, and equipment within proposed work area, using a HEPA vacuum and cover with polyethylene sheeting sealed with tape.

3.2.1.3.4 Clean proposed work areas using, where practicable, HEPA vacuum cleaning equipment. Do not use methods that raise dust, such as dry sweeping, or vacuuming using other than HEPA filter-equipped vacuums.

3.2.1.3.5 Cover and seal airtight light fixtures, duct openings and other suspended ceiling objects using clear 6 mil polyethylene sheeting and tape.

3.2.1.3.6 Erect scaffolding or platforms necessary to perform the removal work. All platforms that exceed 25 feet in height will require the submission of a shop drawing stamped by a professional engineer for approval by the inspector within a minimum of 5 days prior to commencing the work. Guard rails shall be provided around all platforms or scaffolding where practicable.

3.2.1.3.7 Cover floor area of scaffold or platform with one layer of FR polyethylene.

3.2.1.3.8 Extend scaffolding or platform under the item being removed to prevent material from falling.

3.2.1.3.9 Separate parts of the building required to remain in use from the work area by polyethylene drop sheets at the perimeter of the work area.

3.2.1.3.10 Set up an airtight enclosure around the work area where the work on friable asbestos-containing material is to be carried out. Enclosure should be set up using 1 layer of FR polyethylene sheeting to cover the floors, and 1 layer of 6 mil (0.15 mm) thick clear polyethylene sheeting to cover the walls. Two layers of FR polyethylene sheeting should be used to cover carpeted floors. Polyethylene on the walls should be made to overlap with the polyethylene on the floor a minimum of 300 mm.

3.2.1.3.11 Polyethylene sheeting shall be suitably braced and/or restrained so that excessive billowing or failure of the polyethylene sheeting or taped joints does not occur as a result of the negative pressure differential created by the vacuums.

3.2.1.3.12 Erect a temporary structure made of wooden studs to support polyethylene sheeting where necessary.

3.2.1.3.13 Insert a hose of a HEPA filter equipped vacuum into the enclosure to provide negative air pressure inside the enclosure.

3.2.1.3.14 Entrance to the enclosure should be covered with two pieces of overlapping polyethylene sheeting.

3.2.1.3.15 Separate the work area with clearly visible warning signs advising of the hazards of asbestos dust and that entry is restricted to authorized trained personnel wearing personal protective equipment.

3.2.2 Entry and Exit Procedures from Asbestos Removal Work Areas: the following general procedures shall be adhered to when entering into and exiting from asbestos abatement work areas:

3.2.2.1 Work Area Entry Procedures:

- 3.2.2.1.1 Every worker and visitor planning to enter the work area should remove all street clothing and should store them in a designated clean change room.
- 3.2.2.1.2 The person shall then put on disposal coverall with head covering, respirators with clean filters and foot covering and shall proceed to the work area through the flaps covering the entrance to the enclosure.
- 3.2.2.2 Work Area Exit Procedures:
- 3.2.2.2.1 Each worker shall decontaminate their protective clothing, boots and respirator by first HEPA vacuuming and then by damp wiping using soap and water.
- 3.2.2.2.2 The removed disposable coveralls shall be disposed of as asbestos waste in a 0.15 mm (6 mil) labelled waste bag. Respirator filter inlets shall be sealed in tape or disposed of as asbestos waste.
- 3.2.3 Asbestos Removal Procedures
- 3.2.3.1 Asbestos Removal shall not commence until:
- 3.2.3.1.1 The work area is effectively separated from clean areas of the building.
- 3.2.3.1.2 Warning signs are posted outside the removal work areas.
- 3.2.3.1.3 All surfaces which are not possible to clean are sealed with polyethylene sheeting and tape.
- 3.2.3.1.4 Arrangements have been made for waste disposal, landfill site operator has been contacted and storage bin is on site.
- 3.2.3.1.5 Tools equipment and materials are on hand and in the work area.
- 3.2.3.1.6 Facilities for the washing of hands and face are available for workers leaving the work area.
- 3.2.3.2 Before beginning the work remove visible dust from surfaces in the work area. Use HEPA vacuum, or damp cloths where damp cleaning is considered more appropriate. Do not use compressed air to clean up or remove dust from any surface.
- 3.2.3.3 Wet materials containing asbestos to be removed, disturbed, or sealed with amended water. Garden reservoir type low velocity fine mist sprayer may be used. Perform work in a manner to reduce dust creation to lowest levels practicable. Spray asbestos material repeatedly during the work process to minimize asbestos fibre dispersion.
- 3.2.3.4 Removed material has to be placed directly in waste bags. Wherever possible, asbestos-containing material should be removed in sections as intact as possible.
- 3.2.3.5 Areas that used to be covered with the asbestos-containing material should be cleaned after the material is removed, using brushes, steel wool, or any other tools suitable.
- 3.2.3.6 Frequently during the work and immediately after completion of the work, clean up dust and waste containing asbestos using a HEPA vacuum or by damp wiping.
- 3.2.3.7 All labelled waste bags should be placed in clean clear 6 mil poly bags before they are taken out of the enclosure.
- 3.2.4 Final Clean
- 3.2.4.1 When removal is complete, clean the entire work area by HEPA vacuuming and wet wiping.
- 3.2.4.2 All tools and equipment used in the removal process such as hook knives, extension cords, scrapers, wire brushes, garden sprayers etc, should be washed and cleaned and placed in 6 mil polyethylene bags.
- 3.2.4.3 The work area shall be deemed clean by the Inspector when there is no visible residue, dirt, film, stain, or discolouration resulting from either asbestos removal or cleaning activities.
- 3.2.4.4 After completion of the initial cleaning and after the Inspector has passed the visual inspection, spray sealant on all surfaces in the work area, including, but not limited to:

- 3.2.4.4.1 where asbestos material has been removed.
- 3.2.4.4.2 polyethylene sheeting used on walls, floors and ceilings.
- 3.2.4.5 Sealant should be sprayed using a garden reservoir type low velocity fine mist sprayer. The sprayer cannot be used if the nozzle is partially obstructed, or if a uniform fine mist spray cannot be obtained.
- 3.2.4.6 Enclosure should be left standing until all the sealant has dried or, if required, until an air sample is taken inside the enclosure, and the fibre concentration level is below 0.05f/cc.
- 3.2.4.7 After the area is declared clean and written approval to proceed has been received from the Inspector:
  - 3.2.4.7.1 Dismantle boundaries and isolating barriers and treat as asbestos waste. Drop sheets shall be wetted and folded to contain dust and then placed in waste bags.
  - 3.2.4.7.2 Immediately before their removal from the work area, and disposal, clean each filled labelled waste bag using damp cloths or HEPA vacuum and place in second clean clear polyethylene waste bag.
  - 3.2.4.7.3 Dispose of waste as per procedures specified in subsection 1.15 Waste Transport and Disposal.
- 3.2.4.8 Repair or replace objects damaged in the course of the work. Re-establish objects moved to temporary locations in the course of the work, in their proper positions. Re-secure mounted objects removed in the course of the work in their former positions.



### 3.3 ***Type 2 Removal Operation: For Work Using Glove Bags***

3.3.1 Initial Preparation and Isolation of Work Areas: Unless otherwise specified, work carried out as part of this phase shall proceed as follows:

3.3.1.1 Carry out a survey of the work areas to compile an inventory of existing damages and provide a copy to the Environmental Consultant.

3.3.1.2 Prevent the spread of dust from the work area using measures appropriate to the work to be done.

3.3.1.2.1 Shut off, lock out and seal all ventilation duct vents with the application of one layer of 6 mil (0.15 mm) thick clear polyethylene sheet sealed with tape.

3.3.1.2.2 Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over all flooring in work area where dust and contamination cannot otherwise be safely contained.

3.3.1.2.3 Separate parts of the building required to remain in use from the work area by polyethylene drop sheets around the perimeter of the work area.

3.3.1.2.4 Separate the work area with clearly visible warning signs advising of the hazards of asbestos dust and that entry is restricted to authorized trained personnel wearing personal protective equipment.

#### 3.3.2 Worker Protection Procedures

3.3.2.1 Before proceeding to the work area:

3.3.2.1.1 Each worker shall don respirator and disposable coveralls, including head covering and suitable foot wear. Removal of street clothes in a designated clean room before wearing the disposable coveralls is recommended.

3.3.2.2 Before leaving the work area:

3.3.2.2.1 Each worker shall decontaminate their protective clothing, boots and respirator by first HEPA vacuuming and then by damp wiping using soap and water.

3.3.2.2.2 The removed disposable coveralls shall be disposed of as asbestos waste in a 6 mil (0.15 mm) labelled waste bag.

3.3.2.2.3 The worker shall proceed to clean their hands and arms. The waste water should be collected and filtered using a filter that passes particles 5 microns in size and smaller, before it is discharged into the municipal sewer system.

#### 3.3.3 Asbestos Removal Procedures

3.3.3.1 Asbestos Removal shall not commence until:

3.3.3.1.1 The work area is effectively separated from clean areas of the building by polyethylene drop sheets and the placing of rope barriers at the boundary of the designated work area. The boundaries of the work area shall be a minimum of 10 feet from the location of the insulation being removed.

3.3.3.1.2 Warning signs are posted outside the removal work areas.

3.3.3.1.3 All surfaces which are not possible to clean are sealed with polyethylene sheeting and tape.

3.3.3.1.4 Arrangements have been made for waste disposal, landfill site has been contacted and storage bin is on site.

3.3.3.1.5 Tools equipment and materials are on hand and in the work area.

3.3.3.1.6 Facilities for the washing of hands and face are available for workers leaving the work area.

3.3.3.2 Before beginning work remove visible dust from surfaces in the work area where dust is likely to be disturbed during the course of the work. Use HEPA vacuum, or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate. Do not use compressed air to clean up or remove dust from any surface.

3.3.3.3 Remove all obstructions from around pipe. Where access is required above plaster ceilings, provide sufficient openings to gain access.

- 3.3.3.4 Friable material containing asbestos to be removed or disturbed shall be thoroughly surface wetted before and during work unless wetting creates a hazard or causes damage. Use garden type low velocity fine mist sprayer. Sprayers that are partially clogged, or that does not produce uniformly fine mist will not be accepted. Perform work in a manner to reduce dust creation to lowest levels practicable.
- 3.3.3.5 Inspect all glove bags for defects before using. A defective bag shall not be used.
- 3.3.3.6 Ensure that the following tools are used:
- 3.3.3.6.1 Knife shall have a retractable blade.
- 3.3.3.6.2 Saw shall be a flexible wire type.
- 3.3.3.6.3 Brushes shall not have metal bristles.
- 3.3.3.7 After written authorization has been received from the Inspector to proceed perform the removal using the following procedures.
- 3.3.3.7.1 Place tools necessary to remove insulation, in tool pouch. Wrap the bag around pipe and close zippers. Seal bag to pipe with restraining nylon straps. Welds and folds of glove bag are to remain intact without modification to manufacturers design.
- 3.3.3.7.2 Place hands in gloves and use necessary tools to remove insulation. Cut or remove exterior insulation covering where applicable to expose asbestos pipe covering. Wet exposed pipe or duct covering with sufficient mixture to suppress any dust. Arrange insulation in bag to obtain full capacity of bag.
- 3.3.3.7.3 Insert nozzle of spray pump prefilled and primed with water and surfactant into bag through valve and wash down pipe and interior of bag thoroughly, use cloth or sponge to aid in washing process. Wet surface of insulation in lower section of bag.
- 3.3.3.7.4 Waste material in bags intended for use at more than one location and which are equipped with internal zippers to seal off waste, shall have the upper section of bag thoroughly cleaned then shall be sealed off in lower sections of bag before bag is removed from pipe. Reinstall bag in new location before opening zip lock.
- 3.3.3.7.5 If bag (**Only if bag is a Safe-T-Strip**) is to be moved along pipe, loosen straps, move bag, re seal to pipe using double pull zipper to pass hangers. Repeat stripping operation.
- 3.3.3.7.6 To remove bag after completion of stripping wash top section and tools thoroughly. Seal off waste in lower section of bag using zipper. Pull polyethylene waste container over glove bag before removing from pipe. Release one strap and remove freshly washed tools. Place tools in water. Remove second strap and zipper. Fold over into appropriately labelled waste disposal bags and seal.
- 3.3.3.7.7 Prior to removal of bag ensure that pipe is free of all residue. Remove all residue using wet cloths as necessary. Ensure that surfaces are free of sludge which after drying could release asbestos dust into atmosphere. Seal exposed surfaces of pipe and ends of insulation with slow drying sealer to seal in any residual fibres.
- 3.3.3.7.8 Upon completion of work, cover exposed ends of remaining pipe insulation with polyethylene tape.
- 3.3.3.7.9 If the glove bag is ripped, cut or opened in any way, work that may disturb friable material shall cease immediately. If the rip, cut or opening is small and easy to repair then the glove bag shall be repaired forthwith with tape. Work may continue once the repairs are complete. If the rip, cut or opening is not small and cannot be easily repaired, place the glove bag forthwith in a suitable asbestos waste container. Any spilled material containing asbestos shall be cleaned up and removed by using a vacuum equipped with a HEPA filter.
- 3.3.3.8 All work will be subject to visual inspection and air monitoring. Any contamination of surrounding areas indicated by visual inspection or air monitoring will require the complete enclosure and clean up of affected areas.

3.3.4 Cleanup:

- 3.3.4.1 Frequently during the work and immediately after completion of the work clean up dust and waste containing asbestos using a HEPA vacuum or by damp mopping.
- 3.3.4.2 Place dust and waste containing asbestos in sealed dust tight waste bags. Drop sheets and disposable protective clothing shall be treated as asbestos waste and shall be wetted and folded inward to contain dust and then placed in waste bags.
- 3.3.4.3 Glove bags, disposal bags, dropsheets, cloth rags and any porous materials are to be considered as asbestos waste and handled according to disposal subsection.
- 3.3.4.4 Immediately before their removal from the work area, and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.
- 3.3.4.5 Seal and remove double bagged waste from site. Dispose of in accordance with procedures specified in section 1.15.
- 3.3.4.6 Perform final thorough cleanup of work areas and adjacent areas affected by the work using HEPA vacuums.

### 3.4 *Type 3 Removal Operation*

- 3.4.1 Initial Preparation and Isolation of Work Areas: Unless otherwise specified, work carried out as part of this phase shall proceed as follows:
- 3.4.1.1 Carry out a survey of the work areas to compile an inventory of existing damages and provide a copy to the Environmental Consultant.
- 3.4.1.2 The Contractor is responsible for moving materials and objects which are present in the work areas.
- 3.4.1.3 Separate the asbestos removal work areas from other areas in the building required to remain in use by erecting floor to ceiling hoarding walls constructed of wood stud frames, plywood sheets and polyethylene sheeting (where specified). All joints formed between plywood sheets and between plywood sheets and other objects and building components shall be sealed air tight using a surface film forming type sealer and duct tape. Seal both edges of hoarding walls with caulking around fixtures and at walls and floors.
- 3.4.1.4 All surfaces, equipment and objects located in the work areas and not scheduled for removal shall be pre-cleaned by HEPA vacuuming or wet wiping and shall be protected by one layer of rip proof poly sheeting unless otherwise specified. Dry sweeping or vacuuming with units not equipped with HEPA filters shall not be allowed.
- 3.4.1.5 All equipment, objects and articles scheduled for removal shall be taken out of the work area only if its removal will not disturb any asbestos-containing materials.
- 3.4.1.6 Ensure that smoke detectors, fire alarms, heat detectors and other life safety equipment remain active and operating as installed.
- 3.4.1.7 All specified clean demolition work can be carried out before the Type 3 enclosure is set up on condition that the demolition work does not disturb any asbestos-containing materials.
- 3.4.1.8 Construct the decontamination enclosure systems for workers and for equipment and materials as specified.
- 3.4.1.9 Build tunnels and platforms in all locations in the work areas as specified and seal properly.
- 3.4.1.10 Independently seal off all openings leading to the work area using polyethylene sheeting and duct tape. Such openings include, but are not limited to, windows, doorways, corridors, skylights, diffusers, grills and air ducts. Also seal all floor openings independently before covering the entire floor with polyethylene sheeting. Ensure that the individual seals are air tight and water tight.
- 3.4.1.11 Cover floors with one layer of fibre reinforced polyethylene sheeting and seal with duct tape. Poly on the floor shall extend a minimum of 30 cm up all vertical surfaces located in the work area.
- 3.4.1.12 Cover walls with one layer of fibre reinforced polyethylene sheeting (unless specified otherwise). Overlap floor poly with wall poly by a minimum of 30 cm at each layer. The layers of wall poly shall always overlap the layers of the floor poly.
- 3.4.1.13 Ensure that adjoining sheets of poly used on walls and floors overlap by at least 30 cm.
- 3.4.1.14 Ensure that poly sheets are properly supported to avoid excessive billowing and failure of the enclosure as a result of applying negative pressure differential. Brace the poly in case of excessive billowing using 1"x2" straps.
- 3.4.1.15 Use flame resistant polyethylene sheeting near heat sources.
- 3.4.1.16 Create negative pressure in the work area using HEPA-filtered negative air unit distributed evenly (horizontally and vertically) within the work area. Supply any necessary platforms as required to elevate the negative air unit.
- 3.4.1.17 Provide enough negative air units to be able to exchange the air volume of the work area at least once every 20 minutes (three air changes per hour) and to maintain a minimum of 0.02" water gauge differential.

- 3.4.1.18 The pressure differential shall be continuously monitored using an automatic recorder as specified. Place the monitor outside the contaminated work area. A backup negative air unit shall be set up and ready for operation in case one of the original units fail.
- 3.4.1.19 Operate the negative air units from the start of the preparation and isolation phase until completion of the final clean up work and air testing.
- 3.4.1.20 Ensure that the necessary make up air is supplied to the work area through flaps installed in the perimeter seal.
- 3.4.1.21 Replace pre-filters and HEPA filters as necessary to maintain the proper flow rate and to ensure that the unit continues to function properly.
- 3.4.1.22 Contaminated air from the work area shall be exhausted directly to the outside through sealed ducts. Where necessary, remove existing windows and replace with a plywood panel. Secure panel in place and make weather tight using caulking. Install appropriately sized openings for exhaust (typically 12"). Replace windows upon completion of work.
- 3.4.1.23 All negative air units which are set up to discharge inside the building shall be leak tested in place using the DOP method.
- 3.4.1.24 The Contractor is allowed to connect to the owner's existing water supply for use in the asbestos work areas and in the temporary shower and decontamination facilities. The Contractor shall be responsible for making all the connections using vacuum breakers and other backflow preventers.
- 3.4.1.25 The Contractor shall use copper pipes and fittings and high pressure hoses when making connections to the main water supply. The Contractor shall also install a main shut-off valve on the clean side of the decontamination enclosure. All connections shall be made down stream from the main shut-off valve. Ensure that the pressure in the temporary water distribution system is relieved if the system is to be left unattended. Ensure that no leaks are present around hose pipe connections. Minimize the possibility of water damage through spills or leaks by providing drip pans of suitable size and by ensuring that the drip pans are drained regularly.
- 3.4.1.26 Ensure that all water from the drainage facilities installed on the shower and other decontamination enclosures is passed through filtration systems as specified.
- 3.4.1.27 Test all temporary piping installed during this project and ensure that they are watertight. All temporary pipe installation shall remain water tight for the duration of the project. Pipes shall be installed parallel to walls and shall be temporarily secured to existing structures. Ensure that all piping is removed upon completion of work. Avoid damaging or altering the owner's existing water equipment and piping.
- 3.4.1.28 All electrical work shall be performed by a licensed electrician in compliance with all applicable regulations. Isolate, disconnect and lockout all power supplying or passing through the work area. Ensure that power supply to the remaining areas of the building is not disrupted during work in asbestos contaminated areas.
- 3.4.1.29 Unless specified, the use of the existing power and lighting circuits shall not be allowed. Use temporary electrical panels to provide power and lighting to the decontamination facilities and the work area. One electrical panel shall be provided for every 5000 square feet of contained asbestos work areas. Electrical panels shall be equipped and sized to handle all electrical equipment required for the completion of the project. The Contractor shall also be required to provide other additional electrical equipment such as temporary lighting, circuit breakers, panels, transformers and switch gears. The contractor is responsible for determining the location of the main panel in the building for their connections. The panels used by the Contractor shall be compatible with the electrical systems in the building.
- 3.4.1.30 The Contractor shall be responsible for establishing and maintaining fire and emergency exits from the work area that are acceptable to the Provincial Fire Marshall and other authorities having jurisdiction. The emergency exits shall be sealed in a manner that will not hinder the use of the doors during an evacuation and shall be clearly marked by using proper exit signs.

- 3.4.1.31 Battery powered emergency lighting shall be installed by the Contractor to provide general lighting throughout the work area in case of loss of power supply to the ground fault panel and to ensure that the emergency exits and the exit routes remain lit during the power failure.
- 3.4.1.32 Ensure that fire extinguishers are installed throughout the asbestos work area at each of the emergency exits and on both sides of the decontamination facilities. All fire extinguishers installed inside the work area shall be protected by clear polyethylene sheets and shall be easily accessible in case of an emergency.
- 3.4.1.33 The Contractor shall place warning signs at all access points leading to the contained work area. The signs shall be posted at the curtained door ways and shall read:
- CAUTION  
ASBESTOS HAZARD AREA  
NO UNAUTHORIZED ENTRY  
WEAR ASSIGNED PROTECTIVE EQUIPMENT  
BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM
- 3.4.1.34 Once the initial clean preparation and isolation of the work area is completed, the Contractor shall request an inspection from the Environmental Consultant before proceeding to next phase. Notify the Environmental Consultant 24 hours before the inspection is needed.
- 3.4.1.35 Once authorization is obtained from the Environmental Consultant, proceed to setting up critical seals that might become accessible once removal operations commence.
- 3.4.1.36 Shut off and lock out the HVAC system serving the subject work area. Ensure that all work requiring the complete shut down of the HVAC system is carried out during the time when the building is not occupied.
- 3.4.1.37 Set up the upper seal using two layers of rip proof poly sheets. One end of the poly sheets shall be tapped to the underside of the deck. The other end shall be fastened to the top of the lower work area perimeter seal. Ensure that the upper seal is airtight by sealing all opening around objects present in the ceiling space. Use smoke tubes to test the integrity of the seals after restarting the HVAC system for the rest of the building.
- 3.4.1.38 Unless otherwise specified, all electrical systems scheduled to remain inside the work area during asbestos removal activities shall be sealed using duct tape and poly sheets. Examples of such systems include speakers, wiring, smoke and heat detectors, alarm equipment, communication systems, PA systems, junction boxes, etc.
- 3.4.1.39 Once all the preparation work is complete, the Contractor shall ensure that the work area is maintained neat and organized. All the enclosures shall be inspected by the supervisor before and after the completion of each work shift to ensure that the hoarding walls, polyethylene barriers and enclosures are intact. Any damaged discovered during the inspection shall be repaired immediately. Maintain an inspection log book on site to document when (date and time) the inspection was carried out and by who (name and signature of the person). Summarize any problems encountered during the inspection.
- 3.4.1.40 Ensure that the negative air units and the associated ducting and exhaust openings are regularly inspected during the work shift. The pressure differential monitoring unit shall be also inspected regularly during the work shift to ensure that the specified negative pressure inside the work area is maintained.
- 3.4.2 Entry and Exit Procedures from Asbestos Removal Work Areas: the following general procedures shall be adhered to when entering into and exiting from asbestos abatement work areas:
- 3.4.2.1 Work Area Entry Procedures:
- 3.4.2.1.1 Every worker and visitor planning to enter the work area shall remove all street clothing including undergarments and shall store them in the clean change room.
- 3.4.2.1.2 All uncontaminated articles such as clothing, footwear, towels, personal effects, etc. shall be store in the clean room of the decontamination facility.



- 3.4.2.1.3 The person shall then put on disposal coverall with head covering, respirators with clean filters and foot covering and shall proceed to the work areas through the shower and then the equipment and access room.
- 3.4.2.2 Work Area Exit Procedures:
- 3.4.2.2.1 Using HEPA vacuuming or wet wiping, remove all gross contamination from personal protective equipment (disposable coveralls, boots, hard hats, safety glasses, exterior of respirator, etc.) in the work area and then proceed to the equipment and access room.
- 3.4.2.2.2 In the equipment and access room, remove all protective clothing except the respirator and proceed to the shower. All disposal contaminated clothing shall be placed in asbestos disposal bags. Reusable items shall be stored neatly in the equipment and access room for use during the next shift.
- 3.4.2.2.3 Proceed naked to the shower while still wearing the respirator. While showering, clean the outside of the respirator with soap and water. Seal the openings in the filter as per the manufacturer's instruction or using duct tape. Alternatively, the filters can be disposed of as asbestos waste. Continue showering by thoroughly wetting and washing the body and the head. Wet and clean the inside of the respirator. Filters shall not be allowed in the clean room if not properly sealed.
- 3.4.2.2.4 Upon completion of showering and drying off, proceed to the clean room and dress in street clothing.
- 3.4.3 Asbestos Removal Procedures
- 3.4.3.1 Asbestos removal work shall not commence until the following requirements have been met:
- 3.4.3.2 All work areas have been and contained as specified, decontamination enclosure systems have been set up and occupied areas of the building have been properly isolated.
- 3.4.3.2.1 All required notifications have been made and a notice of project have been posted in a visible area.
- 3.4.3.2.2 Warnings signs have been displayed at all potential access points into the work area.
- 3.4.3.2.3 All arrangements have been made with the waste disposal facility.
- 3.4.3.2.4 All equipment, materials and tools needed inside the work area are available and in working condition.
- 3.4.3.2.5 Appropriate negative pressure differential have been established inside the work area with proper allowance for make up air.
- 3.4.3.2.6 All building security arrangements have been made.
- 3.4.3.2.7 Written authorization has been obtained from the Environmental Consultant to commence asbestos removal work.
- 3.4.3.3 Using an airless sprayer, spray the asbestos-containing material with water mixed with a wetting agent. Apply enough amended water to ensure that the material is wet all way through to the substrate. Avoid dripping. Etch the surface of the material being wetted in cases were the water does not penetrate the outer layer of the material.
- 3.4.3.4 Remove the wet asbestos-containing materials in layers and/or small sections while maintaining exposed surfaces of insulation in a wet condition. Spray the material regularly throughout the removal work to maintain saturation and to minimize the generation and dispersion of dust. Ensure that the wet material does not dry out.
- 3.4.3.5 Ensure that the removed material and other waste generated during the removal process is collected and bagged immediately. Place the material in yellow labelled bags. Ensure that the waste water is also collected regularly. Avoid pooling of water. Dispose of the waste water in labelled 6 mil polyethylene bags (or other suitable rigid containers) or pump it straight into the sanitary sewer after passing it through the specified two stage filters. Refer to Section 3.3.4 for specific procedures for handling of materials and waste.

- 3.4.3.6 Mist the air during the removal process using an airless sprayer capable of producing a fine mist and amended water to keep the airborne fibres levels as low as possible. Monitor the air inside the work area during removal. Airborne fibre levels in excess of 2.5 fibres/cc requires the utilization of more airless sprayers.
- 3.4.3.7 Remove deck mounted objects and other obstructions as necessary to facilitate the removal of the asbestos-containing materials. Ensure that the removal work includes all asbestos-contaminated materials specified for removal.
- 3.4.3.8 After completion of gross asbestos removal work, perform a more thorough cleaning of all surfaces that used to be covered by asbestos to remove all visible residue and fibrous materials. Cleaning shall be carried out using wire brushing (stiff bristle brushes such as nylon or fibre bristles not metal), wet sponging and vacuuming. Ensure that the surfaces remain wet during the performance of this work.
- 3.4.3.9 Notify the Environmental Consultant in cases where asbestos-containing materials is encountered which cannot be properly removed without demolishing building structural members or removing major service elements. The Environmental Consultant will advise the Contractor in writing regarding the next course of action. If sealing the material in place is the recommended course of action, apply a penetrating sealer onto the material and ensure that it penetrates all the way to the substrate.
- 3.4.3.10 Continue with the wet thorough cleaning activities and include other surfaces in the work area including, but not limited to, decontamination facilities, polyethylene sheeting, walls and floor surfaces, equipment, containers, piping, ducts, conduits and poly surfaces used in the equipment and access room and the equipment decontamination facilities. Pre-filters used on the negative air units shall be removed and shall be disposed of as asbestos waste.
- 3.4.3.11 Request a visual clearance inspection by the Environmental Consultant once all the cleaning activities are completed. The level of cleanliness shall be acceptable to the Environmental Consultant before a written authorization is issued to apply the lock-down material.
- 3.4.4 Procedures for Handling of Materials and Waste
- 3.4.4.1 Seal all filled asbestos waste containers and clean the exterior of the containers and other items by wet sponging. Move the containers from the filling area to a temporary storage area located within the enclosure and close to the equipment waste decontamination facility.
- 3.4.4.2 Move the item to the container cleaning room, clean by wet sponges and pass it through the curtained doorway to a second worker stationed in the holding room. The second worker shall be fully protected (similar to the removal workers) and can only leave by going through the work area and exiting through the worker decontamination facility (after taking a shower). The second worker shall then clean or double bag and seal the item and shall pass it through the curtained doorway to a third worker stationed in the transfer room. The third worker enters the transfer room from the clean side and does not need to use personal protective equipment. The third worker is then responsible for transferring the item to the disposal bin or to the Contractor's temporary storage room or truck.
- 3.4.4.3 All waste generated within the asbestos work area shall be treated as asbestos-contaminated waste and shall be disposed of accordingly. Non-porous materials which can be properly washed and cleaned can be disposed of as normal waste after cleaning.
- 3.4.4.4 The Contractor shall use a combination of a rigid container with 6 mil poly bag to transport and dispose of waste containing sharp materials which could rip two 6 mil poly bag.
- 3.4.4.5 Transportation of waste and materials through occupied areas of the building shall be limited to a time when the building is not occupied. The Contractor shall use covered carts to transport the waste inside the building. Predetermined transport routes shall be approved by the Environmental Consultant. Workers transporting the waste shall be equipped with spill kits and full personal protective equipment and shall be trained to contain and clean any spilled asbestos-containing materials resulting from a failure in the waste containers.

- 3.4.4.6 Ensure that waste transport routes, loading areas and garbage bin storage areas are kept clean at all times. Garbage bins shall be of the fully enclosed type and shall be locked at all times when not in use. Garbage bins shall be placed only in locations specified and approved by the Owner or his representative.
- 3.4.4.7 Schedule garbage bin pick up and drop off times in consultation with the Environmental Consultant and ensure that the scheduled times do not interfere with the operations of the building Owner or his tenants.
- 3.4.4.8 Transport and dispose of asbestos waste as specified in Section 1.15
- 3.4.5 Procedures for Locking-Down of Work Area
- 3.4.5.1 Upon completion of clean up operations and after receiving written authorization from the Environmental Consultant to proceed, apply a lock-down agent acceptable to the Environmental Consultant on all surfaces in the work area such as areas where asbestos materials has been removed, pipes, ducts and other exposed objects present in the work area, polyethylene sheeting and other exposed walls, ceilings and floors, etc. Ensure that the sprayed material covers all surfaces. Apply twice as much lock-agent on areas that used to be covered by asbestos-containing materials.
- 3.4.5.2 Ensure that proper respiratory protective equipment is used during the application of the lock-down agent since, depending on the nature of the sealer used, potentially hazardous materials could be generated during the application process.
- 3.4.5.3 Restrict access to the work area for a period of 24 hours after completion of the lock-down application to allow for the dust to settle and for the lock-down agent to dry off. Clearance air samples will then collected inside the work area.
- 3.4.5.4 The work area shall be considered acceptable for public occupancy only if the airborne fibre levels inside the work area are less than 0.01 fibres/cc. Levels above 0.01 fibres/cc requires that the entire area be re-cleaned and another coat of lock-down agent be applied by the Contractor on all surfaces in the work area. Re-sampling will be carried out and the entire process shall be repeated until the fibres levels are less than 0.01 fibres/cc.
- 3.4.5.5 The Contractor shall be responsible for all charges associated with re-cleaning work and other associated requirements as specified.
- 3.4.6 Procedures for Work Area Teardown and Dismantling
- 3.4.6.1 Proceed with the teardown of the work area only after obtaining written authorization from the Environmental Consultant. Ensure that Type 3 procedures remain in effect during this phase of work. The worker and equipment and material decontamination units shall remain fully operational. The negative air units shall continue to operate throughout the duration of the teardown work.
- 3.4.6.2 Start by removing polyethylene sheeting by carefully folding it away from the walls to the centre of the work area making sure that any loose debris is trapped within the poly. Also remove all enclosures, duct tape, caulking, polyurethane foam and other materials used in setting up the enclosure. Ensure that one layer of polyethylene sheeting is kept in place in situations where re-application of fireproofing is required. Polyethylene and other materials used in setting up enclosures shall be disposed of as asbestos-contaminated waste.
- 3.4.6.3 Clean all vacuum units, fittings, hoses and other small tools used during the removal work inside the work area, seal in 6 mil poly bags and remove from the work area through the equipment and materials decontamination unit. Wash down and clean other equipment used during the work and remove from the work area.
- 3.4.6.4 Clean up the asbestos work area including all surfaces and all decontamination enclosures. Remove negative air units pre-filters and dispose of as asbestos waste. Seal the exterior of the unit on all sides with poly and remove from the work area.
- 3.4.6.5 Remove all waste bags containing polyethylene sheets and other materials used to set up the enclosures and dispose of as specified.

- 3.4.6.6 Remove all hoarding walls separating the work area from occupied areas except in locations where the walls are set up adjacent to other areas that still contain asbestos. Obtain approval of Environmental Consultant before dismantling hoarding walls.
- 3.4.6.7 Dismantle the remainder of the enclosure including scaffolding, platforms, decontamination facilities, tunnels, etc. Final clean the work area using HEPA vacuuming and wet wiping. Clean and remove all ground fault panels and temporary lighting.
- 3.4.7 Procedures for Re-Establishment of Objects and Systems
- 3.4.7.1 Re-establish mechanical and HVAC systems and install new clean air filters where previously removed. Re-establish all electrical system and return to as found condition unless otherwise specified.
- 3.4.7.2 Repair, replace and make good on all damages not identified during the per-removal survey.
- 3.4.7.3 Unless otherwise specified, all items and objects removed during the various phases of the work shall be returned to their original position and shall be properly mounted and secured.

## Section 02082 Site Work – Lead Abatement

### PART 1 – GENERAL

#### 1.1 **General Conditions and Related Work**

- 1.1.1 This section forms a part of the Contract Document and should be read in conjunction with all other Sections and Divisions in order to comply with the requirements of the General Conditions of the Contract.
- 1.1.2 It is the intent that work performed as outlined in this section will result in the complete removal and disposal or decontamination of all lead-containing materials, existing lead-contaminated materials and materials and/or surfaces that become contaminated by lead as a result of the work specified by this Section. The referenced materials include construction materials (paints, and coatings), existing structures, building components, and debris.
- 1.1.2 Removal of identified lead-containing materials shall be carried out in accordance with the following requirements:
- 1.1.2.1 Guideline: Lead on Construction Projects (issued by Ontario Ministry of Labour);
- 1.1.2.2 Designated Substances Regulation O. Reg. 490/09; and
- 1.1.2.3 Regulation for Construction Projects, O. Reg. 213/91.
- 1.1.3 Dispose of all waste as specified in applicable sections of the specifications document.
- 1.1.4 The Environmental Consultant may perform area and personal air monitoring to verify the adequacy of the respirators used by the Contractor and effectiveness of dust suppression methods. Contractor's personnel shall co-operate with the Environmental Consultant during the collection of the air samples.
- 1.1.5 This project and all work associated with it is regulated by Ontario Regulation 490/09, The Occupational Health and Safety Act and other applicable regulations.
- 1.1.3 Provide all equipment, material, services, supervision and labour required or specified to complete the scope of work of this project as described in the Contract and Specifications Documents.
- 1.1.4 Provide and maintain, in compliance with applicable regulation, codes and by-laws, sanitary temporary water closets and washbasins for use of workers.

#### 1.2 **Description of Work**

- 1.2.1 **Before submitting a bid, confirm the scope of work of the project visiting the site and reading the entire Contract documents. The information presented is for general information purposes and should not be used as the only basis for submitting a bid.**
- 1.2.1.1 Work in the area shall be carried out using Type 2a Removal Operation Procedures (Sub-Section 3.6) as outlined in Guideline: Lead on Construction Projects (issued by Ontario Ministry of Labour) as follows:
- 1.2.1.2 Ensure that the work area is separated from the rest of the building as required. Separate the lead removal work area from the other areas in the building required to remain in use by erecting a Type 2a enclosure using hoarding walls constructed of polyethylene sheeting and wood stud frames.
- 1.2.1.3 Pre-clean the work area including floors, walls, electrical panels housing, conduits, wires and cables, and all other equipment and items present in the work area using vacuum units equipped with HEPA filters and wet wiping. Pre-clean all surfaces to be protected.
- 1.2.1.4 Isolate the work area from the rest of the building by constructing a polyethylene enclosure supported with duct tape and 2"x4" studs or other suitable means. The abatement contractor shall

create walls and cover floors in the Work Area with one (1) layer of rip proof polyethylene sheeting.

- 1.2.1.5 The abatement Contractor shall be responsible for providing their own electrical power to the building/work area if required. The abatement Contractor shall be responsible for hiring and paying for a licensed electrical sub-contractor to perform this work.
- 1.2.1.6 The abatement Contractor shall be responsible for providing their own temporary lighting using ground fault panels. The level of lighting shall be acceptable to the Consultant.
- 1.2.1.7 Pre-clean and seal (air and water tight) all openings that lead from the work area. Ensure that all floor openings are independently sealed and are water tight. Use silicone or caulking where necessary to achieve water tightness.
- 1.2.1.8 **Remove and dispose of all lead-containing paint and lead-contaminated materials. Lead-containing paint was identified in the following colours and areas:**
- Lead-containing green paint was identified on doors, door frames and seats within the subject location;
  - Lead-containing beige paint was identified on the walls of the Former Restaurant area within the subject location; and,
  - Lead-containing brown paint was identified on the walls of the Former Restaurant area within the subject location.
- 1.2.1.9 **The work shall be done only by means of non-powered hand held tools and wetted to control the spread of dust. The use of any alternative method of removal shall be discussed with the Environmental Consultant before the bid closing period. The Environmental Consultant (acting as the representative for the City of Peterborough) shall have the final approval regarding any new proposed methodology.**
- 1.2.1.10 Remove and dispose of all paint as required. Clean the walls, floors and other surfaces in the work area after removing the paint by HEPA vacuuming followed by damp wiping and leave the work area clean.
- 1.2.1.11 Once cleaning activities are completed, the Contractor shall then proceed with the rest of the work as specified by the applicable sections of the specifications as issued by the City of Peterborough.
- 1.2.1.12 Drywall joint compound in the subject building is asbestos-containing and shall be removed and disposed of as Section 02082.
- 1.2.1.13 Dispose of all waste as specified in applicable sections of the specifications document.
- 1.2.1.14 The Environmental Consultant may perform area and personal air monitoring to verify effectiveness of dust suppression methods and adequacy of the respirators used by the Contractor. Contractor's personnel shall co-operate with the Inspector in collecting air samples.

### **1.3 Definitions**

- 1.3.1 **Abatement:** Procedures to control dust migration from lead-containing construction materials, existing structures, building components, and debris from manufacturing processes involving lead. Includes cutting, blasting, welding, burning, and removal.
- 1.3.2 **Air Monitoring:** The process of measuring the lead content in a specific volume of air ( $\text{mg}/\text{m}^3$ ) in a stated period of time.
- 1.3.3 **Airtight:** Prohibiting air movement between contaminated area(s) and control area(s) during ingress and egress the work area, consisting of two curtained doorways at least 6 feet apart.
- 1.3.4 **Ambient Air Monitoring:** Sampling for airborne concentrations of lead adjacent to the Work Area.



- 1.3.5 Authorized Visitor: The building Owner or his representative, persons of any regulatory or other agency having jurisdiction over the project and the lead abatement Consultant or his representative.
- 1.3.6 Barrier: An obstruction (wall, ceiling, floor) that separates work area(s) from adjacent control area(s) to prevent cross contamination.
- 1.3.7 Chemical Stripping Agent Neutralizer: Chemical stripping agent neutralizers may be used on exterior surfaces only. Neutralizers shall be compatible with and not harmful to the substrate that they are applied to and the stripping agent that has been applied to the surface substrate.
- 1.3.8 Chemical Stripping Removers: Chemical removers shall contain no methylene chloride products and shall be compatible with and not harmful to the substrate that they are applied to.
- 1.3.9 Contractor/Supervisor: An individual who supervises lead abatement work and has the proper qualifications and training as specified in this document.
- 1.3.10 Control Area: An area which is considered uncontaminated and is suitable for regular occupancy.
- 1.3.11 Critical Barrier: One or more layers of plastic sealed over all openings into a regulated area or any other similarly placed physical barrier sufficient to prevent airborne lead in a regulated area from migrating to an adjacent area.
- 1.3.12 Curtained Doorway: An access point to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, constructed by placing two overlapping sheets of rip-proof plastic over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway. The free bottom edge of the plastic sheets shall be weighted to ensure proper closure. The plastic sheets shall overlap by no less than 1.5 meters.
- 1.3.13 Demolition: The razing, removing or wrecking of any building component, assembly or system together with any associated handling operations.
- 1.3.14 Decontamination Area: An enclosed passage-way adjacent and connected to the work area and consisting of a dirty room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with lead dust and/or debris.
- 1.3.15 Diocetylphthalate (DOP) Test: A test method that uses Diocetylphthalate aerosol to challenge a HEPA filter-equipped negative pressure unit to determine its integrity and effectiveness to filter out lead dust, fume or mist.
- 1.3.16 Dirty Room: A contaminated area or room which is part of the worker decontamination enclosure system, with storage for contaminated clothing and equipment.
- 1.3.17 Disposal: Procedures necessary to transport and dispose of the lead contaminated material(s) stripped and removed from the work area(s) at an approved waste disposal site in compliance with the applicable environmental regulations.
- 1.3.18 Disposal Bag: A 0.15 mm 6 mil thick, leak-tight polyethylene bag used for transporting lead waste from containment into a lead waste container for disposal.
- 1.3.19 Disturbance: Activities that disrupt the matrix of Lead or generate visible dust and debris.
- 1.3.20 Emery 3004 – a compound (a poly-alpha olefin) that may be substituted for DOP in HEPA filter testing.
- 1.3.21 Encapsulation: Procedures necessary to coat all lead-containing materials with an encapsulate to control the possible release of lead dust, fume, or mist into the ambient air.
- 1.3.22 Enclosure: All herein specified procedures necessary to complete the enclosure of all lead-containing material and dust behind airtight, impermeable, permanent barriers.
- 1.3.23 Filtration System for Water: A multistage system for filtering water from the decontamination shower and wastewater. The system is usually manufactured with two filters: a primary filter and a

- secondary filter. The primary filter collects and retains particles that are 20 microns or larger and the secondary filter removes particles that are 5 microns or larger.
- 1.3.24 HEPA Filter Equipment: High efficiency particulate air filtered vacuuming equipment with a filter system capable of collecting and retaining lead dust, fume, or mist. Filters shall be capable of trapping and retaining at least 99.97 percent of 0.3 micrometer diameter particles.
- 1.3.25 Lead: The term includes elemental lead, and/or inorganic and organic lead compounds derived from chemically treated and/or altered elements (i.e. paints, plastics, pigments, glasses, and rubber compounds).
- 1.3.26 Lead Cleaning Agent: A cleaning agent suitable for lead dust. Acceptable detergents include products with a high phosphate content (containing at least 5% trisodium phosphate) and/or phosphate-free lead dissolving agents such as Ledisolv™ or similar product.
- 1.3.27 Lead-Containing Material: Any material analyzed and found to have a concentration equal to or greater than 1.0 milligrams per square centimetres (mg/cm<sup>2</sup>) or 5,000 micrograms per gram (µg/g), parts per million (ppm).
- 1.3.28 Lead Leachate Material: Any material analyzed and found to have a concentration equal to or greater than 5.0 milligrams per litre (mg/l) or 100 milligrams per kilogram (mg/kg)/ micrograms per gram (µg/g) as per O. Reg 347 (as amended), Schedule 4, *Leachate Quality Criteria*, February 2001.
- 1.3.29 Lead Surface Contamination: Any surfaces analyzed and found to have a concentration equal to or greater than 40 micrograms per square feet (µg/ft<sup>2</sup>) or 4 micrograms per 100 square centimetres (µg/cm<sup>2</sup>) for floors, 250 µg/ft<sup>2</sup> (25 µg/cm<sup>2</sup>) for window sills, and 400 µg/ft<sup>2</sup> (40 µg/cm<sup>2</sup>) for window troughs as per the U.S. Environmental Protection Agency (EPA) Lead, *Identification of Dangerous Levels of Lead*, Final Rule, January 2001 (40 CFR Part 74).
- 1.3.30 Lead Waste Container: An impermeable container acceptable to a disposal site and Ministry of the Environment. It shall be labeled as required by the Ministry of the Environment and Transport Canada.
- 1.3.31 Lead Work Area: An area where lead removal operations are performed which is isolated by physical boundaries to prevent the spread of lead dust or debris.
- 1.3.32 Negative Pressure Fan System: An air purifying fan system located within or outside the isolated work area, which draws air out of the work area through a HEPA filter and discharges this air directly to the exterior of the building, thus keeping the static air pressure in the work area lower than in adjacent areas and preventing infiltration of contaminated air from work area to adjacent areas. This system shall be equipped with an alarm to warn of system breakdown, shall maintain a minimum pressure differential of 0.03" water gauge relative to adjacent areas outside of work area(s) and shall be equipped with an instrument to continuously monitor and automatically record pressure differences.
- 1.3.33 Negative Pressure Respirator: A respirator in which the air inside the respiratory inlet covering is negative during inhalation in relation to the air pressure of the outside atmosphere and positive during exhalation in relation to the air pressure of the outside atmosphere.
- 1.3.34 Powered Air Purifying Respirator (PAPR): A full-face mask into which filtered air is pumped at approximately 100 – 150 litres per minute (4 – 6 cubic feet per minute). The PAPR consists of a full-face mask, a battery pack, an air pump, high efficiency filter and hoses.
- 1.3.35 Personal Monitoring: Sampling of airborne lead concentrations within the breathing zone (within 12 inches of the mouth) of a worker.
- 1.3.36 Personnel: Supervisors, Contractor employees, subcontractor employees.
- 1.3.37 Positive Pressure Respirator: A respirator that maintains a positive pressure inside the facepiece during inhalation and exhalation in relation to the atmospheric pressure.
- 1.3.38 Shower Room: A room between the clean room and the equipment room in the worker decontamination enclosure system which supplies hot and cold running water for complete

showering practices during decontamination. The shower room provides an airtight barrier between contaminated and clean areas.

- 1.3.39 Supplied-air Respirator – an accepted respirator and air-supply hose with a hood/helmet, a tight fitting face-piece that is supplied with compressed breathing air from a compressed breathing air system.
- 1.3.40 Tape-Sealed Polyethylene Sheets: Rip-proof polyethylene sheets or polyethylene sheets of type and thickness as specified, sealed with tape along the edges, around objects, over cuts and in other locations as required to provide a continuous polyethylene membrane to protect underlying surfaces from water damage and damage by sealant and to prevent the escape of lead dust, fume or mist through the sheeting into a clean area.
- 1.3.41 Wet Cleaning: The process of eliminating lead dust and/or debris from building surfaces and objects by using cloths, mops, or other cleaning tools dampened with a lead cleaning agent.
- 1.3.42 Work: Includes all labour, supervision, materials and equipment required for the complete execution of the project as specified in the contract.
- 1.3.43 Work Decontamination Enclosure System: A decontamination system for workers, consisting of a clean room, a shower room, and an equipment room. One entrance to the clean room shall be outside of the contaminated area. One entrance to the equipment room shall be connected directly to the contaminated area.

#### **1.4 Work Schedule**

- 1.2.13 It is the responsibility of the Contractor to provide the necessary manpower and work shifts to meet the schedule as specified below:
- 1.2.14 The detailed schedule and the start date for the project will be determined by the City of Peterborough and the project management team.
- 1.2.15 The Contractor shall, at no extra cost to the owner, be responsible for the completion of work required or scheduled to be performed on weekends, holidays and after regular hours and shall be carried out as required to meet the schedule specified.
- 1.4.1 In all situations where the Contractor fails to meet the specified schedule, the Contractor shall pay all costs of inspection and air monitoring by the Consultant.

#### **1.4 Submittals**

- 1.5.3 All submittals must be received by the Consultant or his representative before the work is allowed to commence.
- 1.5.4 The Contractor shall submit the following:
- 1.5.4.1 Proof that the Contractor has made arrangement for the transport and disposal of lead waste. The proof shall be satisfactory to the Consultant.
- 1.5.4.2 Name of the landfill.
- 1.5.4.3 A copy of the weight scale or waste manifest/bill of lading (once received).
- 1.5.4.4 Proof satisfactory to the Consultant that each Supervisor scheduled to work on the project has successfully completed an approved lead abatement course and can provide an up to date training certificate issued by a competent entity.
- 1.5.4.5 References that each and every supervisor had supervised a minimum of 7 other lead removal projects of similar size and scope. One supervisor shall remain on site while lead removal or cleanup is being carried out.
- 1.5.4.6 Copies of Insurance certificates and Workplace Safety and Insurance Board status.
- 1.5.4.7 D.O.P test results and performance data for negative air unit systems.

- 1.5.4.8 Proposed work schedule.
- 1.5.4.9 Work force expected to be present on site daily.
- 1.5.4.10 Proposed number of shifts.
- 1.5.4.11 Layouts of proposed platforms and hoardings for the Consultant's review and approval.
- 1.5.4.12 Layout of proposed waste and worker decontamination facilities and lead work area enclosures
- 1.5.4.13 Proof that all workers have received Workplace Hazardous Material Information System (WHMIS) training.
- 1.5.4.14 A WHMIS information package containing documentation addressing test results, flammability and fire data and Material Safety Data Sheets (MSDS) for products, chemicals and materials used on site during the course of the lead abatement project.
- 1.5.4.15 Proof satisfactory to the Consultant that each worker scheduled to work on the project has successfully completed an approved lead abatement course and can provide an up to date training certificate issued by a competent entity.
- 1.5.4.16 Proof satisfactory to the Consultant that each worker scheduled to work on the project has been fit tested for the appropriate respirator to be used.
- 1.5.4.17 Code of practice for respiratory protection.
- 1.5.4.18 Pressure differential monitoring data – to be submitted on a daily basis.

## **1.5 Quality Assurance**

- 1.5.1 Ensure that work progresses according to schedule.
- 1.5.2 Ensure that work complies with all the requirements of the applicable regulations, guidelines and manuals.
- 1.5.3 Ensure that no water runoff or airborne lead contaminates control area(s) outside the lead removal work area(s). The Consultant has been given authorization by the Owner to stop any work where contamination of control area(s) is suspected. The Contractor shall be responsible for all costs to rectify the problem.
- 1.5.4 Use only skilled and qualified workers for all trades required to work on this project.
- 1.5.5 Only the lead abatement Contractor, and never the Consultant, is responsible for the following:
  - 1.5.5.1 Safety programs and precautions required by applicable regulations for the work being performed.
  - 1.5.5.2 Control over the acts and omissions of the Contractor's workers, agents, subcontractors and other employees of the Contractor required to perform work on the project.
  - 1.5.5.3 Control over construction techniques, methods, means or procedures.

## **1.6 Regulations**

- 1.7.5 The Contractor shall comply with all local, provincial and federal requirements (regulations, codes, standards and guidelines) relating to lead and other work activities being carried out.
- 1.7.6 In case of conflict among the above mentioned requirements or with these specifications, the more stringent requirements shall apply.
- 1.7.7 Perform work following the requirements of the various regulations in effect at the time the work is being carried out.
- 1.7.8 The regulations, codes, standards and guidelines shall include, but are not limited to:
  - 1.7.4.7 Ontario Occupational Health and Safety Act.

- 1.7.4.8 Ministry of Labour Occupational Health and Safety Act requirements for construction projects including Ontario Regulation 843 *Designated Substance – Lead*, as amended to O. Reg. 109/04.
- 1.7.4.9 Ministry of Labour Occupational Health and Safety Act Ontario Regulation 213/91 *Construction Projects*, as amended to O. Reg. 628/05.
- 1.7.4.10 Ontario Ministry of Labour; *Guideline: Lead on Construction Projects*, Occupational Health & Safety Branch, September 2004.
- 1.7.4.11 The U.S Department of Housing and Urban Development; *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*, June 1995.
- 1.7.4.12 The U.S Department of Housing and Urban Development; *Identification of Dangerous Levels of Lead*, January 2001.
- 1.7.4.13 Ontario Ministry of Environment Regulations for the disposal of hazardous waste, including R.R.O. 1990, Regulation 347 (as amended) *General – Waste Management*, as amended to O. Reg. 326/03.
- 1.7.4.14 Federal Transportation of Dangerous Goods Act, 1992 and associated federal Transportation of Dangerous Goods Regulation, SOR/DORS/2001-286 and the Ontario *Dangerous Goods Transportation Act, R.S.O. 1990 Chapter D.1.*
- 1.7.4.15 WHMIS Regulations.

## **1.8 Supervision**

- 1.8.1 The Contractor shall provide a trained and qualified shift supervisor for each and every shift during which lead removal and clean up is being carried out. The Owner reserves the right to stop all work if this requirement is not complied with, at no additional charge to the Owner.
- 1.8.2 The qualification of the supervisor shall meet the requirements specified under Section 1.5 Submittals above.
- 1.8.3 The shift supervisor shall have the authority to make decisions and take actions with respect to production, manpower and equipment.
- 1.8.4 Obtain approval from the Owner or his representative before replacing supervisory personnel.
- 1.8.5 At the request of the Owner or his representative, the Contractor shall, without asking for explanation, replace supervisory personnel with 2 days from receiving the Owner's written request.

## **1.9 Notifications**

- 1.9.2 The Contractor shall be responsible for immediately notifying the following, orally and in writing, prior to any work on this project commencing:
  - 1.9.1.4 The land fill site which agreed to accept the waste as per the requirements of Regulation 347 (as amended).
  - 1.9.1.5 The Fire Marshall, in cases were the execution of the work will result in blocking building exists or when turning off, removing or temporarily altering fire alarms.

## **1.10 Proscriptions**

- 1.10.1 The use of motorized lift equipment in the work area(s) is not allowed.
- 1.10.2 The use of compressed air for removal or clean up of lead dust and debris from any surface is not allowed.
- 1.10.3 Dry sweeping is prohibited during the removal and cleaning activities.
- 1.10.4 Smoking, eating, drinking or chewing is not allowed in the work area(s).

- 1.10.5 Unauthorized persons or persons not using proper personal protective equipment shall not be allowed to enter the work area(s).
- 1.10.6 No entry into the work area(s) shall be permitted to any person who has facial hair growth that prevents the establishment of a proper seal between the respirator and the skin.
- 1.10.7 The use of torches, propane-fired heaters and other open flames shall not be permitted in the lead work area(s).

### **1.11 *Equipment and Material Protection and Replacement***

- 1.11.1 Before starting the removal operations, the Contractor shall perform a survey to document existing damage in all areas where lead removal will be carried out or in areas where transportation of waste will take place.
- 1.11.2 The Contractor shall be responsible for protecting all equipment and materials within, and in the vicinity of, the work area(s).
- 1.11.3 The Contractor shall be responsible for replacing all equipment and materials that become damaged as a result of the work being carried out by the Contractor at no additional cost to the owner.

### **1.12 *Worker and Visitor Protection***

- 1.12.1 Instruct all personnel (workers and visitors) in all aspects of work procedures and protective equipment before permitting entry into the lead abatement work area(s).
- 1.12.2 A competent person (as defined by the Occupational Health and Safety Act) shall provide all the training and instructions.
- 1.12.3 Instructions and training shall include, but shall not be limited to, the following:
  - 1.12.3.1 Entry and exit from lead abatement work area(s).
  - 1.12.3.2 Work practices and personal hygiene.
  - 1.12.3.3 The use, cleaning and care of respirators and protective clothing.
  - 1.12.3.4 Protective measures and work procedures.
- 1.12.4 Lead work area entry and exit procedures shall be posted in the clean room of the decontamination unit.
- 1.12.5 Respiratory Protection:
  - 1.12.5.1 All personnel required to wear respirators shall be fit tested.
  - 1.12.5.2 Each worker or visitor required to enter an lead abatement work area shall be provided with a personally issued respirator that is:
    - 1.12.5.2.1 Appropriate for the work that is being carried out.
    - 1.12.5.2.2 Acceptable to the Ministry of Labour, Occupational Health and Safety Division.
  - 1.12.5.3 The worker shall be responsible for wearing a respirator that is issued by the Contractor.
  - 1.12.5.4 The following criteria, as outlined in Table 1, shall be followed when selecting an appropriate respirator:



Table 1: Respirators

WORK CLASSIFICATION	REQUIRED RESPIRATOR
<p><b>Type 1 Operations (&lt;0.05 mg/m<sup>3</sup>)</b></p> <ul style="list-style-type: none"> <li>Application of lead-containing coatings with a brush or roller.</li> <li>Removal of lead-containing coatings with a chemical gel or paste and fibrous laminated cloth wrap.</li> <li>Removal of lead-containing coatings or materials using a power tool that has an effective dust collection system equipped with a HEPA filter.</li> <li>Installation or removal of lead-containing sheet metal.</li> <li>Installation or removal of lead-containing packing, babbitt or similar material.</li> <li>Removal of lead-containing coatings or materials with a non-powered hand tool, other than manual scraping and sanding.</li> <li>Soldering.</li> </ul>	Respirators should not be necessary if the general procedures listed in Section 6.1 are followed and if the level of lead in the air is less than 0.05 mg/m <sup>3</sup> . However, if the worker wishes to use a respirator, a half-mask particulate respirator with N-, R-, or P-series filter, and 95, 99, or 100% efficiency should be provided.
<p><b>Type 2a Operations (&gt;0.05 to 0.50 mg/m<sup>3</sup>)</b></p> <ul style="list-style-type: none"> <li>Welding or high temperature cutting of lead-containing coatings or materials outdoors. This operation is considered a Type 2a operation only if it is short-term, not repeated, and if the material has been stripped prior to welding or high temperature cutting. Otherwise, it will be considered a Type 3a operation.</li> <li>Removal of lead-containing coatings or materials by scraping or sanding using a non-powered hand tools.</li> <li>Manual demolition of lead-painted plaster walls or building components by striking a wall with a sledge hammer or similar tool.</li> </ul>	<b>NIOSH Assigned Protection Factor of 10</b> Half-mask particulate respirator with N-, R-, or P-series filter, and 95, 99, or 100% efficiency.
<p><b>Type 2b Operations (&gt;0.50 to 1.25 mg/m<sup>3</sup>)</b></p> <ul style="list-style-type: none"> <li>Spray application of lead-coatings.</li> </ul>	<b>NIOSH Assigned Protection Factor of 25</b> Powered air purifying respirator equipped with a hood or helmet, and any type of high efficiency filter.  Supplied air respirator equipped with a hood or helmet and operated in a continuous flow mode.
<p><b>Type 3a Operations (&gt;1.25 to 2.50 mg/m<sup>3</sup>)</b></p> <ul style="list-style-type: none"> <li>Welding or high temperature cutting of lead-containing coatings or materials indoors or in a confined space.</li> <li>Burning of a surface containing lead.</li> <li>Dry removal of lead-containing mortar using an electric or pneumatic cutting device.</li> <li>Removal of lead-containing coatings or materials using power tools without an effective dust collection system equipped with a HEPA filter.</li> <li>Removal or repair of a ventilation system used for controlling lead exposure.</li> <li>Demolition or cleanup of a facility where lead-containing products were manufactured.</li> <li>An operation that may expose a worker to lead dust, fume, or mist that is not a Type 1, Type 2, or Type 3b operation.</li> </ul>	<b>NIOSH Assigned Protection Factor of 50</b> Full-facepiece air purifying respirator with N-, R-, P-series filters, and 100% efficiency.  Tight-fitting powered air purifying respirator with a high efficiency filter.  Full-facepiece supplied air respirator operated in demand mode.  Half-mask or full-facepiece supplied air respirator operated in continuous-flow mode.
<p><b>Type 3b Operations (&gt;2.50 mg/m<sup>3</sup>)</b></p> <ul style="list-style-type: none"> <li>Abrasive blasting of lead-containing coatings or materials.</li> <li>Removal of lead-containing dust using an air mist extraction system.</li> </ul>	<b>NIOSH Assigned Protection Factor of ≥100</b> Type CE abrasive-blast supplied respirator operated in a positive pressure mode with a tight-fitting half-mask facepiece.  Full-facepiece supplied air respirator operated in positive-pressure or other positive-pressure mode.

- 1.12.5.5 Respiratory protection systems shall be certified by the National Institute for Occupational Safety and Health (NIOSH), the British Standards Institution or any other testing agency that is acceptable to the Ministry of Labour.
- 1.12.5.6 Respirator shall be stored in a clean location such as the clean room of the decontamination unit. This room can also be used for charging PAPR batteries.
- 1.12.5.7 The procedures specified by the equipment manufacturer shall be followed while using and maintaining the respirators.
- 1.12.5.8 Respirators shall be cleaned and inspected at the end of each shift. All damaged and deteriorated parts found during the inspection shall be replaced before the respirator is used again.
- 1.12.5.9 Appropriate combination cartridges shall be used if substances other than lead are to be handled inside the lead work area(s).
- 1.12.5.10 Used filters shall be tested and replaced as specified by the manufacturer or as specified below. The more stringent testing and replacement protocol shall be followed.
- 1.12.5.11 Cartridges for negative pressure respirators should be replaced every 16 hours of actual usage
- 1.12.5.12 Cartridges for PAPRs should be replaced every 8 hours.
- 1.12.5.13 Cartridges shall be treated as lead waste and shall be disposed of accordingly after usage inside lead work area(s).
- 1.12.5.14 All supplied air respirators shall meet the breathing air purifying requirements in accordance with the CSA Standard Z180.1-00.
- 1.12.6 Protective Clothing:
- 1.12.6.1 The Contractor shall provide every worker and authorized visitor with full body disposable coveralls and disposable impervious gloves.
- 1.12.6.2 All personnel shall wear the protective coveralls before they are allowed to enter into the lead work area(s).
- 1.12.6.3 Coveralls shall be equipped with head covering (hood), foot covering and tight fitting cuffs at the neck, ankles and wrists.
- 1.12.6.4 The disposable coveralls shall be made up of materials that do not readily permit the penetration of lead dust.
- 1.12.6.5 The impervious gloves shall be suitable for handling any lead cleaning agent and/or other chemical that may be required.
- 1.12.6.6 Disposable coveralls shall be immediately repaired (using duct tape) or replaced once torn.
- 1.12.6.7 Disposable gloves shall be immediately replaced once torn.
- 1.12.6.8 Coveralls and gloves shall be disposed of as lead waste once they are worn inside the lead abatement area(s).
- 1.12.6.9 Workers are allowed to wear reusable protective clothing provided that the clothing is left in the equipment room until the end of the lead abatement project. The clothing shall then be disposed of as lead waste.
- 1.12.6.10 Safety shoes, hard hats and additional body protection equipment shall be used as necessary to meet the requirements of applicable safety regulations.

### **1.13 Inspections**

- 1.13.1 The lead abatement Consultant will be present on site to carry out quality control inspections for the entire duration of the project. The inspections will be performed inside and outside the work area(s).

- 1.13.2 The purpose of the inspections is to ensure that the work is being completed following the requirements and procedures outlined in the specifications documents and applicable regulations.
- 1.13.3 The Consultant will issue written instructions to the lead abatement Contractor throughout the duration of the project. The instructions will authorize the Contractor to proceed with the following phase of work. The general phases of work will consist of the following: Pre-cleaning, set-up and preparation of the work area, removal of specified materials, clean-up of work area and tear down of containment.
- 1.13.4 The Contractor shall not proceed to the next phase of work without obtaining authorization from the Consultant.
- 1.13.5 The Consultant has been given authorization by the Owner to order a work shutdown if suspect or confirmed contamination of area(s) adjacent to work area(s) has occurred.
- 1.13.6 In all adjacent area(s) where it is determined by the Consultant (through visual inspection or air monitoring) that contamination has occurred, the Contractor shall be responsible to the complete isolation and cleaning of such area(s) under the direction of the Consultant and at no extra charge to the Owner.
- 1.13.7 The Consultant has been given authorization by the Owner to ensure that the Contractor adheres to specified procedures and materials and to inspect for the lead work area(s) for final completion and cleanliness. Any additional work (including labour and material charges) specified by the Consultant to achieve a completion of work to the level specified shall be carried out by the Contractor at no additional charge to the Owner.
- 1.13.8 The Contractor shall ensure that all equipment and materials to be used on the project are acceptable to the Consultant. Unacceptable materials and equipment shall be replaced by the Contractor at no additional charge to the Owner.
- 1.13.9 The Contractor shall be responsible for all additional inspection charges which are carried out as a result of a failure by the Contractor to meet set criteria relating to schedule, health and safety and quality.

#### **1.14 Air Monitoring**

- 1.14.1 Air samples may be collected by the Consultant (on behalf of the Owner) prior to, during and after the remediation activities, both inside and/or outside the lead work area(s).
- 1.14.2 The objective of air monitoring is to detect defects in the containment within the work area(s) and to ensure that any contamination of adjacent (control) areas is discovered and rectified immediately.
- 1.14.3 Any contamination of area(s) outside the limits of the lead work area(s) (as determined by air monitoring) shall be contained and shall be thoroughly cleaned to the Consultant's satisfaction. The Contractor shall be responsible for all additional charges associated with such work.
- 1.14.4 Air monitoring may be carried out according to either, or both NIOSH methods described below:
- 1.14.4.1 The latest edition of the National Institute for Occupational Safety and Health (NIOSH) Method 7082. The samples will be analyzed by the Flame Atomic Absorption Spectrophotometer technique as specified in the above noted NIOSH method.
- 1.14.4.2 The latest edition of the National Institute for Occupational Safety and Health (NIOSH) Method 7702. The samples will be analyzed by the X-Ray Fluorescence (XRF) portable technique as specified in the above NIOSH method.
- 1.14.5 The Contractor shall cooperate with the Consultant during air monitoring and shall:
- 1.14.5.1 Ensure that workers wear sampling equipment for personal samples up to the duration of an entire shift.
- 1.14.5.2 Ensure that the workers exercise care and avoid damaging the Consultant's equipment.
- 1.14.5.3 Ensure that the samples and equipment are not tampered with.

- 1.14.6 The Contractor shall be responsible for charges associated with re-sampling due to tampering with the air samples.
- 1.14.7 The Contractor shall be responsible for repair or replacement charges of testing equipment that become damaged due to the actions of the Contractor forces.
- 1.14.8 The maximum allowable concentration of airborne lead concentrations outside a lead work area(s) is  $0.025 \text{ mg/m}^3$  or  $25 \mu\text{g/m}^3$ .
- 1.14.8.1 Results equal to or greater than the specified level will indicate lead contamination of these adjacent areas and respiratory protection is required.
- 1.14.8.2 The contaminated areas shall be isolated, contained and cleaned to the satisfaction of the Consultant in the same manner as the lead work area at no additional cost to the Owner. The airborne lead concentration shall be below  $0.025 \text{ mg/m}^3$  or  $25 \mu\text{g/m}^3$  after cleaning.
- 1.14.8.3 Re-occupancy air samples may be collected and analyzed by NIOSH method 7082 or 7702. The work area(s) will be considered clean and clear for public occupancy only if the airborne concentrations are less than  $0.005 \text{ mg/m}^3$  ( $5 \mu\text{g/m}^3$ ).
- 1.14.8.4 In case the concentrations are equal to or greater than  $0.005 \text{ mg/m}^3$  ( $5 \mu\text{g/m}^3$ ), the Contractor shall be responsible for re-cleaning the lead work area(s). This process will have to be repeated until the concentration levels are below the specified limit.

### **1.15 Wipe Sampling**

- 1.15.1 Wipe samples will be collected by the Consultant (on behalf of the Owner) following a 2 hour settling period as part of the clearance inspection once the final cleaning procedures have been completed inside the work area(s).
- 1.15.2 The objective of wipe sampling is to verify the effectiveness of the cleaning procedures and to ensure that any contamination on surfaces inside the lead work area(s) is discovered and rectified immediately.
- 1.15.3 Wipe sampling will be carried out following procedures specified in the latest edition of the National Institute for Occupational Safety and Health (NIOSH) Method 9100 or the American Society for Testing of Materials (ASTM) Standard E1728-99. The samples will be analyzed by either the Flame Atomic Absorption Spectrophotometer technique as specified in NIOSH method 7082 or Graphite Furnace Atomic Absorption Spectrophotometer technique, NIOSH method 7105.
- 1.15.4 The clearance standards for settled lead dust inside a lead work area(s) is  $40 \mu\text{g/ft}^2$  ( $4 \mu\text{g}/100\text{cm}^2$ ) for floors,  $250 \mu\text{g/ft}^2$  ( $25 \mu\text{g}/100\text{cm}^2$ ) for interior window sills, and  $400 \mu\text{g/ft}^2$  ( $40 \mu\text{g}/100\text{cm}^2$ ) for window troughs.
- 1.15.5 In case the dust levels are equal to or greater than the specified clearance standards, the Contractor shall be responsible for re-cleaning the lead work area(s). This process will have to be repeated until the concentrations are below the specified limit.

### **1.16 Waste Transport and Disposal**

- 1.16.1 All lead-containing and lead-contaminated materials shall be disposed of as prescribed by Ontario R.R.O 1990, Regulation 347 (as amended), Waste Management Regulation, made under the Environmental Protection Act and the provincial and federal regulations for the Transportation of Dangerous Goods.
- 1.16.2 All wash water generated from decontamination activities shall be treated as lead waste and shall be disposed of accordingly.
- 1.16.3 All non-lead containing waste generated during demolition activities inside all lead work area(s) shall be treated as lead waste.
- 1.16.4 Non-porous materials that can be washed and properly cleaned can be disposed of as clean waste.

- 1.16.5 All sharp lead-contaminated materials (such as hangers, T-bars, wood, etc) that could rip or damage a 6mil polyethylene waste disposal bag shall be disposed of in a sealed solid lead waste container.
- 1.16.6 The waste must be stored and transported in an enclosed, lockable waste bin.
- 1.16.7 Every vehicle used for the transportation of lead waste shall display a Class 9 Label.
- 1.16.8 Both sides of the vehicle used for the transportation of lead waste and every waste bag and container shall display the word CAUTION in letters not less than 10 cm in height and the words:
- CONTAINS LEAD WASTE**
- Avoid Creating Dust
- Lead May Be Harmful to Your Health
- Wear Approved Protective Equipment
- 1.16.9 The transport vehicle must be properly equipped to deal with lead waste spills. Equipment shall include, but not limited to, respiratory protective equipment, disposable protective clothing, 6 mil polyethylene bags, shovel and broom and wetting agent.
- 1.16.10 The Contractor shall submit to the Consultant a copy of the shipping document and weight receipt for every shipment of lead waste.

## PART 2 - FACILITIES AND PRODUCTS

### 2.5 **Equipment**

- 2.5.1 Provide equipment that is suitable for intended use as specified by the proper regulations and standards. All equipment used on the project shall be clean and in good state of repair.
- 2.5.2 Airless Sprayer: Equipment used for the application of amended water for dust suppression purposes.
- 2.5.3 Electrical Components and Equipment: supplied by the Contractor for performance of work on this project shall meet the requirements of the Canadian Standards Association (CSA) for use as installed.
- 2.5.4 Electrical Power Cords: Use single length power cords. If single length will not reach work area, use waterproof connectors to connect separate lengths. Use heavy duty cords in high traffic areas or in areas where abrasion of cords is expected. Only grounded electrical cords will be allowed.
- 2.5.5 Ground Fault Panel: use an electrical panel that is installed by a licensed electrician and is equipped with the following:
- 2.5.5.1 Ground fault circuit interrupts (breaker type) of sufficient capacity to supply all lights and equipment to be used in the work area.
- 2.5.5.2 Breakers shall have 5mA ground fault protection.
- 2.5.5.3 Main switch disconnect, test buttons and reset switches and circuit breaker lights.
- 2.5.5.4 Proper enclosure to prevent the penetration of moisture, dust and debris.
- 2.5.6 Temporary Lighting: Provide illumination as required in all work areas to perform the work safely and adequately. Illumination can be achieved by the use incandescent or fluorescent lamps. All lamps shall be protected by grounded guard cages or tempered glass enclosures.
- 2.5.7 Fine Atomizing Spray Nozzle: an airless sprayer nozzle that is designed to deliver no less than 1 gallon per minute of fine spray of water.
- 2.5.8 Flexible Ducting: Tubing used for the exhaust of negative air units. The tubing is made up of plastic with metal reinforcement and is of a diameter that is equal to the exhaust port of a negative air unit.
- 2.5.9 Garden Sprayer: a metal or plastic pressure-can hand pump equipped with a hose and a metal wand. The pump is used to spray a fine mist of liquid on surfaces in a work area.
- 2.5.10 HEPA Filtered Negative Air Unit: A portable air handling system which is used to create negative air pressure differential by the extracting the air directly from the work area and discharging it to the exterior of the area. The unit shall be equipped as follows: Fan, HEPA filter, pre-filters, pressure differential gauge, cabinet, high/low switch, on/off switch.
- 2.5.10.1 The fan shall have a capacity of 1500 cubic feet per minute. The fan shall be considered to have 80% of the rated air flow unless tested and certified by a company specializing in such measurements and subject to the approval of the Consultant.
- 2.5.10.2 Each unit shall have a HEPA filter installed as a final filter in the unit. A tight seal shall be established between the filter and the filter housing through the use of a rubber gasket. Each filter shall be clearly marked with the serial number, direction of air flow, efficiency, air flow rating, name of manufacturer and resistance.
- 2.5.10.3 Each unit shall have an on/off switched located on the exterior of the cabinet. The unit shall also be equipped with overload protection and components such as cabinet, fan, motor, etc shall be grounded.
- 2.5.10.4 Each unit shall have a pressure differential gauge to monitor the filter loading and to indicate when the filters needs to be changed. The unit shall also have a time meter to indicate the total accumulated hours of operation.



- 2.5.10.5 Each unit shall have the following warning and safety devices: a means for preventing the unit from operating without a HEPA filter; auto shutoff system to stop the fan in case of HEPA filter failure such as rupture of the filter or blockage of air flow through the filter.
- 2.5.10.6 Provide units with pre and intermediate filters installed at the intake of the unit and secured in place with clamps or special filter housings. Two pre-filters are required: the first pre-filter shall be of the low efficiency type and shall be 98% efficient for particles 100 microns and larger; the second pre-filter shall be of the medium efficiency type and shall be 95% efficient for particles down to 5 microns.
- 2.5.10.7 The cabinet of the unit shall be constructed of durable material able to withstand rough handling during removal work. The cabinet shall have wheels and shall be designed to allow access to the inside of the unit from the intake side for maintenance and replacement of filters. The unit shall be factory sealed to prevent the escape of dust and debris during transport and use.
- 2.5.11 HEPA Vacuum: A vacuum unit equipped with a HEPA filter and designed so that all discharged air passes through the filter. The unit shall be equipped with all attachments, tools and fittings to facilitate the performance of the work.
- 2.5.12 Pressure Differential Monitoring Unit: An instrument designed to measure the difference in pressure between the interior and exterior of a work area. As a minimum, the instrument shall consist of the following: a continuous recording wheel chart or tape; a gauge with a range from 0 to 0.1 inches water; sensor tubing and wall clamps; wall mounting devices, low limit and high limit audible alarm; and auto reset.
- 2.5.13 Power Washer: A piece of equipment capable of delivering an airless stream of liquid (water) at a pressure between 1200 and 2500 psi. Typically used for cleaning of work area surfaces and equipment and for wetting materials scheduled for removal before work start to reduce the creation of dust.
- 2.5.14 Scaffolding: Select, erect and use scaffolding in a manner that is in compliance with all applicable occupational health and safety regulations.
- 2.5.14.1 Types of scaffolding allowed consist of suspension or standing types such as cantilever, metal tube and coupler, pole or outrigger or tubular welded frame.
- 2.5.14.2 Provide non-skid surfaces and/or foot boards on all scaffolds where foot traffic is anticipated.
- 2.5.14.3 Provide an abrasive non-slip surfaces on rungs of metal ladders.
- 2.5.15 Water Service Components and Equipment: supplied by the Contractor for performance of work on this project shall be temperature and pressure rated for operation of the temperature and pressure encountered.
- 2.5.15.1 Hot water heater to be used for supplying water to the shower shall be:
- 2.5.15.1.1 ULC rated electric hot water heater.
- 2.5.15.1.2 Appropriately sized for the project.
- 2.5.15.1.3 Powered from the ground fault panel.
- 2.5.15.1.4 Equipped with a relief valve that is piped to a drip pan secured to the water heater.
- 2.5.15.2 Supply water to each working area and decontamination unit using pipes having a pressure rating greater than the pressure of the water distribution system. Provide fittings as necessary to allow connecting to existing systems and other temporary facilities.
- 2.5.15.3 The shower provided for the decontamination facility shall be of the walk through type. The shower pan shall be a waterproof, one piece pan constructed from stainless or galvanized steel with welded seams, copper or lead with soldered seams or fibreglass reinforced with wood. The shower head shall be adjustable for spray size and intensity. The shower shall be supplied with separate hot and cold water. The control for water temperature, flow and shut off shall be located inside the shower.

2.5.15.4 Multi-stage cascade filter units shall be provided on drain lines from any water source carrying lead-contaminated water from the work area including the shower. The units shall be provided with a primary and a secondary disposal filter elements. The primary filter shall allow the passage of particles that are 20 microns and smaller. The secondary shall allow the passage of particles that are 5 microns and smaller. The units shall be connected so that the water passes the primary filter first and the discharge of the primary filter passes through the secondary filter.

## **2.6 Materials**

2.6.1 Materials destined for use on this project shall be undamaged, shall comply with the requirements of the contract and specifications and shall be unused at the time of installation unless otherwise indicated.

2.6.2 Lead Waste Container: An impermeable container that is dust-tight and impervious to lead waste. Shall be made of new material only and shall be labelled as required by applicable regulations with a pre-printed cautionary lead warning label. The container shall (depending on the nature of the waste material) be comprised of the following:

2.6.2.1 A 6 mil thick leak-tight polyethylene bag labelled as required and placed inside another 6 mil sealed polyethylene bag (in case the waste does not contain any sharp objects).

2.6.2.2 A 6 mil sealed polyethylene bag positioned inside or outside a heavy duty leak tight solid sealed container of sufficient strength to prevent perforation of the container during handling (in case the waste contains sharp objects).

2.6.3 Caulking: Acrylic polymer sealant that is non-staining.

2.6.4 Drop Sheets: Sheets made up of polyethylene of size and type appropriate to the work. To be placed under an area where work is being carried out.

2.6.5 Felts: 1/16" thick and 36" to 72" wide non-coated, standard cellulose building felt.

2.6.6 Rip-Proof (Fibre Re-enforced) Polyethylene Sheeting: 8 mil fibre re-enforced fabric (bonded on both sides with polyethylene sheeting) made up from 5 mil weave and 2 layers of 1.5 mil poly laminate. Provide new material only in maximum size sheets (to fit work) to minimize joints.

2.6.7 Fire Extinguisher: Provide type "ABC" dry chemical fire extinguishers of a combination of extinguishers suitable for the type of exposure in each case.

2.6.8 First Aid Supplies: Provide and maintain first aid supplies on the project site as required by applicable regulations and construction industry recommendations.

2.6.9 Flame Resistant Polyethylene Sheeting: a layer of polyethylene sheeting that conforms to the requirements of the NFPA Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films. Provide new material only in 6 mil thickness and in maximum size sheets (to fit work) to minimize joints.

2.6.10 Foam: Polyurethane expanding foam of low density.

2.6.11 Polyethylene Sheeting: A 6 mil minimum (unless otherwise specified) thickness polyethylene film in maximum sheet size to minimize seems and black, frosted or clear as required to meet specifications.

2.6.12 Protective Coveralls: Full body coveralls complete with hoods and shoe coverings, made up of a material which does not permit penetration of lead dust, fume or mist and is disposable.

2.6.13 Spray Cement: Specifically formulated spray adhesive in spray cans devised to stick to polyethylene sheets.

2.6.14 Tape: 2" to 3" widths reinforced tape (cloth or fibreglass reinforced) appropriate for sealing polyethylene sheets under dry and wet conditions.

2.6.15 Wetting Agent: A mixture of water and a surfactant used for wetting lead-containing materials before removal to minimize the release of fibres during disturbance of the material.

## **2.7 Platforms**

- 2.7.1 Work in certain areas of the project will require the use of platforms. Unless otherwise specified, work platforms for this project shall be erected as follows:
- 2.7.1.1 Set up a support structure of metal, wood or equivalent scaffolding above which the work platform will be positioned.
- 2.7.1.1.1 Place one layer of rip proof polyethylene sheeting over scaffold board.
- 2.7.1.1.2 Place one layer of plywood sheets over the rip proof poly and fasten in place using nails.
- 2.7.1.1.3 Ensure that the plywood is of sufficient thickness and is capable of supporting the weight of all personnel and equipment expected to be present on the platform. Comply with the requirements of applicable Occupational Health and Safety Acts and Regulations.
- 2.7.1.1.4 Prevent water leakage from the platform by taping and caulking the seams between the plywood sheets and by instating a minimum of two layers of rip proof poly over the plywood sheets.
- 2.7.1.1.5 Isolate the platform from the occupied areas through the use of plywood walls.
- 2.7.1.2 The bases of the support structure shall be adequately sized and rated to protect the floors. The Contractor shall be responsible for rectifying any damages caused by the support structure and the platform.
- 2.7.1.3 Ensure that the support structure is set up in a manner that will not interfere with activities that are regularly carried out in the space.
- 2.7.1.4 Ensure that the existing lighting levels are maintained under the platform by using temporary fluorescent light fixtures.
- 2.7.1.5 Install air tight and water tight escape hatches for every 500 square feet of platform. The hatches shall be designed to allow for quick egress from the work area in case of an emergency and shall be supplied with emergency lighting.

## **2.8 Decontamination Enclosure Systems**

- 2.8.1 Decontamination enclosure systems shall be constructed before any other work commences. The decontamination systems shall include one system for workers decontamination and another system for equipment and waste decontamination.
- 2.8.2 Enclosure System for Worker Decontamination: This enclosure system shall consist of a clean room, a shower room and an equipment and access room.
- 2.8.2.1 Clean Room: A clean room shall be constructed between the clean occupied areas and the shower room. The clean room shall have:
- 2.8.2.1.1 A storage space for clean personal protective equipment.
- 2.8.2.1.2 Hangers, hooks and secures lockers for workers use and for safe storage of personal belongings.
- 2.8.2.1.3 A mirror to aid workers in fittings respiratory equipment before entry into the contaminated areas.
- 2.8.2.1.4 Airlocks on the shower side and the clean occupied area side.
- 2.8.2.1.5 A lockable wood door on the occupied area side to prevent unauthorized entry into the work areas.
- 2.8.2.1.6 An area of 100 square feet (minimum) or shall be based on a criteria of 10 square feet per worker, whichever is greater.
- 2.8.2.2 Shower Room: A shower room shall be constructed between the clean room and the equipment and access room. The shower room shall have:
- 2.8.2.2.1 A shower unit of the walk through type for every 8 workers.
- 2.8.2.2.2 Airlocks on the clean room side and the equipment and access room side.
- 2.8.2.2.3 Clean towels, soap and shampoo supplied by the Contractor for use by the workers.

- 2.8.2.2.4 A constant supply of hot and cold running water with individual controls within the shower units to regulate water temperature and flow rate.
- 2.8.2.2.5 Individual hot and cold shut-off valves with access from the clean room of the decontamination enclosure.
- 2.8.2.2.6 Containers for disposing of used respirator filters and hooks for hanging respirators located on the clean side of the shower.
- 2.8.2.2.7 Watertight piping and sealed drip pans.
- 2.8.2.2.8 Sump pumps for removing shower waste water. Pump the waste water through the filter systems specified before discharging into sanitary sewer drains.
- 2.8.2.2.9 Power switches and outlets that are ground fault protected. Sump pumps power switches shall be located on both sides of the shower unit.
- 2.8.2.3 Equipment and Access Room: An equipment and access room shall be constructed between the shower room and the contaminated work areas. The equipment and access room shall have:
- 2.8.2.3.1 Airlocks on the shower side and the contaminated area side.
- 2.8.2.3.2 An area of not less than 100 square feet to allow one worker enough space to undress comfortably.
- 2.8.2.3.3 Facilities for storing personal protective equipment and clothing which will be used again inside the contaminated areas.
- 2.8.3 Enclosure System for Equipment and Waste Decontamination: This enclosure system shall consist of a transfer room, a holding room and a cleaning room.
- 2.8.3.1 Transfer Room: A transfer room shall be constructed between the clean occupied areas and the holding room. The room shall have a lockable wood door on the occupied area side to prevent unauthorized entry into the work areas. It shall have airlocks on the clean occupied area side and the holding room side. The size of the transfer room should be large enough to facilitate double bagging of waste bags or to house the largest piece of equipment used.
- 2.8.3.2 Holding Room: A holding room shall be constructed between the transfer room and cleaning room. The room shall have airlocks on the transfer room side and the cleaning room side. The size of the transfer room should be large enough to facilitate double bagging of waste bags or to house the largest piece of equipment used inside the lead work area(s).
- 2.8.3.3 Cleaning Room: A cleaning room shall be constructed between the holding room and the contaminated area. The room shall have airlocks on the holding room side and the contaminated area side. The size of the cleaning room should be large enough to facilitate washing and cleaning of waste bags, containers and equipment and for double bagging of waste bags.
- 2.8.3.4 This enclosure system shall not be used by workers exiting the contaminated area as a replacement for the workers decontamination enclosure system.
- 2.8.4 Construction of Decontamination Enclosure Systems: Enclosures shall be constructed using suitable framing to fit the area. Alternatively, existing rooms can be used subject to the approval of the Consultant.
- 2.8.4.1 Use 2"x4" studs at 16" o/c to the construct the walls and ceilings frames. The interior side of the frame shall be covered by one layer of rip proof polyethylene sheeting.
- 2.8.4.2 Cover the exterior side of the frame located inside the contaminated area with plywood sheets. All plywood sheets joints shall be sealed with duct tape. Cover the plywood sheets with two independently sealed layers of rip proof polyethylene sheeting. Cover the exterior side of the frame which are not located inside the contaminated area or in an occupied area with 1 layer of rip proof polyethylene sheets. The exterior side of the frame located in an occupied area shall be covered with painted drywall sheets installed over one layer of rip proof polyethylene sheeting.
- 2.8.4.3 The floor of the decontamination enclosure system shall be protected with two independently sealed layers of rip proof poly sheets. The poly sheets used on the floor shall overlap with the poly sheets installed on the walls.

2.8.4.4

Separate the various rooms of the decontamination enclosure systems by curtained doorways constructed using two flap doors which are of the same dimensions as the openings. The flaps shall be made up of two layers of rip proof polyethylene sheets. Fasten the two sheets together and reinforce all edges with duct tape. The top and one side of each flap shall be secured to the enclosure frame. Attach a weight to the bottom of each of the flaps. Mark the opening between the two flaps using pieces of duct tape configured in the shape of a directional arrow.

## PART 3 - EXECUTION

### 3.5 *Type 1 Removal Operations*

- 3.5.1 Initial Preparation and Isolation of Work Area(s): Unless otherwise specified, work carried out as part of this phase shall proceed as follows:
- 3.5.1.1 Carry out a survey of the work area(s) to compile an inventory of existing damages and provide a copy to the Consultant.
- 3.5.1.2 The Contractor is responsible for moving materials and objects which are present in the work area(s).
- 3.5.1.3 Prevent the spread of dust from the work area using measures appropriate to the work to be done.
- 3.5.1.3.1 Shut off, lock out and seal all ventilation duct vents with the application of one layer of 6 mil (0.15mm) thick clear polyethylene sheet sealed with tape.
- 3.5.1.3.2 Use FR polyethylene drop sheets over all flooring in work area(s) where dust, chips, or debris may be produced and where contamination cannot otherwise be thoroughly cleaned.
- 3.5.1.3.3 Separate parts of the building required to remain in use from the work area(s) by polyethylene drop sheets at the perimeter of the work area(s).
- 3.5.1.3.4 Separate the work area(s) with clearly visible warning signs advising of the hazards of lead dust and that entry is restricted to authorized trained personnel wearing personal protective equipment.
- 3.5.1.3.5 Erect scaffolding or platforms where necessary to perform the removal work. All platforms that exceed 25 feet in height will require the submission of a shop drawing stamped by a professional engineer for approval by the inspector within a minimum of 5 days prior to commencing the work. Guard rails shall be provided around all platforms or scaffolding where practicable. Cover the floor area of the scaffold or platform with one layer of FR polyethylene. Extend the floor of scaffolding or platform under an item being removed to act as a receptacle. Polyethylene sheeting shall be suitably braced and/or restrained so that billowing or failure of the polyethylene sheeting or taped joints does not occur.
- 3.5.2 Entry and Exit Procedures from Lead Removal Work Area(s): the following general procedures shall be adhered to when entering into and exiting from lead abatement work area(s):
- 3.5.2.1 Work Area(s) Entry Procedures:
- 3.5.2.1.1 Every worker and visitor planning to enter the work area should remove all street clothing and should store them in a designated clean change room.
- 3.5.2.1.2 The person shall then put on disposal coverall with head covering, respirators with clean filters and foot covering and shall proceed to the work area(s).
- 3.5.2.2 Work Area(s) Exit Procedures:
- 3.5.2.2.1 Each worker shall decontaminate their protective clothing, boots and respirator by first HEPA vacuuming and then by damp wiping using soap and water.
- 3.5.2.2.2 The removed disposable coveralls shall be disposed of as lead waste in a 0.15 mm (6 mil) labelled waste bag. Respirator filter inlets shall be sealed in tape or disposed of as lead waste.
- 3.5.3 Lead Removal Procedures
- 3.5.3.1 Lead removal shall not commence until:
- 3.5.3.1.1 The work area is effectively separated from clean areas of the building.
- 3.5.3.1.2 Warning signs are posted outside the removal work area(s).
- 3.5.3.1.3 All surfaces which are not possible to clean are sealed with polyethylene sheeting and tape.
- 3.5.3.1.4 Arrangements have been made for waste disposal, landfill site operator has been contacted and storage bin is on site.



- 3.5.3.1.5 Tools equipment and materials are on hand and in the work area(s).
- 3.5.3.1.6 Facilities for the washing of hands and face are available for workers leaving the work area(s).
- 3.5.3.2 Before beginning work remove visible dust from surfaces in the work area where dust is likely to be disturbed during the course of the work. Use HEPA vacuums, or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate. Do not use compressed air or dry sweeping to clean up or remove dust from any surface.
- 3.5.3.3 Wet materials containing lead to be cut, ground, abraded, drilled, or otherwise disturbed with amended water. Use garden type low velocity fine mist sprayer. Perform work in a manner to reduce dust creation to lowest levels practicable. Spray lead material repeatedly during the work process to minimize airborne lead dust.
- 3.5.4 Final Clean
- 3.5.4.1 When removal is complete, clean the entire work area by HEPA vacuuming and wet wiping.
- 3.5.4.2 The work area(s) shall be deemed clean by the Inspector when there is no visible residue, dust, dirt, film, stain, or discolouration resulting from either lead removal or cleaning activities.
- 3.5.4.3 After completion of the initial cleaning and after the Inspector has passed the visual inspection, spray sealant on all surfaces in the work area(s), including, but not limited to:
- 3.5.4.3.1 where lead material has been removed.
- 3.5.4.3.2 polyethylene sheeting used on walls, floors and ceilings.
- 3.5.4.4 Sealant should be sprayed using a garden reservoir type low velocity fine mist sprayer. The sprayer cannot be used if the nozzle is partially obstructed, or if a uniform fine mist spray cannot be obtained.
- 3.5.4.5 After the work area(s) is declared clean and written approval to proceed has been received from the Inspector:
- 3.5.4.5.1 Dismantle boundaries and isolating barriers as lead waste. Drop sheets shall be wetted and folded to contain dust and then placed in waste bags.
- 3.5.4.5.2 Immediately before their removal from the work area(s), and disposal, clean each filled labelled waste bag using damp cloths or HEPA vacuum and place in second clean clear polyethylene waste bag.
- 3.5.4.5.3 Dispose of waste as per procedures specified in subsection 1.16 Waste Transport and Disposal.
- 3.5.4.6 Repair or replace objects damaged in the course of the work. Re-establish objects moved to temporary locations in the course of the work, in their proper positions. Re-secure mounted objects removed in the course of the work in their former positions.
- 3.6 *Type 2a and 2b Removal Operations***
- 3.6.1 Initial Preparation and Isolation of Work Area(s): Unless otherwise specified, work carried out as part of this phase shall proceed as follows:
- 3.6.1.1 Carry out a survey of the work area(s) to compile an inventory of existing damages and provide a copy to the Consultant.
- 3.6.1.2 The Contractor is responsible for moving materials which are present in the work area(s).
- 3.6.1.3 Prevent the spread of dust from the work area(s) using measures appropriate to the work to be done.
- 3.6.1.3.1 Shut off, lock out and seal all ventilation duct vents with the application of one layer of 6 mil (0.15 mm) thick clear polyethylene sheet sealed with tape.
- 3.6.1.3.2 Clean all moveable objects within proposed work area using a HEPA vacuum.

- 3.6.1.3.3 Clean fixed casework and equipment within proposed work area, using a HEPA vacuum and cover with polyethylene sheeting sealed with tape.
- 3.6.1.3.4 Clean proposed work areas using, where practicable, HEPA vacuum cleaning equipment. Do not use methods that raise dust, such as dry sweeping, or vacuuming using other than HEPA filter-equipped vacuums.
- 3.6.1.3.5 Cover and seal airtight light fixtures, duct openings and other suspended ceiling objects using clear 6 mil polyethylene sheeting and tape.
- 3.6.1.3.6 Erect scaffolding or platforms necessary to perform the removal work. All platforms that exceed 25 feet in height will require the submission of a shop drawing stamped by a professional engineer for approval by the inspector within a minimum of 5 days prior to commencing the work. Guard rails shall be provided around all platforms or scaffolding where practicable.
- 3.6.1.3.6.1 Cover floor area of scaffold or platform with one layer of FR polyethylene.
- 3.6.1.3.6.2 Extend scaffolding or platform under the item being removed to prevent material from falling.
- 3.6.1.3.7 Separate parts of the building required to remain in use from the work area by polyethylene drop sheets at the perimeter of the work area.
- 3.6.1.3.8 Set up an airtight enclosure around the work area where the work on lead-containing material is to be carried out. Enclosure should be set up using 1 layer of FR polyethylene sheeting to cover the floors, and 1 layer of 6 mil (0.15 mm) thick clear polyethylene sheeting to cover the walls. Two layers of FR polyethylene sheeting should be used to cover carpeted floors. Polyethylene on the walls should be made to overlap with the polyethylene on the floor a minimum of 300 mm.
- 3.6.1.3.9 Polyethylene sheeting shall be suitably braced and/or restrained so that excessive billowing or failure of the polyethylene sheeting or taped joints does not occur as a result of the negative pressure differential created by the vacuums.
- 3.6.1.3.10 Erect a temporary structure made of wooden studs to support polyethylene sheeting where necessary.
- 3.6.1.3.11 Insert a hose of a HEPA filter equipped vacuum into the enclosure to provide negative air pressure inside the enclosure.
- 3.6.1.3.12 Entrance to the enclosure should be covered with two pieces of overlapping polyethylene sheeting.
- 3.6.1.3.13 The Contractor shall separate the work area(s) and place warning signs at all access points leading to the contained work area. The signs shall be posted at the curtained door ways and shall read:

CAUTION  
LEAD DUST, FUME, or MIST HAZARD AREA  
NO UNAUTHORIZED ENTRY  
WEAR ASSIGNED PROTECTIVE EQUIPMENT  
BREATHING LEAD DUST MAY CAUSE SERIOUS BODILY HARM

- 3.6.2 Entry and Exit Procedures from Lead Removal Work Area(s): the following general procedures shall be adhered to when entering into and exiting from lead abatement work area(s):
  - 3.6.2.1 Work Area(s) Entry Procedures:
    - 3.6.2.1.1 Every worker and visitor planning to enter the work area(s) should remove all street clothing and should store them in a designated clean change room.
    - 3.6.2.1.2 The person shall then put on disposable coveralls with head covering, respirators with clean filters and foot covering and shall proceed to the work area through the flaps covering the entrance to the enclosure.
  - 3.6.2.2 Work Area(s) Exit Procedures:
    - 3.6.2.2.1 Each worker shall decontaminate their protective clothing, boots and respirator by first HEPA vacuuming and then by damp wiping using soap and water.

- 3.6.2.2.2 The removed disposable coveralls shall be disposed of as lead waste in a 0.15 mm (6 mil) labelled waste bag. Respirator filter inlets shall be sealed in tape or disposed of as lead waste.
- 3.6.3 Lead Removal Procedures
- 3.6.3.1 Lead removal shall not commence until:
- 3.6.3.1.1 The work area(s) is effectively separated from clean areas of the building.
- 3.6.3.1.2 Warning signs are posted outside the removal work area(s).
- 3.6.3.1.3 All surfaces which are not possible to clean are sealed with polyethylene sheeting and tape.
- 3.6.3.1.4 Arrangements have been made for waste disposal, landfill site operator has been contacted and storage bin is on site.
- 3.6.3.1.5 Tools, equipment and materials are on hand and in the work area(s).
- 3.6.3.1.6 Facilities for the washing of hands and face are available for workers leaving the work area(s).
- 3.6.3.2 Before beginning the work, remove visible dust from the surfaces in the work area(s). Use HEPA vacuums, or damp cloths where damp cleaning is considered more appropriate. Do not use compressed air or dry sweeping to clean up or remove dust from any surface.
- 3.6.3.3 Wet materials containing lead to be removed, disturbed, or sealed with amended water. Garden reservoir type low velocity fine mist sprayer may be used. Perform work in a manner to reduce dust creation to lowest levels practicable. Spray lead material repeatedly during the work process to minimize airborne lead dust.
- 3.6.3.4 Removed material has to be placed directly in waste bags. Wherever possible, lead-containing material should be removed in sections as intact as possible.
- 3.6.3.5 Areas that used to be covered with the lead-containing material should be cleaned after the material is removed, using brushes, steel wool, or any other tools suitable.
- 3.6.3.6 Frequently during the work and immediately after completion of the work, clean up dust and waste containing lead using a HEPA vacuum or by damp wiping.
- 3.6.3.7 All labelled waste bags should be placed in clean clear 6 mil poly bags before they are taken out of the enclosure.
- 3.6.4 Final Clean
- 3.6.4.1 When removal is complete, clean the entire work area by HEPA vacuuming and wet wiping.
- 3.6.4.2 All tools and equipment used in the removal process such as knives, extension cords, scrapers, wire brushes, garden sprayers etc., should be washed and cleaned and placed in 6 mil polyethylene bags.
- 3.6.4.3 The work area(s) shall be deemed clean by the Inspector when there is no visible residue, dust, dirt, film, stain, or discolouration resulting from either lead removal or cleaning activities.
- 3.6.4.4 The enclosure should be left standing until wipe sample(s) are taken inside the enclosure, and the lead concentration level is below 40  $\mu\text{g}/\text{ft}^2$  for floors and/or 250  $\mu\text{g}/\text{ft}^2$  for window sills, and/or 400  $\mu\text{g}/\text{ft}^2$  for window sills.
- 3.6.4.5 After the area(s) is declared clean and written approval to proceed has been received from the Inspector:
- 3.6.4.5.1 Dismantle boundaries and isolating barriers and treat as lead waste. Drop sheets shall be wetted and folded to contain dust and then placed in waste bags.
- 3.6.4.5.2 Immediately before their removal from the work area(s), and disposal, clean each filled labelled waste bag using damp cloths or HEPA vacuum and place in second clean clear polyethylene waste bag.
- 3.6.4.5.3 Dispose of waste as per procedures specified in subsection 1.16 Waste Transport and Disposal.

3.6.4.6 Repair or replace objects damaged in the course of the work. Re-establish objects moved to temporary locations in the course of the work, in their proper positions. Re-secure mounted objects removed in the course of the work in their former positions.

### **3.7 Type 3a and 3b Removal Operations**

3.7.1 Initial Preparation and Isolation of Work Area(s): Unless otherwise specified, work carried out as part of this phase shall proceed as follows:

3.7.1.1 Carry out a survey of the work area(s) to compile an inventory of existing damages and provide a copy to the Consultant.

3.7.1.2 The Contractor is responsible for moving materials and objects which are present in the work area(s).

3.7.1.3 Separate the lead removal work area(s) from other areas in the building required to remain in use by erecting floor to ceiling rip-proof polyethylene sheeting supported on wood framing.

3.7.1.4 All surfaces, equipment and objects located in the work areas and not scheduled for removal shall be pre-cleaned by HEPA vacuuming or wet wiping and shall be protected by one layer of rip proof poly sheeting unless otherwise specified. Dry sweeping or vacuuming with units not equipped with HEPA filters shall not be allowed.

3.7.1.5 All equipment, objects and articles scheduled for removal shall be taken out of the work area(s) only if its removal will not disturb any lead-containing materials.

3.7.1.6 Ensure that smoke detectors, fire alarms, heat detectors and other life safety equipment remain active and operating as installed.

3.7.1.7 All specified clean demolition work can be carried out before the Type 3 enclosure is set up on condition that the demolition work does not disturb any lead-containing materials.

3.7.1.8 Construct the decontamination enclosure systems for workers and for equipment and materials as specified.

3.7.1.9 Independently seal off all openings leading to the work area(s) using polyethylene sheeting and duct tape. Such openings include, but are not limited to, windows, doorways, corridors, skylights, diffusers, grills and air ducts. Also seal all floor openings independently before covering the entire floor with polyethylene sheeting. Ensure that the individual seals are air tight and water tight.

3.7.1.10 Cover floors with two independently sealed layers of polyethylene sheeting and seal with duct tape. The first layer immediately above the floor shall be 6 mil poly. The other layer shall be rip proof poly. Poly on the floor shall extend a minimum of 30 cm up all vertical surfaces located in the work area.

3.7.1.11 Cover walls with two independently sealed layers of 6 mil clear polyethylene sheeting. Overlap floor poly with wall poly by a minimum of 30 cm at each layer. The layers of wall poly shall always overlap the layers of the floor poly.

3.7.1.12 Ensure that adjoining sheets of poly used on walls and floors overlap by at least 30 cm.

3.7.1.13 Ensure that poly sheets are properly supported to avoid excessive billowing and failure of the enclosure as a result of applying negative pressure differential. Brace the poly in case of excessive billowing using 1"x2" straps or any other measures and means as required.

3.7.1.14 Use flame resistant polyethylene sheeting near heat sources.

3.7.1.15 Create negative pressure in the work area using HEPA-filtered negative air unit distributed evenly (horizontally and vertically) within the work area. Supply any necessary platforms as required to elevate the negative air unit.

3.7.1.16 Provide enough negative air units to be able to exchange the air volume of the work area at least once every 20 minutes (three air changes per hour) and to maintain a minimum of 0.03" water gauge differential.

- 3.7.1.17 The pressure differential shall be continuously monitored using an automatic recorder as specified. Place the monitor outside the contaminated work area. A backup negative air unit shall be set up and ready for operation in case one of the original units fail.
- 3.7.1.18 Operate the negative air units from the start of the preparation and isolation phase until completion of the final clean up work and air testing.
- 3.7.1.19 Ensure that the necessary make up air is supplied to the work area through flaps installed in the perimeter seal.
- 3.7.1.20 Replace pre-filters and HEPA filters as necessary to maintain the proper flow rate and to ensure that the unit continues to function properly.
- 3.7.1.21 Contaminated air from the work area shall be exhausted directly to the outside through sealed ducts. Where necessary, remove existing windows and replace with a plywood panel. Secure the panel in place and make weather tight using caulking. Install appropriately sized openings for exhaust (typically 12"). Replace windows upon completion of work.
- 3.7.1.22 All negative air units which are set up to discharge inside the building shall be leak tested in place using the DOP method.
- 3.7.1.23 The Contractor is allowed to connect to the owner's existing water supply for use in the lead work areas and in the temporary shower and decontamination facilities. The Contractor shall be responsible for making all the connections using vacuum breakers and other backflow preventers.
- 3.7.1.24 The Contractor shall use copper pipes and fittings and high pressure hoses when making connections to the main water supply. The Contractor shall also install a main shut-off valve on the clean side of the decontamination enclosure. All connections shall be made down stream from the main shut-off valve. Ensure that the pressure in the temporary water distribution system is relieved if the system is to be left unattended. Ensure that no leaks are present around hose pipe connections. Minimize the possibility of water damage through spills or leaks by providing drip pans of suitable size and by ensuring that the drip pans are drained regularly.
- 3.7.1.25 Ensure that all water from the drainage facilities installed on the shower and other decontamination enclosures is passed through filtration systems as specified.
- 3.7.1.26 Test all temporary piping installed during this project and ensure that they are watertight. All temporary pipe installation shall remain water tight for the duration of the project. Pipes shall be installed parallel to walls and shall be temporarily secured to existing structures. Ensure that all piping is removed upon completion of work. Avoid damaging or altering the owner's existing water equipment and piping.
- 3.7.1.27 All electrical work shall be performed by a licensed electrician in compliance with all applicable regulations. Isolate, disconnect and lockout all power supplying or passing through the work area. Ensure that power supply to the remaining areas of the building is not disrupted during work in lead contaminated areas.
- 3.7.1.28 Unless specified, the use of the existing power and lighting circuits shall not be allowed. Use temporary electrical panels to provide power and lighting to the decontamination facilities and the work area. One electrical panel shall be provided for every 5000 square feet of contained lead work areas. Electrical panels shall be equipped and sized to handle all electrical equipment required for the completion of the project. The Contractor shall also be required to provide other additional electrical equipment such as temporary lighting, circuit breakers, panels, transformers and switch gears.
- 3.7.1.29 The Contractor shall be responsible for establishing and maintaining fire and emergency exits from the work area that are acceptable to the Provincial Fire Marshall and other authorities having jurisdiction. The emergency exits shall be sealed in a manner that will not hinder the use of the doors during an evacuation and shall be clearly marked by using proper exit signs.
- 3.7.1.30 Battery powered emergency lighting shall be installed by the Contractor to provide general lighting throughout the work area(s) in case of loss of power supply to the ground fault panel and to ensure that the emergency exits and the exit routes remain lit during the power failure.



- 3.7.1.31 Ensure that fire extinguishers are installed throughout the lead work area(s) at each of the emergency exits and on both sides of the decontamination facilities. All fire extinguishers installed inside the work area(s) shall be protected by clear polyethylene sheets and shall be easily accessible in case of an emergency.
- 3.7.1.32 The Contractor shall place warning signs at all access points leading to the contained work area(s). The signs shall be posted at the curtained door ways and shall read:
- CAUTION  
LEAD DUST, FUME, or MIST HAZARD AREA  
NO UNAUTHORIZED ENTRY  
WEAR ASSIGNED PROTECTIVE EQUIPMENT  
BREATHING LEAD DUST MAY CAUSE SERIOUS BODILY HARM
- 3.7.1.33 Once the initial clean preparation and isolation of the work area(s) is completed, the Contractor shall request an inspection from the Consultant before proceeding to next phase. Notify the Consultant 24 hours before the inspection is needed.
- 3.7.1.34 Once authorization is obtained from the Consultant, proceed to setting up critical seals that become accessible once removal operations commence.
- 3.7.1.35 Shut off and lock out the HVAC system serving the subject work area. Ensure that all work requiring the complete shut down of the HVAC system is carried out during the time when the building is not occupied.
- 3.7.1.36 Unless otherwise specified, all electrical systems scheduled to remain inside the work area(s) during lead removal activities shall be sealed using duct tape and poly sheets. Examples of such systems include speakers, wiring, smoke and heat detectors, alarm equipment, communication systems, PA systems, junction boxes, etc.
- 3.7.1.37 Once all the preparation work is complete, the Contractor shall ensure that the work area(s) is maintained neat and organized. All the enclosures shall be inspected by the supervisor before and after the completion of each work shift to ensure that the hoarding walls, polyethylene barriers and enclosures are intact. Any damaged discovered during the inspection shall be repaired immediately. Maintain an inspection log book on site to document when (date and time) the inspection was carried out and by who (name and signature of the person). Summarize any problems encountered during the inspection.
- 3.7.1.38 Ensure that the negative air units and the associated ducting and exhaust openings are regularly inspected during the work shift. The pressure differential monitoring unit shall be also inspected regularly during the work shift to ensure that the specified negative pressure inside the work area(s) is maintained.
- 3.7.2 Entry and Exit Procedures from Lead Removal Work Area(s): the following general procedures shall be adhered to when entering into and exiting from lead abatement work area(s):
- 3.7.2.1 Work Area(s) Entry Procedures:
- 3.7.2.1.1 Every worker and visitor planning to enter the work area(s) shall remove all street clothing including undergarments and shall store them in the clean change room.
- 3.7.2.1.2 All uncontaminated articles such as clothing, footwear, towels, personal effects, etc. shall be store in the clean room of the decontamination facility.
- 3.7.2.1.3 The person shall then put on disposal coverall with head covering, respirators with clean filters and foot covering and shall proceed to the work areas through the shower and then the equipment and access room.
- 3.7.2.2 Work Area(s) Exit Procedures:
- 3.7.2.2.1 Using HEPA vacuuming or wet wiping, remove all gross contamination from personal protective equipment (disposable coveralls, boots, hard hats, safety glasses, exterior of respirator, etc.) in the work area(s) and then proceed to the equipment and access room.



- 3.7.2.2.2 In the equipment and access room, remove all protective clothing except the respirator and proceed to the shower. All disposal contaminated clothing shall be placed in lead disposal bags. Reusable items shall be stored neatly in the equipment and access room for use during the next shift.
- 3.7.2.2.3 Proceed naked to the shower while still wearing the respirator. While showering, clean the outside of the respirator with soap and water. Seal the openings in the filter as per the manufacturer's instruction or using duct tape. Alternatively, the filters can be disposed of as lead waste. Continue showering by thoroughly wetting and washing the body and the head. Wet and clean the inside of the respirator. Filters shall not be allowed in the clean room if not properly sealed.
- 3.7.2.2.4 Upon completion of showering and drying off, proceed to the clean room and dress in street clothing.
- 3.7.3 Lead Removal Procedures
- 3.7.3.1 Lead removal work shall not commence until the following requirements have been met:
- 3.7.3.2 The work area(s) have been and contained as specified, decontamination enclosure systems have been set up and occupied areas of the building have been properly isolated.
- 3.7.3.2.1 All required notifications have been made.
- 3.7.3.2.2 Warnings signs have been displayed at all potential access points into the work area(s).
- 3.7.3.2.3 All arrangements have been made with the waste disposal facility.
- 3.7.3.2.4 All equipment, materials and tools needed inside the work area(s) are available and in working condition.
- 3.7.3.2.5 Appropriate negative pressure differential have been established inside the work area(s) with proper allowance for make up air.
- 3.7.3.2.6 All building security arrangements have been made.
- 3.7.3.2.7 Written authorization has been obtained from the Consultant to commence lead removal work.
- 3.7.3.3 Using an airless sprayer, spray the lead-containing material with water mixed with a wetting agent. Apply enough amended water to ensure that the material is wet.
- 3.7.3.4 Remove the wet lead-containing materials in layers and/or small sections. Spray the material regularly throughout the removal work to maintain saturation and to minimize the generation and dispersion of dust. Ensure that the wet material does not dry out.
- 3.7.3.5 Ensure that the removed material and other waste generated during the removal process is collected and bagged immediately. Place the material in 6 mil bags bags. Ensure that the waste water is also collected regularly. Avoid pooling of water. Dispose of the waste water in labelled 6 mil polyethylene bags (or other suitable rigid containers) or pump it straight into the sanitary sewer after passing it through proper filters. Refer to Section 3.3.4 for specific procedures for handling of materials and waste.
- 3.7.3.6 Mist the air during the removal process using an airless sprayer capable of producing a fine mist and amended water to keep the airborne dust levels as low as possible. Monitor the air inside and outside of the work area during removal.
- 3.7.3.7 Remove deck mounted objects and other obstructions as necessary to facilitate the removal of the lead-containing materials. Ensure that the removal work includes all lead-contaminated materials specified for removal.
- 3.7.4 Final Clean
- 3.7.4.1 After completion of gross lead removal work, perform a more thorough cleaning of all surfaces that used to be covered by lead to remove all visible residue and dust-containing materials. Cleaning shall be carried out using wire brushing, wet sponging, wet sweeping and/or wet shovelling and HEPA vacuuming. Ensure that the surfaces remain wet during the performance of this work.

- 3.7.4.2 All tools and equipment used in the removal process such as hook knives, extension cords, scrapers, wire brushes, garden sprayers etc, should be washed and cleaned and placed in 6 mil polyethylene bags.
- 3.7.4.3 Notify the Consultant in cases where leads-containing materials is encountered which cannot be properly removed without demolishing building structural members or removing major service elements. The Consultant will advise the Contractor in writing regarding the next course of action.
- 3.7.4.4 Continue with the wet thorough cleaning activities and include other surfaces in the work area(s) including, but not limited to, decontamination facilities, polyethylene sheeting, walls and floor surfaces, equipment, containers, piping, ducts, conduits and poly surfaces used in the equipment and access room and the equipment decontamination facilities. Pre-filters used on the negative air units shall be removed and shall be disposed of as lead waste.
- 3.7.4.5 The work area(s) shall be deemed clean by the Consultant when there is no visible residue, dust, dirt, film, stain, or discolouration resulting from either lead removal or cleaning activities.
- 3.7.4.6 The work area(s) shall be considered acceptable for public occupancy only if the lead concentrations inside the work area are below  $40 \mu\text{g}/\text{ft}^2$  for floors and/or  $250 \mu\text{g}/\text{ft}^2$  for window sills, and/or  $400 \mu\text{g}/\text{ft}^2$  for window sills. Levels above the clearance standards requires that the entire area be re-cleaned and another coat of lock-down agent be applied by the Contractor on all surfaces in the work area. Re-sampling will be carried out and the entire process shall be repeated until the dust levels are below the clearance standards.
- 3.7.4.7 The Contractor shall be responsible for all charges associated with re-cleaning work and other associated requirements as specified.
- 3.7.5 Procedures for Work Area Teardown and Dismantling
- 3.7.5.1 Proceed with the teardown of the work area(s) only after obtaining written authorization from the Consultant. Ensure that Type 3 procedures remain in effect during this phase of work. The worker and equipment and material decontamination units shall remain fully operational. The negative air units shall continue to operate throughout the duration of the teardown work.
- 3.7.5.2 Start by removing polyethylene sheeting by carefully folding it away from the walls to the centre of the work area making sure that any loose debris is trapped within the poly. Also remove all enclosures, duct tape, caulking, polyurethane foam and other materials used in setting up the enclosure. Polyethylene and other materials used in setting up enclosures shall be disposed of as lead-contaminated waste.
- 3.7.5.3 Clean all vacuum units, fittings, hoses and other small tools used during the removal work inside the work area(s), seal in 6 mil poly bags and remove from the work area through the equipment and materials decontamination unit. Wash down and clean other equipment used during the work and remove from the work area(s).
- 3.7.5.4 Clean up the lead work area including all surfaces and all decontamination enclosures. Remove negative air units pre-filters and dispose of as lead waste. Seal the exterior of the unit on all sides with poly and remove from the work area(s).
- 3.7.5.5 Remove all waste bags containing polyethylene sheets and other materials used to set up the enclosures and dispose of as specified.
- 3.7.5.6 Remove all hoarding walls separating the work area(s) from occupied areas except in locations where the walls are set up adjacent to other areas that still contain lead. Obtain approval of Consultant before dismantling hoarding walls.
- 3.7.5.7 Dismantle the remainder of the enclosure including scaffolding, platforms, decontamination facilities, tunnels, etc. Final clean the work area using HEPA vacuuming and wet wiping. Clean and remove all ground fault panels and temporary lighting.

- 3.7.6            Procedures for Re-Establishment of Objects and Systems
- 3.7.6.1        Re-establish mechanical and HVAC systems and install new clean air filters where previously removed. Re-establish all electrical system and return to as found condition unless otherwise specified.
- 3.7.6.2        Repair, replace and make good on all damages not identified during the per-removal survey.
- 3.7.6.3        Unless otherwise specified, all items and objects removed during the initial preparation phase of the work shall be returned to their original position and shall be properly mounted and secured.

**END OF SECTION**