**ASBESTOS ABATEMENT**

**TYPE 2 OPERATION – INTERMEDIATE PRECAUTIONS**

**Part 1 General**

* 1. **SUMMARY**

.1 Comply with requirements of this Section, when performing the following Work, which is considered to be an Ontario Regulation 278/05 Type 2 Asbestos Operation.

.1 Removing or otherwise disturbing less than or equal to 1 (m2) of AC SFP, if the material is wetted and the work is done by means of non-powered, hand-held tools.

.2 Removing part of a false ceiling to obtain access to a work area, if asbestos-containing material is likely to be lying on the surface of the false ceiling.

.3 Removal of any friable ACM encountered in the general work area (eg. pipe elbow insulation) if there is less than or equal to 1 square metre (m2) of the material and if the material is wetted and the work is done by means of non-powered, hand-held tools.

.4 The use of glove bags to remove AC pipe insulation.

.2 Air sampling will be completed by Consultant designated by the Owner. Costs associated with asbestos inspections and air sampling and analysis, shall be covered by the Contractor. A cash allowance of $5,000 has been provided to cover asbestos inspection and air sampling and analysis.

* 1. **SECTION INCLUDES**

.1 Requirements and procedures for asbestos abatement of minor amounts of Chrysotile asbestos-containing materials (ACM) of the type described within and for removal of non-AC ceiling tiles to gain access to a ceiling space containing AC SFP.

* 1. **RELATED SECTIONS**

.1 Asbestos Abatement – Type 3 Operations

.2 Allowances

.3 Section V– Owner’s Safety Requirements

* 1. **REFERENCES**

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.205-94, Sealer for Application of Asbestos-Fibre Releasing Materials.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

 .1 Material Safety Data Sheets (MSDS)

.3 Transport Canada (TC).

 .1 Transportation of Dangerous Goods Act, 1992 (TDGA)

.4 Underwriters’ Laboratories of Canada (ULC).

.5 Ontario Occupational Health and Safety Act (OHSA).

.6 Ontario Environmental Protection Act (EPA)

 .1 O.Reg. 347/90 – General – Waste Management.

* 1. **DEFINITIONS**

.1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any dimension at 99.97% efficiency.

.2 Amended Water: water with non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.

.3 Asbestos-Containing Materials (ACM): materials identified under Existing Conditions Article, including fallen materials and settled dust.

.4 Minor Amounts of ACM: less than or equal to 1 m2 of friable material containing chrysotile asbestos.

.5 Asbestos Work Area: area where work takes place which will, or may disturb ACM.

.6 Authorized Visitors: Owner, Engineer, Architect, Consultant, or designated representatives, and representatives of regulatory agencies.

.7 Friable Material: material that when dry can be crumbled or powered by hand pressure and includes such material that is crumbled, pulverized or powdered.

.8 Glove Blag: prefabricated glove bag as follows:

 .1 Minimum thickness 0.25mm (10mil) polyvinyl-chloride bag

 .2 Integral 0.25mm (10mil) thick polyvinyl-chloride gloves and elastic ports.

.3 Equipped with reversible double-pull double throw zipper on top and at approximately mid-section of the bag.

 .4 Straps for sealing ends around pipe.

.5 Must incorporate internal closure strip it is to be moved or used in more than one specific location.

.9 Occupied Area: any area of building or work site that is outside Asbestos Work Area.

.10 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.

.11 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for scope for work.

* 1. **SUBMITTALS**

.1 Submit proof satisfactory to Consultant that asbestos removal methods will satisfy requirements for Type 2 procedures.

.1 If, in the opinion of the Consultant, the Contractor’s proposed work methods do not meet the intent of this section, carry out work in accordance with Asbestos Abatement – Type 3 Operations.

.2 The onus is on the Contractor to select the appropriate removal method to satisfy regulatory requirements and these specifications.

.2 Submit proof satisfactory to Consultant that suitable arrangements have been made to dispose of AC waste in accordance with requirements of authority having jurisdiction.

 .3 Submit Provincial and/or local requirements for Notice of Project Form.

.4 **Submit proof of Contactor’s Asbestos Liability Insurance.**

.5 Submit necessary permits for transportation and disposal of asbestos containing waste (ie. A certificate of approval for a waste management system to haul asbestos waste) and proof that asbestos-containing waste has been received and properly disposed.

.6 Submit proof satisfactory that employees have had instruction on hazards of asbestos exposure, respiratory use, dress, entry and exit from Asbestos Work Area, and aspects of work procedures and protective measures.

 .1 Training to meet or exceed requirements of O.Reg. 278/05.

.7 Submit proof that supervisory personnel have attended asbestos abatement course. There shall be a minimum of one supervisor for every 10 workers.

 .1 Training to meet or exceed requirements of O.Reg.278/05.

.8 Submit proof satisfactory to the Owner that sub-contractors are qualified and meet training requirements according to existing legislation.

.9 Submit documentation including test results, fire and flammability data, and Material Safety Data Sheets (MSDS) for chemicals or materials including:

 .1 encapsulants;

 .2 amended water;

.3 slow-drying sealer

* 1. **QUALITY ASSURANCE**

.1 Regulatory Requirements: comply with Federal, Provincial and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications more stringent requirements applies. Comply with regulations in effect at the time work is performed.

.2 Health and Safety:

 .1 Safety Requirements: worker protection.

.1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:

.1 Full face, powered or non-powered, air purifying respirator equipped with HEPA filter cartridges, personally issued to worker and marked as to efficiency and purpose, as specified in Table 2 of O.Reg.278/05, and acceptable to Authority having jurisdiction as suitable for type of asbestos and level of asbestos exposure in Asbestos Work Area. If disposable type filters are used, provide sufficient filters so that workers can install new filters following disposal of used filters and before re-entering contaminated areas.

.2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibers, consisting of full-body covering including head coverings with snug-fitting cuffs at wrists, ankles and neck.

.2 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.

.3 Before leaving Asbestos Work Area, dispose of protective clothing as contaminated waste as specified.

.4 Ensure workers wash hands and face when leaving Asbestos Work Area. Facilities for washing to be located proximal to the Work Area.

.5 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.

.2 Visitor Protection:

.1 Provide protective clothing and approved respirators to Authorized Visitors to work areas.

.2 Instruct Authorized Visitors in the use of protective clothing, respirators and procedures.

.3 Instruct Authorized Visitors in proper procedures to be followed in entering into and existing from Asbestos Work Area.

* 1. **WASTE MANAGEMENT**

.1 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6mm bags or leak proof drums. Label containers with appropriate warning labels.

.2 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

* 1. **EXISTING CONDITIONS**

.1 Asbestos is present in the following building materials as indicated in Appendix B.

.2 The Contractor is to satisfy himself as to the exact known quantity and location of ACM for the removal, included in this tender.

.3 Notify the Consultant/Owner of friable material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Consultant.

* 1. **SCHEDULING**

.1 Hours of Work: 8:30am - 4:30pm; although it is flexible.

.2 Submit to Owner a copy of notifications to start of Work.

**Part 2 Products**

**2.1 MATERIALS**

 .1 Drop and Enclosure Sheets

 .1 Polyethylene: 0.15mm thick.

.2 FR polyethylene: 0.15 mm thick woven fiber reinforced fabric bonded both sides with polyethylene.

.2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in concentration to provide thorough wetting of asbestos-containing material.

.3 Waste Containers: contain waste in two separate containers.

 .1 Inner container: 0.15mm thick sealable polyethylene bag or, where glove bag method is used, glove bag itself.

 .2 Outer container: sealable metal or fiber type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fiber type or second 0.15mm thick sealable polyethylene bag.

 .3 Labeling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site.

 .4 Glove bag:

.1 Acceptable materials: safe-T-Strip products in configuration suitable for Work, or Alternative material approved by addendum during tendering period in accordance with Instructions to Tenderers.

.2 Glove bags intended for use in more than one location must be equipped with reversible, double-pull, double-throw zipper on top and at approximately mid-section of bag.

.5 Tape: tape suitable for sealing polyethylene to surfaces under both dry and wet conditions using amended water.

.6 Slow – drying sealer: non-staining, clear, water – dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibers.

 .1 Sealer: flame spread and smoke developed rating less than 50.

**Part 3 Execution**

**3.1 SUPERVISION**

 .1 Minimum of one Supervisor for every ten workers is required.

.2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos-containing materials.

**3.2 PROCEDURES**

.1 Before beginning Work, at each access to Asbestos Work Area, install warning signs in both official languages in upper case ‘Helvetica Medium’ letters reading as follows, where number in parentheses indicates font size to be used: ‘CAUTION ASBESTOS HAZARD AREA (25mm) / NO UNAUTHORIZED ENTRY (19mm) / WEAR ASSIGNED PROTECTIVE EQUIPMENT (19mm) / BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7mm)’.

.2 Before beginning Work remove visible dust from surfaces in work area where dust is likely to be disturbed during course of work. This does not include the top side of any non-AC ceiling tiles that will be removed to gain access to the ceiling space. Removal of any ceiling tiles in this area must completed AFTER an enclosure has been constructed for the space.

.1 Use HEPA vacuum, or damp cloths where damp cleaning does not create hazard and is otherwise appropriate.

 .2 Do not use compressed air to clean up or remove dust from any surface.

.3 Prevent spread of dust from Asbestos Work Area using measures appropriate to work to be done.

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

.2 Securely cover or remove from the work area any equipment or furniture inside of it.

.3 Use an enclosure of polyethylene or other suitable material that is impervious to asbestos (including, if the enclosure is opaque, one or more transparent window areas to allow observation of the entire work area from outside the enclosure), if the work area is not enclosed by walls.

 .4 Disable the mechanical ventilation system serving the work area.

 .5 Seal the ventilation ducts to and from the work area.

.4 Separation of Work Areas from Occupied Areas:

.1 Separate parts of building required to remain in use from parts of building used for asbestos abatement by means of airtight barrier system constructed as follows:

.1 Build suitable floor to ceiling lumber or metal stud framing, cover with polyethylene sheeting sealed with tape, and apply 9mm minimum thick plywood. Seal joints between plywood sheets and between plywood and adjacent materials with surface film forming type sealer, to create airtight barrier.

.2 Cover plywood barrier with polyethylene sealed with tape, as specified for work areas.

.5 Remove loose material by HEPA vacuum including any loose material found on the topside of non-AC, suspended acoustic ceiling tiles; thoroughly wet friable material containing asbestos to be removed or disturbed before and during Work unless wetting creates hazard or causes damage.

.1 Use garden reservoir type low – velocity sprayer or airless spray equipment capable of producing mist or fine spray.

 .2 Perform Work in a manner to reduce dust creation to lowest levels practicable.

.6 Pipe Insulation Removal Using Glove Bag:

 .1 Place tools necessary to remove insulation in tool pouch. Wrap the bag around pipe and close zippers. Seal bag to pipe with cloth straps.

 .2 Place hands in gloves and use necessary tools to remove insulation. Arrange insulation in bag to obtain full capacity of bag.

 .3 Insert nozzle of a garden reservoir type sprayer into bag through valve and wash down pipe and interior of bag thoroughly. Wet surface of insulation in lower section of bag.

 .4 When glove bags are intended for use at more than one location: After wash-down and application of sealer, seal off waste in lower section of bag using zipper at mid-section of bag. Remove air from top section bag through the elasticized valve using a HEPPA vacuum. Remove bag from pipe, reinstall in new location, and reseal to pipe prior to opening the lower section of the bag. Repeat stripping operations.

 .5 If bag is to be moved along pipe, first remove air from top section through the elasticized valve using a HEPA vacuum. Next loosen straps, move bag, re-seal to pipe using double-pull zipper to pass hangers. Repeat stripping operation.

 .6 To remove bag after completion of stripping, wash top section and tools thoroughly. Remove air from top section through the elasticized valve using a HEPA vacuum. 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 waste container and seal.

 .7 After removal of bag ensure that pipe is free of all residue. Remove all residue using HEPA vacuum or wet cloths. Ensure that surfaces are free of sludge which, after drying, could release asbestos dust into atmosphere. Seal exposed surfaces of pipe insulation with polyethylene taped in place.

.7 Work is subject to visual inspection and/or air monitoring. Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected area. Contractor to assume all costs of any required re-cleaning.

.8 Clean-up:

.1 Frequently during Work and immediately after completion of work, clean up dust and asbestos-containing waste using HEPA vacuum or by damp mopping.

.2 Place dust and AC waste, in sealed dust-tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste and wet and fold to contain dust and then place in waste bags.

.3 Immediately before their removal from Asbestos Work Area and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.

.4 Seal and remove double-bagged waste from site. Dispose of in accordance with requirements of Federal, Provincial and Municipal authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that guidelines and regulations for asbestos disposal are followed.

.11 Following completion of work, polyethylene sheeting used for barriers and enclosures shall be cleaned up by HEPA vacuuming and damp mopping. All barriers shall be left in place until approval to tear down is received from the Consultant. Notify Consultant of completion of work and arrange for clearance inspection, providing minimum 24 hours advanced notice.

.12 Contractor shall forthwith rectify any deficiencies identified by the Consultant during any of the inspections at not cost to the Owner.

.13 Perform final thorough clean-up of Asbestos Work Areas and adjacent areas affected by Work using HEPA vacuum.

.14 Re-establish mechanical and electrical systems in proper working order. Install new filters.

**3.3 AIR MONITORING**

.1 Consultant shall collect a minimum of three (3) air samples in the Work Area prior to commencement of any abatement work (including set up of scaffolding, drop sheets, barriers or other activities related to the removal).

.2 Final air monitoring will be conducted following removal of AC SFP according to the Type 3 Asbestos Abatement specifications which are part of this package.

.3 From the beginning of Work until completion of cleaning operations, Consultant reserves the right to collect air samples inside and outside the enclosure.

 .1 If air monitoring shows that areas outside work area enclosures are contaminated, enclose, maintain and clean these areas, in same manner as that applicable to work areas. Work done by the Contractor subsequent to discovery of contamination outside of enclosure shall be at no cost to the Owner.

**3.4 INSPECTION**

.1 The following inspections will be completed by the Consultant over the duration of the work. The Contractor is to provide minimum 24 hours notice to the Consultant to arrange for inspections. Asbestos Abatement Work shall not proceed until each inspection is completed and approval to proceed is obtained from the Consultant.

.1 Initial Inspection: following completion of hoarding erection but prior to the commencement of removal.

.2 Visual Inspection: following settling period but prior to application of slow-drying sealer to surfaces of the work area.

.2 All inspections shall be performed to confirm compliance with specification and governing authority requirements. Deviation from these requirements that have not been approved in writing by Consultant may result in Work stoppage, at no cost to Owner.

.3 During inspection the Consultant will inspect Work for:

 .1 Adherence to specific procedures and materials.

 .2 Final cleanliness and completion.

 .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

.4 When asbestos leakage from Asbestos Work Area has occurred or is likely to occur Consultant may order Work shutdown.

.1 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

**END OF SECTION**

**ASBESTOS ABATEMENT**

**TYPE 3 OPERATION – MAXIMUM PRECAUTIONS**

**Part 1 General**

* 1. **SUMMARY**

.1 Comply with requirements of this Specification for removal of asbestos containing sprayed fireproofing in all Work areas. This work is considered to be a Type 3 asbestos operation as described in Ontario Regulation 278/05 (O.Reg.278/05). Removal of suspended ceilings and support system and other ACM in the general work area (eg. pipe insulation) may be completed as part of this Type 3 operation if not already completed as part of the Type 2 operation.

.2 Contractor will comply with the requirements for air sampling described in Section 3.6. Air sampling will be completed by the Consultant designated by the Owner. Costs associated with asbestos inspections and air sampling and analysis shall be covered by the Contractor. A cash allowance of $5,000.00 has been provided to cover asbestos inspection and air sampling and analysis.

* 1. **SECTION INCLUDES**

.1 Requirements and procedures for asbestos abatement of major amounts of friable asbestos-containing materials of the type described within.

* 1. **RELATED SECTIONS**

.1 Asbestos Abatement, Type 2 Operation – Intermediate Precautions

.2 Allowances

.3 Specifications for Applied Fireproofing

.4 Section V – Owner’s Safety Requirements

* 1. **REFERENCES**
		1. .1 Canadian General Standards Board (CGSB)
			+ 1. .1 CAN/CGSB-1.205-94, Sealer for Application of Asbestos-Fibre Releasing Materials.
		2. .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
			+ 1. .1 Material Safety Data Sheets (MSDS).
		3. .3 Transport Canada (TC)
			+ 1. .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
		4. .4 Underwriter’s Laboratories of Canada (ULC).
		5. .5 Ontario Occupational Health and Safety Act (OHSA).
			+ 1. .1 O.Reg. 278/05 – Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations.
				2. .2 O.Reg.490/09 – Designated Substances
		6. .6 Ontario Environmental Protection Act (EPA)
			+ 1. .1 O.Reg.347/90 – General – Waste Management
	2. **DEFINITIONS**

.1 Polyethylene sheeting sealed with tape: Polyethylene sheeting of type and thickness specified sealed with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide continuous polyethylene membrane to protect underlying surfaces from water damage or damage by sealants, and to prevent escape of asbestos fibres through sheeting into clean area.

.2 DOP Test: testing method used to determine integrity of negative Pressure unit using dioctyl phthalate (DOP) HEPA-filter leak test.

.3 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must be appropriate capacity for scope of work.

.4 Negative pressure: system that extracts air directly from work area, filters such extracted air through High Efficiency Particulate Air filtering system, and discharges this air directly outside work area to exterior of building.

.5 Airlock: system for permitting ingress or egress without permitting air movement between contaminated area and uncontaminated area, typically consisting of two curtained doorways at least 2m apart.

.6 Curtained doorway: arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed follows:

.1 Place two overlapping sheets of polyethylene over existing or temporarily framed doorway, secure each along top of doorway, secure vertical edge of other sheet along opposite vertical side of doorway.

.2 Reinforce free edges of polyethlene with duct tape and weight bottom edge to ensure proper closing.

.3 Overlap each polyethylene sheet at openings not less than 1.5m on each side.

* 1. **SUBMITTALS**

.1 Before beginning Work:

.1 Obtain from appropriate agency and submit necessary permits for transportation and disposal of asbestos waste (ie. A certificate of approval for a waste management system to haul asbestos waste). Ensure that dump operator is fully aware of hazardous nature of material begin dumped, and proper methods of disposal. Submit proof satisfactory that suitable arrangements have been made to receive and properly dispose of asbestos waste.

.2 Submit proof satisfactory that employees have had instruction on hazards of asbestos exposure, respirator use, dress, use of showers, entry and exit from work areas, an aspects of work procedures and protective measures. Ensure supervisory personnel have attended asbestos abatement course, of not less than two days duration. Submit proof of attendance in form of certificate. Minimum of one Supervisor for every ten workers. Training must meet current Ministry of Training, Colleges and Universities (MTCU) requirements for Type 3 asbestos abatement work.

.3 Submit proof satisfactory that asbestos removal methods will satisfy requirement for Type 3 procedures.

.1 The onus is on the Contractor to select the appropriate removal method to satisfy regulatory requirements and these specifications.

.4 Submit documentation including test results for sealer proposed for use.

.5 Submit Provincial requirements for Notice of Project Form.

.6 Submit proof of Contractor’s Asbestos Liability Insurance.

.7 Submit proof that employees have respirator fitting and testing. Works must be fit-tested (irritant smoke test) with respirator that is personally issued.

.8 Submit proof satisfactory to the Owner that sub-contractors are qualified and meet training requirements according to existing legislation.

.9 Submit documentation including test results, fire and flammability data, and Material Safety Data Sheets (MSDS) for chemicals or materials including but not limited to following:

 .1 encapsulants;

 .2 amended water;

 .3 slow-drying sealer.

* 1. **QUALITY ASSURANCE**

.1 Regulatory Requirements: comply with Federal, Provincial and local requirements pertaining to asbestos, provided that in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.

.2 Health and Safety:

 .1 Safety requirements: worker and visitor protection.

.1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area includes:

.1 Full face, powered or non-powered, air purifying respirator equipped with HEPA filter cartridges, personally issued to work and marked as to efficiency and purpose, as specified in Table 2 of O.Reg.278/05, and acceptable to Authority having jurisdiction as suitable for type of asbestos and level of asbestos exposure in Asbestos work Area. If disposable type filters are used, provide sufficient filters so that workers can install new filters following disposal of used filters and before re-entering contaminated areas.

.2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibres, consisting of full-body covering including head covering with snug-fitting cuffs at wrists, ankles and neck.

 .2 Requirements for each worker:

.1 Remove street clothes in clean change room and put on respirator with new filters or reusable filters that have been tested as satisfactory, clean coveralls and head covers before entering Equipment and Access Rooms or Asbestos Work Area. Store street clothes, uncontaminated footwear, towels, and similar uncontaminated articles in clean change room.

.2 Remove gross contamination from clothing before leaving work area then proceed to Equipment and Access Room and remove clothing except respirators. Place contaminated worksuits in receptacles for disposal with other asbestos-contaminated materials. Leave reusable items except respirator in Equipment and Access Room. Still wearing the respirator proceed naked to showers. Using soap and water wash body and hair thoroughly. Clean outside of respirator with soap and water while showering; remove respirator; remove filters and wet them and dispose of filters in container provided for purpose; and wash and rinse inside of respirator. When not in use in Work Area, store work footwear in Equipment and Access Room. Upon completion of asbestos abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before removing from work area or from Equipment and Access Room.

.3 After showering and drying off, proceed to clean change room and dress in street clothes at end of each day’s work, or in clean coveralls before eating, smoking, or drinking. If re-entering Work Area, follow procedures outlined in paragraphs above.

.4 Enter unloading room from outside dressed in clean coveralls to remove waste containers and equipment from Holding Room of Container and Equipment Decontamination Enclosure system. Workers must not use this system as means to leave or enter work area.

.3 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.

.4 Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual asbestos abatement.

.5 Provide and post in Clean Change Room and in Equipment and Access Room the procedures described in this Section, in both official languages.

.6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.

.7 Visitor Protection:

.1 Provide protective clothing and approved respirators to Authorized Visitors to work areas.

.2 Instruct Authorized visitors in the use of protective clothing, respirators and procedures.

.3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

* 1. **WASTE MANAGEMENT AND DISPOSAL**

.1 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 mil polyethylene bags or leak proof drums. Label containers with appropriate warning labels.

.2 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

* 1. **EXISTING CONDITIONS**

.1 Asbestos is present in the following building materials, as indicated in the Appendix B.

.2 The Contractor is to satisfy himself as the exact quantity and location of ACM for disturbance or removal as part of the current project.

.3 Notify Owner of friable material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Owner.

* 1. **SCHEDULING**

.1 Not later than ten (10) days before Work on this project, notify following in writing:

 .1 Ontario Ministry of Labour

 .2 Disposal Authority

.2 Submit to Owner copy of notifications prior to start of Work.

.3 Hours of Work: 8:30 - 4:30; although it is flexible.

**Part 2 Products**

**2.1 MATERIALS**

.1 Polyethylene: minimum 0.15 mm thick unless otherwise specified.

.2 FR Polyethylene: minimum 0.15 mm thick, woven fibre reinforced fabric bonded both sides with polyethylene.

.3 Tape: fiberglass – reinforced duct tape suitable for sealing polyethylene under both dry conditions and wet conditions using amended water.

.4 Wetting agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether, or other approved material, mixed with water in concentration to provide adequate penetration and wetting of asbestos-containing material.

.5 Asbestos waste containers: Metal or fibre – type acceptable to dump operator with tightly fitting covers and 0.15mm minimum thickness sealable polyethylene liners.

.1 Label containers in accordance with applicable Asbestos and TDGA Regulations. Label in both official languages.

.6 Slow – drying sealer: non-staining, clear, water – dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.

 .1 Sealer: flame spread and smoke developed rating less than 50.

**Part 3 Execution**

**3.1 PREPARATION**

 .1 Work Areas:

.1 Shut off and isolate air handling and ventilation systems to prevent fibre dispersal to other building areas during work phase. Conduct smoke tests to ensure that duct work is airtight. Seal and caulk joints and seams of active return air ducts within Asbestos Work Area.

.2 Pre-clean moveable furniture within proposed work areas using HEPA vacuum and remove from work areas to temporary location as specified by Client.

.3 Pre-clean fixed casework, plant, and equipment within proposed work areas, using HEPA vacuum and cover with polyethylene sheeting sealed with tape.

.4 Clean proposed work areas using, where practicable, HEPA vacuum cleaning equipment. If not practicable, use wet cleaning method. Do not use methods that raise dust, such as dry sweeping, or vacuuming using other than HEPA vacuum equipment.

.5 Put negative pressure system in operation and operate continuously from time first polyethylene is installed to seal openings until final completion of work including final cleanup. Provide continuous monitoring of pressure difference using automatic recording instrument.

.6 Seal off openings such as corridors, doorways, windows, skylights, ducts, grilles, and diffuser, with polyethylene sheeting sealed with tape.

.7 Cover floor and wall surfaces with polyethylene sheeting sealed with tape. Use minimum one layer of FR polyethylene on all surfaces. Cover floors first so that polyethylene extends at least 300mm up walls then cover walls to overlap floor sheeting.

.8 Build airlocks at entrances to and exists from work areas so that work areas are always closed off by one curtained doorway when workers enter or exit.

.9 At each access to work areas install warning signs in both official languages, in upper case “Helvetica Medium” letters reading as follows where number in parentheses indicates font size to be used: **“CAUTION ASBESOS HAZARD AREA** (25mm) **NO UNAUTHORIZED ENTRY** (19mm) **WEAR ASSIGNED PROTECTIVE EQUIPMENT** (19MM) **BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM** (7mm)”.

.10 After work area isolation, remove heating, ventilating, and air condition filters, pack in sealed plastic bags 0.15mm minimum thick and treat as contaminated asbestos waste.

.11 Ensure suitable emergency and fire exit is provided from work are to satisfy the requirements of the **Ontario Fire Marshall’s Office** or any other Authority having jurisdiction.

.12 Where application of water is required for wetting asbestos-containing materials, shut off electrical power, provide 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard. Ensure safe installation of electrical lines and equipment.

 .2 Worker Decontamination Enclosure System:

.1 Work Decontamination Enclosure System includes Equipment and Access Room, Shower Room, and Clean Room, as follows:

.1 Equipment and Access Room: build Equipment and Access Room between Shower Room and work area, with two curtained doorways, one to Shower Room and one to work area. Install portable toilet, waste receptor, and storage facilities for workers’ shoes and protective clothing to be re-worn in work area. Build Equipment and Access Room large enough to accommodate specified facilities, other equipment needed, and at least one worker allowing him/her sufficient space to undress comfortably.

.2 Shower Room: build Shower Room between Clean Room and Equipment and Access Room, with two curtained doorways, one to Clean Room and open to Equipment and Access Room. Provide one shower for every five workers. Provide constant supply of hot and cold or warm water. Confirm with building maintenance staff on locations of hot water, cold water and drains to common sewers. Provide piping and connect to water sources and drains. Provide soap, clean towels, and appropriate containers for disposal of used respirator filters.

.3 Clean Room: build Clean Room between Shower Room and clean areas outside of enclosures, with two curtained doorways, one to outside of enclosures and one to Shower Room. Provide lockers or hangers and hooks for worker’s street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install mirror to permit workers to fit respiratory equipment properly.

 .3 Container and Equipment Decontamination Enclosure System:

.1 Container and Equipment Decontamination Enclosure System consists of Staging Area within work area, Washroom, Holding Room, and Unloading Room. Purpose of system is to provide means to decontaminate waste containers, scaffolding, waste and material containers, vacuum and spray equipment, and other tools and equipment for which Worker Decontamination enclosure System is not suitable.

.1 Staging Area: designate Staging Area in work area for gross removal of dust and debris from waste containers and equipment, labeling and sealing of waste containers, and temporary storage pending removal to Washroom. Equip Staging Area with curtained doorway to Washroom.

.2 Washroom: build Washroom between Staging Area and Holding Room with two curtained doorways, one to Staging Area and one to Holding Room. Provide high – pressure, low – volume sprays for washing of waster container and equipment. Pump waste water through 5 micrometre filter system before directing into drains. Provide piping and connect to water sources and drains.

.3 Holding Room: build Holding Room between Washroom and Unloading Room, with two curtained doorways, one to Washroom and one to Unloading Room. Build Holding Room sized to accommodate at least two waste containers and largest item of equipment used.

.4 Unloading Room: build Unloading Room between Holding Room and outside, with two curtained doorways, one to Holding Room and one to outside.

 .4 Construction of Decontamination Enclosures:

.1 Build suitable framing for enclosures or use existing rooms where convenient, and line with polyethylene sheeting sealed with tape. Use minimum one layer of FR polyethylene on floor.

.2 Build curtained doorways between enclosures so that when people move through or when waste containers and equipment are moved through doorway, one of two closures comprising doorway always remains closed.

 .5 Separation of Work Areas from Occupied Areas:

.1 Separate parts of building required to remain in use from parts of building used for asbestos abatement by means of airtight barrier system constructed as follows:

.1 Build suitable floor to ceiling lumber or metal stud framing, cover with polyethylene sheeting sealed with tape, and apply 9mm minimum thick plywood. Seal joints between plywood sheets and between plywood adjacent materials with surface film forming type sealer, to create airtight barrier.

.2 Cover plywood barrier with polyethylene sealed with tape, as specified for work areas.

 .6 Maintenance of Enclosures:

 .1 Maintain enclosures in tidy condition.

.2 Ensure that barriers and polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery.

.3 Visually inspect enclosures at beginning of each working period.

.4 Use smoke methods to test effectiveness of barriers when directed by Consultant.

 .7 Do not begin Asbestos Abatement work until:

 .1 Arrangements have been made for disposal of waste.

.2 For wet stripping techniques, arrangements have been made for containing, filtering, and disposal of waste water.

.3 Work area and decontamination enclosures and parts of building required to remain in use are effectively segregated.

.4 Tools, equipment, and materials waste containers are on hand.

.5 Arrangements have been made for building security.

.6 Warning signs are displayed where access to contaminate areas is possible.

.7 Notifications have been completed and other preparatory steps have been taken.

.8 Consultant has been notified and initial inspection has been completed. Following completion of hoarding erection, notify Consultant and arrange for initial inspection, providing minimum 24 hours notice. Do not proceed with removal work until approval from Consultant is obtained.

**3.2 SUPERVISION**

 .1 Minimum of one Supervisor for every ten workers is required.

.2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos-containing materials.

**3.3 ASBESTOS REMOVAL**

 .1 Before removing asbestos:

 .1 Prepare site.

 .2 Spray asbestos material with water container specified wetting agent, using airless spray equipment capable of providing “mist” application to prevent release of fibres. Saturate asbestos material sufficiently to wet it to substrate without causing excess dripping. Spray asbestos material repeatedly during work process to maintain saturation and to minimize asbestos fibre dispersion.

.2 Remove any suspended ceiling and associated support system. As they are being removed, pack them in sealable plastic bags 0.15mm minimum thick and place in labeled containers for transport.

.3 Remove all identified asbestos. Apply continuous light misting during removal. Immediately place waste in sealable plastic bags 0.15mm minimum thick and place labeled containers for transport.

.4 Remove saturated asbestos material (SFP) in small sections. Do not allow saturated asbestos to dry out. As it is being removed pack material in sealable plastic bags 0.5mm minimum thick and place in labeled containers for transport.

.5 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging, before moving containers to decontamination Washroom. Wash containers thoroughly in decontamination Washroom, and store in Holding Room pending removal to Unloading Room and outside. Ensure that containers are removed from Holding Room, by workers who have entered from uncontaminated area dressed in clean coveralls.

.6 After completion of stripping work, wire brush and wet-sponge surfaces from which asbestos has been removed, to remove visible material. During this work keep surfaces wet.

.7 After wire brushing and wet sponging to remove visible asbestos, wet clean entire work area including Equipment and Access Room, and equipment used in process. After 24 hour period to allow for dust settling, wet clean these areas and objects again. During this settling period under same conditions, clean these areas and objects again using HEPA vacuum followed by wet cleaning. After inspection by Consultant apply continuous coat of slow drying sealer to surfaces of work area. Allow at least 16 hours with no entry, activity, ventilation, or disturbance other than operation of negative pressure units during this period.

.8 Notify Consultant and arrange for final clearance inspection and air sampling, providing minimum 24 hours advanced notice.

.9 Contractor shall forthwith rectify any deficiencies identified by the Consultant during any of the inspections at no cost to the Owner.

**3.4 FINAL CLEANUP**

.1 Following cleaning specified in Section 3.3 above, and when air sampling shows that asbestos levels inside the enclosure do not exceed 0.01 fibres/cc as determined by membrane filter method at 400-500X magnification phase contrast illumination, as described in NIOSH Method 7402, proceed with final cleanup. (NOTE: Sections of the hoarding may be left in place for use to protect the area during subsequent application of new fireproofing material. This will depend on the condition of the hoarding and drop sheet materials following removal activities. Consultant will provide direction.)

.2 Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum visible asbestos-containing particles observed during cleanup, immediately, using HEPA vacuum equipment.

.3 Place polyethylene seals, tape, cleaning material, clothing, and other contaminated waste in plastic bags and sealed labeled waste containers for transport.

.4 Include in clean-up Work areas, Equipment and Access Room, Washroom, Shower Room, and other contaminated enclosures.

.5 Include in cleanup sealed waste containers and equipment used in Work and remove from work areas, via Container and Equipment Decontamination Enclosure System, at appropriate time in cleaning sequence.

.6 Conduct final check to ensure that no dust or debris remains on surfaces as result of dismantling operations.

.7 As work progresses, and to prevent exceeding available storage capacity on site, remove sealed and labeled containers containing asbestos waste and dispose of to authorized disposal area in accordance with requirements of disposal authority. Ensure that each shipment of containers transported to dump is accompanied by Contractor’s representative to ensure that dumping is done in accordance with governing regulations.

**3.5 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS**

 .1 When clean up is complete:

.1 Apply non-asbestos sprayed fireproofing to abated section according to the specifications for Applied Fireproofing provided as part of Appendix D.

.2 Re-establish objects and furniture moved to temporary locations in course of Work, in their proper positions.

.3 Re-secure mounted objects removed in course of Work, in their former positions.

.4 Re-establish mechanical and electrical systems in proper working order. Install new filters.

.5 Repair or replace objects damaged in the course of Work, as directed by Consultant.

 .6 Re-instate new ceiling tiles and any required support system.

**3.6 AIR MONITORING**

.1 Consultant shall collect a minimum of three (3) air samples in the Work Area prior to commencement of any abatement work (including set up of scaffolding, drop sheets, barriers or other activities related to the removal).

.2 From beginning of Work until completion of cleaning operations, Consultant reserves the right to collect air samples inside and outside the enclosure.

 .1 Contractor will be responsible for monitoring asbestos concentrations inside enclosure in accordance with applicable Provincial Occupational Health and Safety Regulations.

.3 Use results of air monitoring inside work area to establish type of respirators to be used. Workers may be required to wear sample pumps for up to full-shift periods.

.1 If fibre levels are above safety factor of respirators in use, stop abatement, apply means of dust suppression, and use higher safety factor in respiratory protection for persons inside enclosure.

 .2 If air monitoring shows that areas outside work area enclosures are contaminated, enclose, maintain and clean these areas, in same manner as that applicable to work areas.

.4 Final air monitoring to be conducted as follows: After Asbestos Work Area has passed visual inspection and acceptable coat of lock-down agent has been applied to surfaces within enclosure, and appropriate settling period has passed, Consultant will perform air monitoring within Asbestos Work Area.

 .1 Final air monitoring results must show fibre levels of less than 0.01 f/cc.

.2 If air monitoring results show fibre levels in excess of 0.01 f/cc, re-clean work area and apply another acceptable coat of lock-down agent to surfaces.

 .3 Repeat as necessary until fibre levels are less than 0.01 f/cc.

**3.7 INSPECTION**

.1 The following inspections will be completed by the Consultant over the duration of the work. The Contractor is to provide minimum 24 hours notice to the Consultant to arrange for inspections. Asbestos Abatement Work shall not proceed until each inspection is completed and approval to proceed is obtained from the Consultant.

.1 Initial Inspection: following completion of hoarding erection but prior to the commencement of removal.

.2 Visual Inspection: following settling period but prior to application of slow-drying sealer to surfaces of the work area.

.3 Final Clearance Inspection and Air Sampling: following application of slow-drying sealer (minimum 16 hours after application of sealer).

.2 All inspections shall be performed to confirm compliance with specification and governing authority requirements. Deviation from these requirements that have not been approved in writing by Consultant may result in Work stoppage, at no cost to Owner.

.3 During inspections the Consultant will inspect Work for:

 .1 Adherence to specific procedures and materials.

 .2 Final cleanliness and completion.

 .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

.4 When asbestos leakage from Asbestos Work Area has occurred or is likely to occur, Consultant may order Work shutdown.

 .1 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

**END OF SECTION**