

PART 1 GENERAL

1.1 General and Related Work

- .1 Read this Section in conjunction with all drawings and all other Sections so as to comply with the requirements of Division 1 and the General Conditions of the Contract.
- .2 Requirements specified elsewhere:
 - .1 Section 02 81 00 Hazardous Materials – General Provisions

1.2 Outline of Work

- .1 Refer to the attached drawing for the extent of the Abatement Work Areas.
- .2 Install Hoarding Walls between Abatement Work Area boundaries as shown on drawing.
 - .1 Install Type B Hoarding Walls between the Abatement Work Area and unoccupied areas.
- .3 Using Type 3 procedures of this section, remove and dispose of the following:
 - .1 Plaster wall and ceiling finishes throughout the Basement scheduled for removal or alteration for HVAC (see attached drawing).

1.3 Personal Protection

- .1 Protect all personnel at all times when possibility of disturbance of ACM exists.
- .2 Provide the following respiratory protection to all personnel:
 - .1 Full Face Air Purifying Respirators with P100 high efficiency (HEPA) cartridge filters during projects when performing wet abatement of sprayed applied surfacing materials containing chrysotile asbestos, or wet abatement of other non-surfacing asbestos-containing material specified in this section.
 - .2 Non-powered half-face respirators with P100 high efficiency (HEPA) cartridge filters for dismantling of Type 3 enclosures, using Type 2 Procedures.
- .3 Provide protective clothing, to all personnel entering the Abatement Work Area.
- .4 Wear hard hats, safety shoes and other personal protective equipment required by applicable construction safety regulations.

1.4 Differential Pressure Monitoring

- .1 Install differential pressure monitor at a location chosen by the Abatement Consultant.
- .2 Co-operate with the Abatement Consultant in collection of pressure monitoring data.
- .3 Maintain specified differential pressure at monitoring location. Negative air pressure is to be -0.02 inches of water, relative to the area outside the enclosed area.

1.5 Inspections

- .1 Refer to Part 1.12 Inspections in Section 02 81 00 – General Provisions.
- .2 The following Milestone Inspections are to be scheduled:
 - .1 Milestone Inspection - Clean Site Preparation
 - .2 Milestone Inspection - Contaminated Perimeter Preparation
 - .3 Milestone Inspection – Bulk Removal Inspection

- .4 Milestone Inspection - Visual Clearance
- .5 Milestone Inspection – Clearance Sampling

PART 2 PRODUCTS AND FACILITIES

2.1 Materials and Equipment

- .1 Refer to Section 02 81 00.

2.2 Hoarding Walls

- .1 Type B Hoarding Wall: 38 mm x 89 mm wood or metal studs at 400 mm o/c with continuous sill and top plate, covered with one layer of rip-proof polyethylene sheeting on each side of wall.

2.3 Decontamination Facilities

- .1 Workers' Decontamination Facility: A decontamination facility comprised of three linked rooms, Contaminated Change Room, a Shower Room, and a Clean Change Room.
 - .1 Rooms, Occupied Areas and Abatement Work Areas, shall be separated by curtained doorways at each door.
 - .2 Contaminated Change Room: Room between Shower Room and Abatement Work Area.
 - .1 Locate on contaminated side of Shower Room.
 - .2 Install asbestos waste container for asbestos contaminated protective clothing.
 - .3 Install storage facilities for any personal protective equipment to be reused in Abatement Work Area including boots, hard hats, etc., but excluding respirators.
 - .4 Install hooks and shelves as required for personal protective equipment.
 - .5 Minimum size of generally 2 m x 2 m. Increase size accordingly to accommodate number of workers.
 - .3 Shower Room: Room between Clean Change Room and Contaminated Change Room.
 - .1 Install one walk through shower unit for every six workers.
 - .2 Install constant supply of hot and cold water, controllable at each shower. Water supply must be sufficient to provide water at a minimum temperature of 40 degrees Celsius (maximum 50 degrees) in a volume required for all workers to properly decontaminate.
 - .1 Install individual hot and cold shut-off valves on water supply located on clean side of Shower Room. Connect shower to these valves.
 - .2 Install individual controls inside the shower to regulate water flow and temperature.
 - .3 Install rigid piping or Shower Hose with watertight connections for supply and drains.
 - .4 Install a sealed drip pan under and around the showers, 150 mm deep.
 - .5 Install sump pumps, sufficient for volume of waste shower water from showers and drip pan. Direct waste shower water to sanitary drains.
 - .6 Install ground fault protected power switch on clean side of shower for sump pumps, or timed for shut off.
 - .7 Provide adequate quantity of soap, shampoo, clean towels
 - .8 Install an Asbestos Waste Container for disposal of used respirator filters, on the contaminated side of the Shower Room.

- .4 **Clean Change Room:** A room between the Shower Room and Occupied Areas.
 - .1 Install hooks and shelves on clean side of shower in clean Change Room for storage of respirators.
 - .2 Install lockers or hangers for workers' street clothes and personal belongings.
 - .3 Install hose bib on domestic cold water pipe for connection on clean side of Abatement Work Area.
 - .4 Provide ground fault protected power supply to hot water tanks, sump pump, battery chargers.
 - .5 Install a fire extinguisher, mount to wall.
 - .6 Minimum size of generally 2m x 2m. Increase size accordingly to accommodate number of workers.
- .5 **Waste and Equipment Decontamination Facility:** Waste and Equipment Decontamination Facility comprised of three linked rooms: a Container Cleaning Room, a Holding Room and a Transfer Room.
 - .1 Purpose of Waste and Equipment Decontamination Facility is to provide a means to decontaminate asbestos waste containers, scaffolding, vacuums, and other tools and equipment and materials required in the Abatement Work Area.
 - .2 Rooms, Occupied Areas and Abatement Work Areas, shall be separated by curtained doorways at each door.
- .6 **Container Cleaning Room:** Room between Abatement Work Area and Holding Room of sufficient size to allow proper washing of equipment and waste containers or double bagging of asbestos waste. All wash water shall be treated as asbestos contaminated waste.
- .7 **Holding Room:** Room between Container Cleaning Room and Transfer Room, of sufficient size to accommodate at least two asbestos waste containers and two workers double bagging waste, or for largest item of equipment used.
 - .1 Install a fire extinguisher mounted to wall.
- .8 **Transfer Room:** Room between Holding Room and Occupied Area, acting as an air lock for the transfer of waste.
- .9 **Construction of Decontamination Facilities**
 - .1 Install floor protection as follows:
 - .1 Install one layer of rip-proof polyethylene sheeting over two layers of 6 mil polyethylene sheeting beneath entire decontamination facility.
 - .2 Turn 600 mm of polyethylene up the sides of the decontamination facility and overlap with the polyethylene sheeting covering the walls.
 - .3 Install plywood with taped and caulked joints between layers of 6 mil polyethylene where required to protect surfaces from water damage (e.g. carpet).
 - .2 Install walls as follows:
 - .1 Around all rooms, between all rooms, at entrance to Abatement Work Area and at entrance to Occupied Area.
 - .2 Install 38 x 89 mm wood framing at 610 mm o/c with continuous top and sill plates.

- .3 Install one layer rip-proof polyethylene sheeting on interior walls of Decontamination Facility.
- .4 Install one layer rip-proof polyethylene sheeting both sides on interior dividing walls of Decontamination Facility.
- .5 Install one layer rip-proof polyethylene sheeting over one layer of 6 mil polyethylene sheeting on walls exposed to the Abatement Work Area.
- .6 Install one layer rip-proof polyethylene sheeting over one layer of 6 mil polyethylene sheeting on walls exposed to the Occupied Area.
- .3 Install roof as follows:
 - .1 Install joists. Size of joists is to be determined by clear span. For clear spans up to 2850 mm use SPF Select 38 x 140 mm wood joist at 400 mm o/c with continuous 38 x 140 mm wood headers, and install strapping beneath joists.
 - .2 Where roof is not exposed to the Abatement Work Area, install one layer rip-proof polyethylene sheeting over joists.
 - .3 Turn 600 mm of polyethylene down the sides over polyethylene on the perimeter walls.
 - .4 At underside of joists in all rooms, install one layer of polyethylene sheeting.
 - .5 Minimum interior clear height 2000 mm to underside of joist.
- .10 Curtained Doorways
 - .1 Construct as follows:
 - .1 Install two flap doors, full width and height of door opening at all doors between chambers, facilities and Abatement Work Area.
 - .2 Construct each flap door of two layers of polyethylene sheeting with all edges reinforced with tape. Use wood strapping to securely fasten flap doors to head and alternate jambs.
 - .3 Install weights attached to bottom edge of each door flap.
 - .4 Provide direction arrows on flaps to indicate opening.

PART 3 EXECUTION

3.1 Clean Site Preparation

- .1 Remove stored or non-fixed items from the Abatement Work Area, including but not limited to equipment, furniture, waste etc. Store in area provided by the City.
- .2 Moving of equipment, tools, supplies, and stored materials that can be performed without disturbing ACM will be performed by others.
- .3 Remove surface mounted fixtures specified to be reused or turned over to the City.
- .4 Install Hoarding Walls between Abatement Work Area and Occupied Area.
- .5 Install Worker Decontamination facility.
 - .1 Worker Decontamination Facility to be located within the Abatement Work Area.
- .6 Install Waste Decontamination facility.
 - .1 Waste Decontamination Facility to be located within the Abatement Work Area.

- .7 Install one layer of rip-proof polyethylene sheeting over two layers of 6 mil polyethylene sheeting so as to protect all equipment and finishes in the Abatement Work Area that may be damaged. Items to remain include but are not limited to:
 - .1 Millwork.
 - .2 Doors.
 - .3 Protect pneumatic control lines located in Abatement Work Area. Notify Abatement Consultant if lines are or become damaged.
- .8 Seal openings in walls below ceiling level using polyethylene, tape, caulking, etc. including but not limited to windows, doors, vents, diffusers, etc.
- .9 Seal openings in ceiling, using polyethylene, tape, caulking, etc. including diffusers, grills, etc.
- .10 Establish negative pressure in Abatement Work Areas as follows:
 - .1 Discharge HEPA filtered negative pressure machines as follows:
 - .1 Remove existing glazing where necessary and replace with a 19 mm plywood panel.
 - .2 Install panel securely on the exterior side of the window frame and make weather-tight with caulking.
 - .3 For each negative pressure unit, provide a 300 mm diameter, duct opening through panel.
 - .4 Cover duct opening with chicken wire.
 - .5 Direct discharge away from building access points.
 - .6 Reinstall glazing to match existing upon completion of work.
- .11 Install Ground Fault Panel.
- .12 Install temporary lighting in all work areas at levels that will provide for a safe and efficient use of the work area.
- .13 Isolate, at panel, and disconnect existing power supply to Abatement Work Area. Power supply to remaining areas of building must not be disrupted during work of this section.
 - .1 Lock-out/tag-out power at electrical panels.
 - .2 Mark/tag any items within or passing through the Abatement Work Area that are to remain live including but not limited to cable, conduit, wire, fixtures, equipment panels, etc.
- .14 Install hose bib on domestic cold water pipe for connection of hoses for wetting.
 - .1 Install hoses with watertight connections and airless sprayers to wet asbestos-containing materials.
- .15 Shut down HVAC systems serving the Abatement Work Area.
 - .1 Leave induction units at building exterior walls on lowest supply setting when temperatures are below 0°C so windows and exterior walls do not ice.
 - .2 Disable any exhaust/return systems at induction units, washrooms, etc.
 - .3 Seal and protect induction units with one layer of 6 mil polyethylene sheeting.
- .16 Perform clean demolition of non-asbestos materials as specified.

- .17 Install one layer of rip-proof polyethylene sheeting over two layers of 6 mil polyethylene sheeting, on floor surfaces in Abatement Work Area.
 - .1 Install additional layers of rip-proof polyethylene and/or plywood to protect carpeted floor surfaces.
 - .2 Extend floor protection a minimum of 300 mm up all vertical surfaces in the Abatement Work Area.
- .18 On walls within and forming the perimeter of the Abatement Work Area install two layers of 6 mil polyethylene sheeting.
 - .1 At junction of floor and wall surface overlap floor polyethylene with wall polyethylene by a minimum of 300 mm at each layer. One layer of wall polyethylene must always overlap the top layer of floor polyethylene.
- .19 Notify Abatement consultant Milestone Inspection - Clean Site Preparation. Obtain written approval for this Milestone Inspection before proceeding.
- .20 Install signage in clearly visible locations and in sufficient numbers to adequately warn of an asbestos dust hazard.
- .21 Post Notice of Project Form.

3.2 Contaminated Perimeter Preparation

- .1 Perform the following using Type 3 procedures including using the required personal protective equipment specified.
 - .1 Perform preparation work at perimeter during Quiet Hours after shutting down HVAC systems affecting the Abatement Work Area, or during normal hours if complete HVAC system is isolated.
 - .2 Remove ceiling including grids, support and channels, or other obstructions around perimeter of Abatement Work Area. Remove ceilings in sections equal to the work that can be performed in one shift.
 - .3 To complete:
 - .1 Install a layer of 6 mil polyethylene on all drywall at upper perimeter, above ceiling after cleaning of overspray or dust from wall.
 - .2 Carefully wet asbestos-containing sprayed fireproofing and remove, from deck and beams along the upper perimeter of the Abatement Work Area, a line of asbestos 300 mm wide to allow for installation of upper perimeter seal.
 - .3 Install upper perimeter seal from front of wall to deck above using one layer of rip-proof polyethylene sheeting. Seal completely.
 - .4 Seal any remaining holes in existing perimeter walls, columns, deck, etc. exposed by removal of tile at perimeter of Abatement Work Area.
 - .5 Notify Abatement Consultant to the need for Milestone Inspection - Contaminated Perimeter Preparation.

3.3 Contaminated Site Preparation

- .1 Perform the following using Type 3 procedures including using the required personal protective equipment specified.
 - .1 Perform preparation work at perimeter during Quiet Hours after shutting down HVAC systems affecting the Abatement Work Area, or during normal hours if complete HVAC system is isolated.

- .2 Remove lenses from light fixtures.
- .3 Remove lamps from light fixtures. Lamps are to be recycled. Do not dispose of fluorescent lamps.
- .4 Remove light fixtures and associated electrical supply cable back to the junction box.
- .5 Remove ceiling mounted items specified to be turned over to the City and remove associated electrical supply cable back to the junction box.
- .6 Remove remaining ceiling mounted items specified to be removed, and associated electrical supply cable back to the junction box.
- .7 Remove remaining ceiling tiles, grid and hangers.
- .8 Cut hangers as close to deck as possible.
- .9 Reinstall temporary lighting previously supported by ceiling system.
- .10 Temporarily support all existing electrical and mechanical services and items supported by the ceiling systems that are not scheduled to be removed.
- .11 Clean and protect electrical systems in the Abatement Work Area with polyethylene and tape. Include all communication, coaxial, triaxial, fire and public address systems, wiring, conduit, speakers, heat and smoke detectors, alarms, exit lights, junction boxes, etc.
 - .1 Mark/tag any items within or passing through the Abatement Work Area that are to remain live.
- .12 Clean and seal holes or penetrations in deck, ducts, etc. when exposed by ceiling removal.
- .13 Notify Abatement Consultant to the need for Milestone Inspection - Contaminated Perimeter Preparation.

3.4 Maintenance Of Contaminated Abatement Work Area

- .1 Inspect Abatement Work Area perimeter Hoarding Walls and Upper Perimeter Seals at the beginning and end of each working period and once on each day work does not take place. Inspection must be performed by competent person.
- .2 Inspect HEPA filtered negative pressure machines including discharge ducting at the beginning and end of each working period. Inspection must be performed by competent person.
- .3 Perform Differential Pressure Monitoring on a frequent basis and record pressure at start and end of shift at a minimum.
- .4 Inspect polyethylene sheeting and ensure it is effectively sealed and taped. Repair damage and remedy defects immediately.
- .5 Inspect electrical panels and ensure locks and tags are on panels prior to entering the Abatement Work Area.
- .6 Maintain Abatement Work Area in tidy condition.
- .7 Remove waste and debris frequently.
- .8 Remove standing water on polyethylene/floor at the end of every shift.
- .9 Turn off water supply to hoses and reduce pressure in hose, prior to leaving the Abatement Work Area at end of shift.

- .10 Turn off water supply to showers, at the end of every shift.
- .11 Ensure shower pans are pumped out at the end of every use and shift.

3.5 Wet Removal

- .1 Do not use compressed air to clean or remove dust or debris.
- .2 Remove and dispose of remaining non-asbestos items before, during or after wet removal.
- .3 Spray asbestos-containing plaster material with Amended Water using airless spray equipment prior to removal. Keep ACM wet to prevent release of airborne fibres during removal.
- .4 Remove asbestos-containing plaster material specified to be removed, clean substrate.
 - .1 Fully wetted ACM may be scraped directly into waste containers or may be allowed to fall to floor.
 - .2 ACM cannot be allowed to fall from one level to the next.
- .5 All dislodged ACM shall be maintained in wet state until placed in asbestos waste containers for disposal.
- .6 As work progresses, and at regular intervals, place waste in asbestos waste containers and remove from the Abatement Work Area.
- .7 After completion of gross asbestos removal work, perform the following:
 - .1 Wet clean surfaces from which ACM has been removed with stiff bristle brushes, vacuums, wet-sponges etc. to remove all visible residue and asbestos-containing materials.
 - .2 Wet clean surfaces which ACM has fallen on using stiff bristle brushes, vacuums, wet-sponges etc. to remove all visible residue and asbestos-containing materials
 - .3 Wet clean other surfaces in the Abatement Work Area, including the decontamination facilities, scaffolding, equipment, polyethylene sheeting on floor and walls surfaces etc., ducts and similar items not covered with polyethylene sheeting.
 - .4 Remove wash water as contaminated waste.
 - .5 Remove waste.
 - .6 Level of cleanliness must be acceptable to Abatement Consultant.
 - .7 Remove and dispose of the pre-filters from all negative air units as asbestos-contaminated waste.
- .8 Remove induction unit covers and:
 - .1 Clean entire induction unit with HEPA vacuum using Type 2 Procedures.
 - .2 Turn induction unit covers over to the City.
 - .3 Cover induction units with one layer of 6 mil polyethylene sheeting.
- .9 Notify Abatement Consultant to the need for Milestone Inspection - Visual Clearance.

3.6 Waste and Material Handling

- .1 Waste bins must be placed on grade or in receiving.
- .2 All bins must be covered and locked when waste transfer is not being performed.

- .3 Ensure redundant non-ACM, rubble, debris, etc. which was not cleaned and which was removed during contaminated work are treated, packaged, transported and disposed of as asbestos waste.
- .4 Fluorescent lamps contain mercury and are to be recycled. Do not dispose of fluorescent lamps.
- .5 Clean, wash and apply Post Removal Sealant to metal waste prior to removal from Abatement Work Area.
 - .1 Recycle metals or dispose of metals as clean waste.
- .6 Clean, wash and apply Post Removal Sealant to non-porous materials prior to disposal as clean waste.
 - .1 Obtain prior written approval from the Abatement Consultant for each individual type of material.
- .7 Clean and wash equipment prior to removal from Abatement Work Area if removed prior to completion.
- .8 Place all equipment, tools and unused materials that cannot be cleaned in Asbestos Waste Containers.
- .9 As work progresses, and at regular intervals, transport the sealed and labelled asbestos waste containers from the Abatement Work Area to waste bin.
- .10 Place items in bins according to waste classification. Place asbestos waste, metals, non-asbestos waste, etc. in separate bins.
- .11 Removal of waste containers and decontaminated equipment and materials from the Abatement Work Area shall be performed using the Waste and Equipment Decontamination Facility as follows:
 - .1 Prior to entering the Waste and Equipment Decontamination Facility Container Cleaning Room, the first worker (fully protected inside the Abatement Work Area) shall remove any visible contamination from the surface of the item or waste container being removed from the Abatement Work Area.
 - .2 The first worker then carries the item into the Container Cleaning Room and wet sponges the item prior to passing the item through the curtained doorway to a second worker in the Holding Room. (The second worker shall be fully protected with respirator and disposable clothing and may only leave the decontamination facility via the Abatement Work Area.)
 - .3 The second worker in the Holding Room double bags or wraps and seals the item. Without entering the Transfer Room, the second worker passes the item through the curtained doorway into the Transfer Room.
 - .4 A third worker enters the Transfer Room from the clean area. (The third worker must never enter the Holding Room.) The third worker removes the item from the Transfer Room and transports it to the disposal bin.
- .12 Transport waste and materials via the predetermined routes and exits. Arrange waste transfer route with the City. Use a closed, covered cart to transport through Occupied Areas.
- .13 Limit transportation of waste and materials through Occupied Areas of the building to Quiet Hours.

- .14 Provide workers transporting waste with means to access full personal protective equipment and all tools required to properly clean up spilled ACM in the case of a rupture of an Asbestos Waste Container.
- .15 Bin loading area and waste routes shall be kept clean at all times. Use Type 2 asbestos abatement procedures if appropriate or requested by City's Representative.
- .16 Pick-up and drop off of garbage bin shall be at pre-approved times, and must not interfere with the City's operations.
- .17 Transport asbestos contaminated waste to a licenced landfill.

3.7 Application Of Post Removal Sealant

- .1 Wet Removal
 - .1 Obtain Abatement Consultant's written permission to proceed.
 - .2 Apply one coat of Post Removal Sealant with an airless sprayer, in accordance with Manufacturer's Instructions, to cover all surfaces on all items in the Abatement Work Area, including but not limited to polyethylene, ACM substrate, structural steel, and surfaces scheduled for demolition.
 - .1 Do not apply post removal sealant to materials that will be damaged by its application.
 - .3 Notify Abatement Consultant to the need for Milestone Inspection – Clearance Sampling.

3.8 Air Clearance Monitoring

- .1 Site must be dry prior to Air Clearance Monitoring.
- .2 PCM samples will be collected as per Air Monitoring Section.

3.9 Abatement Work Area Dismantling

- .1 Use Type 2 worker precautions during dismantling.
- .2 Operate negative air units during dismantling.
- .3 Polyethylene, tape, cleaning material, etc. to be treated as asbestos waste.
- .4 Wash remaining equipment and tools used in contaminated Abatement Work Area to remove all asbestos contamination, or place in Asbestos Waste Containers prior to being removed from Abatement Work Area.
- .5 Clean Abatement Work Area, Equipment and Access area, washing/Showering Room.
- .6 Remove upper seals, and seals over tops of walls, on deck, at columns, etc. within the Abatement Work Area.
- .7 Remove top layer of polyethylene sheeting from surfaces protected by two or more layers of polyethylene sheeting. The bottom layer of polyethylene will remain until all re-fireproofing is complete. Remove outer layer as follows:
 - .1 Remove asbestos contaminated Polyethylene by carefully rolling away from walls to centre of Abatement Work Area.
 - .2 Cut the lower layer of polyethylene sheeting to expose the baseboards, window sills, cabinets, shelves and other horizontal surfaces that may be contaminated by fallen ACM.

- .3 Remove visible fibres or residue found during removal of polyethylene using a HEPA vacuum.
- .4 Remove polyethylene protection and hoarding walls where hoarding walls separate occupied areas from work area. Hoarding walls to remain are identified on asbestos demolition drawings.
- .8 Remove top layer of polyethylene on walls, finishes, and equipment.
- .9 Remove remaining polyethylene sheeting.
- .10 Remove water hoses and shut off at source.
- .11 Remove Signs, Hoarding Walls, Decontamination Facilities, Equipment Enclosures, Tunnels, Platforms.
- .12 Seal vacuum hoses and fittings, flexible ductwork and all tools used in contaminated work site in 6 mil polyethylene bags prior to removal from Work Area.
- .13 Remove temporary lights.
- .14 Remove negative air unit prefilters. Dispose of as asbestos contaminated waste.
- .15 Remove HEPA filtered negative pressure machines and discharge ducting.
- .16 Immediately upon shutting down negative air units, seal air inlet grill and exhaust vent with polyethylene and tape.

3.10 Re-Establishment of Items

- .1 Upon completion of work:
 - .1 Move items that were removed from Abatement Work Area prior to work, back into same location within Abatement Work Area.
 - .2 Remove and disconnect Ground fault Panel, tags and locks from electrical panels and re-energize equipment and items.
 - .3 Remove hose bibs installed and repair pipe.
 - .4 Remove negative air discharge panel and reinstall glazing to match existing.
 - .5 Reinstall ducts removed to perform cleaning of ducts or to access ACM.
 - .6 Clean, mop and vacuum Abatement Work Area and area beneath any tunnels, platform and Decontamination Facilities.
 - .7 Enable building air handling systems.

END OF SECTION