

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group:
 - .1 CAN/CSA S269.2-M87, Access Scaffolding for Construction Purposes.
 - .2 CSA S350 M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
- .2 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Assessment Act (CEAA), 2012
 - .2 Canadian Environmental Protection Act (CEPA), 2012
 - .1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
 - .2 Hazardous Materials Information Review Act, 1985.

1.2 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose off site, unless indicated to be removed and salvaged or removed and reinstalled.
- .2 Remove and Salvage: Detach items from existing construction and deliver them to Departmental Representative.
- .3 Remove and Reinstall: Detach items from existing construction, prepare them for re-use, and re-install them where indicated.
- .4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled.
- .5 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate selective demolition work so that work of this Section adheres to aesthetic criteria established by the Drawings and specified dimensions with all elements in planes as drawn, maintaining their relationships with all other building elements.
- .2 Coordination: Coordinate with Departmental Representative for the material ownership as follows:

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- .1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Departmental Representative's property, demolished materials shall become Contractor's property and shall be removed from Project site.
- .2 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Departmental Representative that may be encountered during selective demolition remain Departmental Representative's property:
 - .1 Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Departmental Representative.
 - .2 Coordinate with Departmental Representative's historical advisor, who will establish special procedures for removal and salvage.
- .3 Pre-demolition Meeting: Conduct a pre-demolition meeting at Project site, in accordance with requirements listed in Section 01 31 19 – Project Meetings, to confirm extent of salvaged and demolished materials; and to review Contractor's demolition plan prepared by a professional engineer.

1.4 SUBMITTALS

- .1 Provide the following submittals before starting work of this Section:
 - .1 Schedule of Selective Demolition Activities: Coordinate with Section 01 32 16.19 – Demolition Progress Schedule – Bar (GANTT) Chart, and indicate the following:
 - .1 Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
 - .2 Coordinate with Departmental Representative's building manager and user group regarding on-going site operations, and limit the number of interruptions during regular business hours.
 - .3 Interruption of utility services.
 - .4 Coordination for shutoff, capping, and continuation of utility services.
 - .5 Use of elevator and stairs.
 - .6 Locations of temporary partitions and means of egress, including for others affected by selective demolition operations.
 - .7 Coordination with continuing occupancy of portions of existing building.
 - .2 Demolition Plan: Submit a plan of demolition area indicating extent of temporary facilities and supports, methods of removal and demolition prepared by a professional engineer in accordance with requirements of Authority Having Jurisdiction, and as follows:
 - .1 Proposed Dust Control and Noise Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Departmental Representative reserves the right to

make modifications where proposed methods interfere with the Departmental Representative's ongoing operation

- .2 Inventory: Submit a list of items that have been removed and salvaged after selective demolition is complete.
- .3 Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
- .4 Pre-demolition photographs: Submit photographs indicating existing conditions of adjoining construction and site improvements prior to starting Work. Include finish surfaces that may be misconstrued as damage caused by selective demolition operations.

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements: Comply with governing environmental notification requirements and regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction and in accordance with the following:
 - .1 Federal Workers' Compensation Service and Provincial Workers' Compensation Boards/Commissions.
 - .2 Government of Canada, Labour Program: Workplace Safety and Provincial Occupational Health and Safety Standards and Programs.
- .2 Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project:
 - .1 Conform to the Provincial Occupational Health and Safety Act and Regulations.
 - .2 Conform to Provincial Workers' Compensation Board Regulations.

1.6 SITE CONDITIONS

- .1 Portions of building immediately adjacent to selective demolition area will be occupied.
 - .1 Conduct selective demolition so that operations will not be disrupted.
 - .2 Provide not less than 72 hours' notice to Departmental Representative of activities that will affect operations.
- .2 Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities and as follows:
 - .1 Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- .3 Departmental Representative assumes no responsibility for condition of areas to be selectively demolished:
- .4 Hazardous Materials: Hazardous materials are present in building to be selectively demolished. A report on the presence of hazardous materials is attached as an information document to this Section for review and use:

- .1 Examine report to become aware of locations where hazardous materials are present.
- .2 Coordinate with Section 02 61 33 – Hazardous Designated Substance Report.
- .5 Storage or sale of removed items or materials on site will not be permitted.
- .6 Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
- .7 Maintain fire protection facilities in service during selective demolition operations.

Part 2 Products

2.1 MATERIALS

- .1 Temporary Support Structures: Design temporary support structures required for demolition work and underpinning, and other foundation supports necessary for the project using a qualified professional engineer registered or licensed in province of the Work.
- .2 Hoarding and Dust Screens: Refer to Section 01 56 00 – Temporary Barriers and Enclosures for framing and sheathing materials.
- .3 Repair Materials: Use repair materials identical to existing materials:
 - .1 If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - .2 Use materials whose installed performance equal or surpasses that of existing materials.
 - .3 Comply with material and installation requirements specified in individual technical specification Sections.
- .4 Retained Materials: Retain items identified for re use in new construction.
- .5 Floor Patching and Levelling Compounds: Cement based, trowelable, self levelling compounds compatible with specified floor finishes; gypsum based products are not acceptable for work of this Section.
- .6 Gypsum Board Patching Compounds: Joint compound to ASTM C475/C475M, bedding and finishing types thinned to provide skim coat consistency to patch and prepare existing gypsum board walls ready for new finishes in accordance with Section 09 21 16 – Gypsum Board Systems.

2.2 EQUIPMENT

- .1 Provide equipment required for safe and proper demolition of building interiors indicated.

2.3 DEBRIS

- .1 Arrange for transport and disposal of demolished materials from the site.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify that utilities have been disconnected and capped.
- .2 Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- .3 Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- .4 Notify the Departmental Representative where existing mechanical, electrical, or structural elements conflict with intended function or design:
 - .1 Investigate and measure the nature and extent of conflict and submit a written report to Departmental Representative.
 - .2 Departmental Representative will issue additional instructions or revise drawings as required to correct conflict.
- .5 Engage a professional engineer to survey condition of building when removing elements that may result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
- .6 Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

- .1 Coordinate existing services indicated to remain and protect them against damage during selective demolition operations.
- .2 Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
 - .1 Arrange to shut off affected utilities with utility companies.
 - .2 If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
 - .3 Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - .4 Cut off pipe or conduit to a minimum of 25 mm below slab, and remove concrete mound.

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- .3 Coordinate with Mechanical and Electrical Divisions for shutting off, disconnecting, removing, and sealing or capping utilities.
- .4 Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.
- .5 Existing Utilities:
 - .1 Abandon existing utilities and below grade utility structures; cut utilities flush with grade.
 - .2 Demolish existing utilities and below grade utility structures that are within 1500 mm outside of footprint indicated for new construction; abandon utilities outside this area, fill abandoned utility structures with satisfactory soil materials.
 - .1 Piping: Disconnect piping at unions, flanges, valves, or fittings
 - .2 Wiring Ducts: Disassemble into unit lengths and remove plug in and disconnecting devices
 - .3 Demolish and remove existing utilities and below grade utility structures.
 - .1 Piping: Disconnect piping at unions, flanges, valves, or fittings.
 - .2 Wiring Ducts: Disassemble into unit lengths and remove plug in and disconnecting devices

3.3 PREPARATION

- .1 Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.
- .2 Identify and mark all equipment and materials identified to be retained by Departmental Representative or to be re-used in subsequent construction. Separate and store items to be retained in an area away from area of demolition, and protect from accidental disposal.
- .3 Conduct selective demolition and debris removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities:
 - .1 Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Departmental Representative and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
 - .2 Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 - .3 Protect existing site improvements, appurtenances, and landscaping to remain.
 - .4 Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

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- .4 Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain in accordance with Section 01 56 00 – Temporary Barriers and Enclosures, and as follows:
 - .1 Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - .2 Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - .3 Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - .4 Cover and protect furniture, furnishings, and equipment that have not been removed.
- .5 Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
 - .1 Provide temporary weather tight enclosure for building exterior.
 - .2 Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures.
 - .3 Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
- .6 Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise in accordance with Section 01 51 00 – Temporary Utilities.
- .7 Provide and maintain shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished:
 - .1 Strengthen or add new supports when required during progress of selective demolition.
- .8 Do not disrupt active or energized utilities crossing the demolition site.
- .9 Post warning signs on electrical lines and equipment that must remain energized to serve other areas during period of demolition.
- .10 Mark materials required to be re-used, store in a safe place until ready for re installation.

3.4 POLLUTION CONTROLS

- .1 Dust Control: Provide water mist, temporary enclosures, or other suitable methods reviewed and accepted by the Departmental Representative to limit

spread of dust and dirt. Comply with governing environmental protection regulations, and as limited below:

- .1 Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- .2 Wet mop floors to eliminate tracking of dirt, wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.
- .2 Prevent debris from blocking drainage inlets and systems and ground drainage, and protect material and electrical systems and services that must remain in operation.
- .3 Remove and transport debris to prevent spillage on adjacent surfaces and areas.
- .4 Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- .5 Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.
- .6 Provide and maintain fire prevention equipment and alarms accessible during demolition.

3.5 SELECTIVE DEMOLITION

- .1 Demolish and dismantle work in a neat and orderly manner and in accordance with all regulations.
- .2 Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - .1 Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - .2 Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - .3 Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - .4 Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame cutting operations. Maintain [fire watch and] portable fire suppression devices during flame cutting operations.

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- .5 Maintain adequate ventilation when using cutting torches.
- .6 Remove decayed, vermin infested, or otherwise dangerous or unsuitable materials and promptly dispose of off site.
- .7 Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
- .8 Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- .9 Dispose of demolished items and materials promptly.
- .3 Comply with Departmental Representative's requirements for using and protecting stairs, walkways, loading docks, building entries, and other building facilities during selective demolition operations.
- .4 Demolish in a manner to minimize generation and migration of dust.
- .5 Removed and Salvaged Items:
 - .1 Clean salvaged items.
 - .2 Pack or crate items after cleaning.
 - .3 Identify contents of containers.
 - .4 Store items in a secure area until delivery to Departmental Representative.
 - .5 Protect items from damage during transport and storage.
- .6 Removed and Reinstalled Items:
 - .1 Clean and repair items to functional condition adequate for intended re use. Paint equipment to match new equipment.
 - .2 Pack or crate items after cleaning and repairing.
 - .3 Identify contents of containers.
 - .4 Protect items from damage during transport and storage.
 - .5 Reinstall items in locations indicated.
 - .6 Comply with installation requirements for new materials and equipment.
 - .7 Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- .7 Existing Items to Remain:
 - .1 Protect construction indicated to remain against damage and soiling during selective demolition.
 - .2 Items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.
- .8 Concrete:
 - .1 Demolish in small sections.

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- .2 Cut concrete full depth at junctures with construction to remain and at regular intervals, using power driven saw, then remove concrete between saw cuts.
- .3 Neatly trim openings to dimensions indicated.
- .4 Provide temporary shoring as required. Do not drop demolished material. Temporary shoring to be designed by a professional engineer registered in the province of Nova Scotia.
- .9 Structural Steel including but not limited to beams, columns, stairs, catwalks and supports:
 - .1 Demolish in small sections.
 - .2 Cut steel with flame or grinder at junctions with construction to remain.
 - .3 Provide temporary shoring as required. Do not drop demolished material. Temporary shoring to be designed by a professional engineer registered in the province of Nova Scotia.
- .10 Concrete Slabs on Grade: Saw cut perimeter of area to be demolished, then break up and remove.
- .11 Below Grade Construction: Demolish foundation walls and other below grade construction including; but not limited to, the following:
 - .1 Basements.
 - .2 Foundation walls.
 - .3 Footings.
- .12 Masonry:
 - .1 Demolish in small sections.
 - .2 Cut masonry at junctures with construction to remain, using power driven saw, then remove masonry between saw cuts.
- .13 Air Conditioning Equipment: Remove equipment without releasing refrigerants.
- .14 Fill openings in gypsum board walls with gypsum board and wood framing to match existing, skim coat to make wall smooth and even.
- .15 Demolish existing ceramic tile finishes. Remove setting bed or adhesive to the greatest extent possible using mechanical scrapping tools and as follows:
 - .1 Saw cut edge of tile for clean and even transition joint between existing tile to remain and new flooring materials.
 - .2 Lightly shot blast or grind floor to remove remnants of setting materials.
 - .3 Vacuum floor ready for application of skim coating.
 - .4 Repair slab depressions and damage with cementitious patching compound. Skim coat floor with minimum 1 mm thick cementitious floor underlayment compatible with new flooring materials.

- .16 Remove wall coverings scheduled for demolition. Patch and repair wall surfaces with skim coat of gypsum board joint compound leaving wall surfaces smooth and even ready for new wall finishes.
- .17 Floors and Walls:
 - .1 Where walls or partitions that are demolished extend from one finished area into another, patch and repair floor and wall surfaces in the new space.
 - .2 Provide level and smooth surface having uniform finish colour, texture, and appearance.
 - .3 Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.
 - .4 Patch with durable seams that are as invisible as possible.
 - .5 Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - .6 Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
 - .7 Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
- .18 Ceilings: patch, repair, or re hang existing ceilings as necessary to provide an even plane surface of uniform appearance.
- .19 Patch and repair mechanical equipment and electrical fixtures damaged or exposed during demolition to match adjacent finished surfaces.
- .20 At end of each day's work, leave Work in safe condition so that no part is in danger of toppling or falling.

3.6 CLEANING

- .1 Waste Management: Remove waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.
- .2 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) except where explicitly otherwise for materials being salvaged for re use in new construction and as follows:
 - .1 Promptly dispose of demolished materials.
 - .2 Do not allow demolished materials to accumulate onsite.
 - .3 Do not burn demolished materials.
- .3 Divert excess materials from landfill to site approved Departmental Representative.

- .4 Promptly as the Work progresses, and on completion, clean up and remove from the site all rubbish and surplus material. Remove rubbish resulting from demolition work daily.
- .5 Maintain access to exits clean and free of obstruction during removal of debris.
- .6 Keep surrounding and adjoining roads, lanes, sidewalks, municipal rights of way clean and free of dirt, soil or debris that may be a hazard to vehicles or persons.
- .7 Transport material designated for alternate disposal using approved haulers, facilities, receiving organizations listed in DWM Plan and in accordance with applicable regulations.
 - .1 Written authorization from Departmental Representative is required to deviate from haulers, facilities, and receiving organizations listed in DWM Plan.
- .8 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
 - .1 Disposal facilities must be those approved of and listed in DWM Plan.
 - .2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in DWM Plan.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This report of designated or potentially hazardous substances/materials present at this project site is to fulfill the requirements under general duty clauses of the Occupational Health and Safety Act.
- .2 Contractors requesting tenders from subcontractors must furnish this report to subcontractors.
- .3 Be responsible for accurately verifying/calculating the amount of each hazardous material identified and including the removal and disposal of all the identified materials or products in their bid price. Hazardous materials may be found in other areas of the buildings. It is the responsibility of the Contractor to find and handle, remove and dispose of all materials.
- .4 In the event that an item is to be salvaged rather than disposed of, remove the hazardous material to meet applicable guidelines and provide proof to the Departmental Representative.
- .5 Prior to beginning Work, confirm with Departmental Representative that additional hazardous substances/materials have not been brought to the project site.

1.2 DESIGNATED OR HAZARDOUS SUBSTANCES/MATERIALS

- .1 A report is provided as an attachment to the project manual for supporting analytical results and information about the assessment; in the event of a disagreement this project manual takes precedence.
 - .1 "Final Report: Hazardous Materials Survey and Materials Quantification – Bedford Institute of Oceanography Fish Lab Building, Dartmouth, Nova Scotia" prepared by Stantec Consulting Ltd., June 11, 2018.
- .2 Designated or hazardous substances/materials requiring removal include the following:

Table 1 Summary of Findings and Recommendations

Hazard	Material Identified	Recommendations
ACMs	Sealant (brown) associated with ductwork	Material should be removed following Asbestos Abatement Procedures – Minimum

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Hazard	Material Identified	Recommendations
	Tar (black) associated with historical roof penetrations	<p>Precautions (Section 02 82 00.01) and disposed of as non-friable asbestos-containing waste at an approved disposal facility.</p> <p>Brown sealant associated with ductwork was noted on both the insulated and un-insulated ductwork. It is assumed that the duct work plus mastic would be removed as a system and that individual abatement of each joint will not be completed.</p> <p>For the tar (black) associated with historical roof penetrations it was assumed that this material may be present across the entire roof as part of the vapour barrier and remains beneath the new roofing materials. Where roofing work is to be completed for mechanical or electrical removals repairs must consider the potential presence of asbestos materials.</p>
	Texture coat on exterior entrance ceilings over cement board	If required to be disturbed during the planned renovation work, friable material should be removed using Asbestos Abatement Procedures – Maximum Precautions (Section 02 82 00.03) and disposed of as friable asbestos-containing waste at an approved disposal facility.
PACMs	Cement board in good condition associated with the exterior entrances	<p>Given that the texture coat is applied to the PACM cement board, it is assumed that the materials will be removed together.</p>
	Cement board in good condition associated with fume hoods	Material should be tested to confirm the presence/absence of asbestos or removed using Asbestos Abatement Procedures – Minimum Precautions (Section 02 82 00.01) and disposed of as non-friable asbestos-containing waste at an approved disposal facility.
	Gasket material in good condition associated with fume hoods	
	Gasket material in good condition associated with mechanical equipment	If the cement board fume hoods are unable to be removed without breakage, removal must follow Asbestos Abatement Procedures – Maximum Precautions (Section 02 82 00.03).
	Heat shields in good condition associated with lights	Heat shields due to their small size can be managed as a low-risk removal but are

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Hazard	Material Identified	Recommendations
	Fire doors in good condition	typically a friable material.
Lead in paint	Olive green paint on drywall substrate Blue paint on concrete floor Green decorative paint on drywall and concrete substrate	Appropriate worker protection is required if generating dust from well adhered paint. These samples were submitted for lead content analysis and returned results less than the NS Landfill Disposal Guidelines.
Potential lead-containing equipment	Solder on concealed copper piping	Solder on copper piping was visually identified. The removal and handling of suspect lead products (solder) must be conducted in accordance with the Nova Scotia Code of Practice for Working with lead.
Potential PCB-containing equipment	Large switch station	Check small transformer oil and switch station for PCB content prior to removal. If the oil is PCB-containing remove and place in sealed containers and dispose of PCB-containing transformer oil at an approved disposal facility.
	Small transformer	
Mercury-containing equipment	Possible mercury-containing thermostats/thermometers	Check mercury-containing equipment prior to renovation activities. Ensure mercury-containing equipment remains intact to limit worker exposure. Once removed, place in sealed containers and dispose of mercury-containing equipment at an approved disposal facility.
ODSs	Potential ODS-containing equipment includes: air conditioners, refrigerators, refrigerator-freezers, and freezers	This equipment is currently part of an on-going management system with each unit tagged with an identification number and should managed until removed from service at which time it shall be properly disposed of, according to regulations. Confirm with the Owner if remaining portable units are to be sent for disposal or left for the tenants to claim. Air conditioners which are removed from service will require a certified technician to recover the refrigerant prior to removal.

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Hazard	Material Identified	Recommendations
Mould	-	<p>Appropriate worker protection is required when disturbing mould impacted materials. Recommendations provided in the document titled "Mould Guidelines for the Canadian Construction Industry" issued in 2004 should be followed for any work disturbing the apparent mould-impacted materials.</p> <p>There may be concealed mould or apparent mould.</p> <p>There are no special disposal requirements for mould impacted materials.</p>
Silica	Concrete, brick, mortar, and drywall	<p>Appropriate worker protection is required when disturbing these materials. Ensure workers performing activities that generate silica dust such as cutting, sanding, or abrading are not exposed to materials containing crystalline silica in excess of the TLV-TWA of 0.025 mg/m³ (ACGIH) by implementing appropriate dust control practices, and eye and respiratory protection.</p> <p>Silica does not require special disposal requirements. Depending on the planned renovations contractors may need to erect dust control barriers and institute dust mitigation with negative air and water suppression.</p>
Rodent Droppings	Rodent droppings were identified on top of the lay-in ceilings tiles in various locations within the building	<p>Workers removing lay-in ceiling tiles should be made aware of the potential presence of rodent droppings on top of the tiles. A plan / procedure should be developed for assessing areas above tiles to determine if pre-cleaning is required or if routine dust control measures during renovation will be sufficient. Workers may require respiratory protection as part of their personal protective equipment. Prior to reinstatement of new materials, the area should be thoroughly cleaned.</p>

.3 Safety Plan Requirements

- .1 Contractor to prepare site-specific health and safety plans for Contractor workers and subcontractors and suppliers where asbestos, lead, mercury, PCBs, silica, and hazardous biological materials exist. Submit plan to Departmental Representative prior to start of renovation. Renovation

activities must account for the presence of these materials and mitigate the risks to workers prior to and during general renovation work.

END OF SECTION

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Part 1 General

1.1 REFERENCE STANDARDS

- .1 Canadian Environmental Protection Act, 1999 (CEPA 1999)
 - .1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).
- .2 Department of Justice Canada (Jus)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDG Act) 1992, (c. 34).
 - .2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 WHMIS Safety Data Sheets (SDS).
- .4 National Research Council Canada (NRC)
 - .1 National Fire Code of Canada 2015 (NFC).
- .5 Canadian Occupational Health and Safety Regulations, Part X, Division II, Section 10.26.

1.2 DEFINITIONS

- .1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into environment.
- .3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for hazardous materials and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS Safety Data Sheets (SDS) in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures to Departmental Representative for each hazardous material required prior to bringing hazardous material on site.
 - .3 Submit hazardous materials management plan to Departmental Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.

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- .4 Hazardous waste classification: identify waste codes applicable to each hazardous waste material based on applicable federal and provincial acts, regulations, and guidelines. Waste profiles, analyses, and classification submitted to contract offices for review and approval.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
 - .1 When exporting hazardous waste to another country, ensure compliance with Export and Import of Hazardous Waste and Hazardous Recyclable Materials Regulations.
- .2 Storage and Handling Requirements:
 - .1 Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.
 - .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
 - .3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada (NFC) requirements.
 - .4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
 - .1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
 - .2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Departmental Representative.
 - .5 Transfer of flammable and combustible liquids is prohibited within buildings.
 - .6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.
 - .7 Solvents or cleaning agents: non-flammable or have flash point above 38 degrees C.
 - .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
 - .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
 - .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
 - .1 Store hazardous materials and wastes in closed and sealed containers.
 - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.

DEMOLITION

- .3 Store hazardous materials and wastes in containers compatible with that material or waste.
- .4 Segregate incompatible materials and wastes.
- .5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.
- .6 Store hazardous materials and wastes in secure storage area with controlled access.
- .7 Maintain clear egress from storage area.
- .8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.
- .9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
- .10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
- .11 When hazardous waste is generated on site:
 - .1 Co-ordinate transportation and disposal with Departmental Representative.
 - .2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.
 - .3 Use licensed carrier authorized by provincial authorities to accept subject material.
 - .4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.
 - .5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.
 - .6 Only trained personnel handle, offer for transport, or transport dangerous goods.
 - .7 Provide photocopy of shipping documents and waste manifests to Departmental Representative.
 - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to Departmental Representative.
 - .9 Report discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.
- .12 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
- .13 Report spills or accidents immediately to Departmental Representative. Submit a written spill report to Departmental Representative within 24 hours of incident.

DEMOLITION

Part 2 Products

Not Used.

Part 3 Execution

3.1 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.2 DISPOSAL

- .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
- .2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.
- .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
- .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
- .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
- .6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.
- .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
- .8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
 - .1 Hazardous wastes recycled in manner constituting disposal.
 - .2 Lead-acid battery recycling.
 - .3 Hazardous wastes with economically recoverable precious metals.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

- .1 This Section specifies requirements and procedures, if needed, for asbestos abatement of potential and confirmed non-friable asbestos-containing materials at Bedford Institute of Oceanography (BIO) Fish Lab Building on Baffin Boulevard in Dartmouth, Nova Scotia, which are identified in the summary table located in Section 02 61 33.

1.2 SUMMARY

- .1 Comply with requirements of this Section when performing work listed in Section 02 61 33 or the following:
 - .1 Removing non-friable asbestos-containing materials, including duct sealant; roofing tar (interior or exterior); cement board associated with fume hoods; gaskets associated with fume hoods and mechanical equipment; and heat shields associated with lighting, if the material is installed or removed without being broken, cut, drilled, abraded, ground, sanded, or vibrated.
 - .2 Break, cut, grind, sand, drill, scrape, vibrate or abrade non-friable asbestos containing materials using non-powered hand-held tools, and the material is wetted to control the spread of dust or fibres.
 - .3 Removal of metal clad fire doors or wooden fire rated doors if they are removed intact.
 - .4 Do not allow asbestos fibres to be discharged to the air. Air at and adjacent to the Asbestos Abatement Work Area may be monitored by the Departmental Representative and must report asbestos levels not exceeding 0.01 fibres/cm³, as determined by NIOSH Method 7400-A Phase Contrast Microscopy (PCM) report.

1.3 REFERENCE STANDARDS

- .1 Canadian Occupational Health and Safety Regulations, Part X, Division II.
- .2 CSA Group (CSA)
- .3 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
 - .2 SOR/2018-196 Prohibition of Asbestos and Products Containing Asbestos Regulations.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 WHMIS Safety Data Sheets (SDS).
- .5 Nova Scotia Environment:
 - .1 Managing Asbestos in Buildings Code of Practice.
 - .2 Removal of Friable Asbestos Containing Materials - Code of Practice.

DEMOLITION

- .6 Nova Scotia Environmental Act, 1995, Asbestos Waste Management Regulations, N.S. Reg. 53/95 (amended 2017).
- .7 Public Services and Procurement Canada Asbestos Management Directive, dated June 5, 2019.
- .8 Public Services and Procurement Canada Asbestos Management Standard, dated June 5, 2019.
- .9 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .10 Underwriters' Laboratories of Canada (ULC)
- .11 U.S. Department of Health and Human Services/Centers for Disease Control and Prevention (CDC)/National Institute for Occupational Safety and Health (NIOSH)
 - .1 NIOSH 94-113-February 2020, NIOSH Manual of Analytical Methods (NMAM), 5th Edition.

1.4 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 direction at 99.97% efficiency.
- .2 Amended Water: water with nonionic surfactant wetting agent added to reduce water tension to allow thorough wetting of fibres.
- .3 Asbestos-Containing Materials (ACMs): materials that contain 0.5% asbestos and are identified under Existing Conditions including fallen materials and settled dust.
- .4 Asbestos Work Area: area where work takes place which will, or may, disturb ACMs.
- .5 Authorized Visitors: Departmental Representatives, and representatives of regulatory agencies.
- .6 Competent worker: in relation to specific work, means a worker who:
 - .1 Is qualified because of knowledge, training, and experience to perform the work.
 - .2 Is familiar with the federal and provincial laws and with the provisions of the regulations that apply to the work.
 - .3 Has knowledge of all potential or actual danger to health or safety in the work.
- .7 Friable material: means material that:
 - .1 When dry, can be crumbled, pulverized or powdered by hand pressure, or
 - .2 Was a non-friable material that has been crumbled, pulverized or powdered.
- .8 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.

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- .9 Occupied Area: any area of the 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 work.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of asbestos-containing waste in accordance with requirements of authority having jurisdiction.
- .3 Submit a letter to Nova Scotia Department of Labour and Advanced Education to inform them of the project and planned scope of work and provide a copy to the Departmental Representative.
- .4 Submit proof of Contractor's Asbestos Liability Insurance.
- .5 Submit to Departmental Representative necessary permits for transportation and disposal of asbestos-containing waste and proof that asbestos-containing waste has been received and properly disposed.
- .6 Submit proof that all asbestos workers and/or supervisor have received appropriate training and education by a competent person in the hazards of asbestos exposure, good personal hygiene and work practices while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing.
- .7 Submit proof satisfactory to Departmental Representative that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.

1.6 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 requirement applies. Comply with regulations in effect at time Work is performed.
- .2 Health and Safety:
 - .1 Perform construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
 - .2 Safety Requirements: worker protection.
 - .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:
 - .1 Air purifying half-mask respirator with P-100 particulate filter, personally issued to worker and marked as to

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efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.

- .2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area, and the protective clothing shall consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing to include suitable footwear, and to be repaired or replaced if torn.
- .2 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
- .3 Before leaving Asbestos Work Area, the worker can decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in a container for dust and waste. The container to be dust tight, suitable for asbestos waste, impervious to asbestos, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before removal from the work area, and removed from the work area frequently and at regular intervals.
- .4 Facilities for washing hands and face shall be provided within the Contractors decontamination chamber, outside of the Asbestos Work Area.
- .5 Ensure workers wash hands and face when leaving Asbestos Work Area.
- .6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.

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1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, corrugated cardboard, plastic, polystyrene packaging material in appropriate on-site bins for recycling.
- .4 Separate for reuse and recycling and place in designated containers.
- .5 Place materials defined as hazardous or toxic in designated containers.
- .6 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .7 Fold up metal banding, flatten and place in designated area for recycling.
- .8 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial, Territorial, and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 mils bags or leak proof drums. Label containers with appropriate warning labels.
- .9 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.8 EXISTING CONDITIONS

- .1 Refer to Section 02 61 33 for existing conditions information. Notify Departmental Representative of friable material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material pending instructions from Departmental Representative.

1.9 PERSONNEL TRAINING

- .1 Before beginning Work, provide Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene and work practices, and in use, cleaning, and disposal of respirators and protective clothing.
- .2 Instruction and training related to respirators includes, following minimum requirements:
 - .1 Fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided by a competent, qualified person.

DEMOLITION

Part 2 Products

2.1 MATERIALS

- .1 Drop Sheets:
 - .1 Polyethylene: 0.15 mm thick.
 - .2 Fibre Reinforced (FR) polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.
- .2 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.
- .3 Tape: fibreglass - 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 mixed with water in a concentration to provide thorough wetting of asbestos-containing material.
- .5 Waste Containers: contain waste in two separate containers.
 - .1 Inner container: 0.15 mm thick sealable polyethylene waste bag.
 - .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
 - .3 Labelling requirements: affix pre-printed cautionary asbestos warning in both official languages that is visible when ready for removal to disposal site.

Part 3 Execution

3.1 PROCEDURES

- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .2 Before beginning Work, isolate Asbestos Work Area using, minimum, preprinted cautionary asbestos warning signs in both official languages that are visible at access routes to Asbestos Work Area.
 - .1 Remove visible dust from surfaces in the work area where dust is likely to be disturbed during course of work.
 - .2 Use HEPA vacuum or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate.
 - .3 Do not use compressed air to clean up or remove dust from any surface.
 - .4 For duct work covered in insulation it will need to be removed to confirm the presence of the duct mastic that is asbestos containing.

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- .3 Prevent spread of dust from Asbestos Work Area using measures appropriate to work to be done. Where appropriate FR polyethylene drop sheets can be used over flooring in Asbestos Work Area. Drop sheets are not to be reused.
- .4 Wet materials containing asbestos to be cut, ground, abraded, scraped, drilled, or otherwise disturbed unless wetting creates hazard or causes damage.
 - .1 Use garden reservoir type low - velocity fine - mist sprayer.
 - .2 Perform Work to reduce dust creation to lowest levels practicable.
 - .3 Work will be subject to visual inspection and air monitoring.
 - .4 Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.
- .5 Frequently and at regular intervals during Work and immediately on completion of work:
 - .1 Dust and waste to be cleaned up and removed using a vacuum equipped with a HEPA filter, or by damp mopping or wet sweeping, and placed in a waste container, and
 - .2 Drop sheets to be wetted and placed in a waste container as soon as practicable.
- .6 Cleanup:
 - .1 Place dust and asbestos containing waste in sealed dust-tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste; wet and fold these items to contain dust, and then place in plastic bags. Duct work sections with mastic may not fit in standard bags and can be wrapped in 0.15 mm FR polyethylene.
 - .2 Clean exterior of each waste-filled bag or poly wrapped section of duct using damp cloths or HEPA vacuum and place in second clean waste bag or wrap in an additional layer of poly immediately prior to removal from Asbestos Work Area. Exterior must have asbestos warning labels in both official languages.
 - .3 Seal waste bags and remove from site. Dispose of in accordance with requirements of Provincial and Federal Authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that the appropriate guidelines and regulations for asbestos disposal are followed.
 - .4 Perform final thorough clean-up of Work areas and adjacent areas affected by Work using HEPA vacuum.
 - .5 Upon completion of asbestos abatement work, the Contractor will notify the Departmental Representative of the completion.
 - .6 A final inspection shall be carried out by the third party environmental professional, supplied by the Contractor to verify that all asbestos containing materials have been removed and that no dust or debris remains on surfaces as a result of removal activities.
 - .1 Work is subject to visual inspection and air monitoring.
Contamination of surrounding areas indicated by visual inspection

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or air monitoring will require additional asbestos abatement to be completed following Type III Asbestos Abatement (Maximum Precautions) procedures and clean-up of affected areas.

- .7 Do not allow asbestos fibres to be discharged to the air. Air at and adjacent to the Asbestos Abatement Work Area may be monitored by the third party environmental professional, supplied by the Contractor and must report asbestos levels not exceeding 0.01 fibres/cm^3 , as determined by NIOSH Method 7400-A Phase Contrast Microscopy (PCM) report.
 - .1 Contractor will be responsible to hire third party environmental professional to conduct all air monitoring, clearance testing and abatement verifications, including the submittal of reports for approval by the Departmental Representative.
 - .2 Clearance air testing shall be in compliance with latest (November 21, 2013) Nova Scotia guidance documents.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

- .1 This Section specifies requirements and procedures, if needed, for asbestos abatement of potential and confirmed asbestos-containing materials at Bedford Institute of Oceanography (BIO) Fish Lab Building on Baffin Boulevard in Dartmouth, Nova Scotia, which are identified in the summary table located in Section 02 61 33.

1.2 SUMMARY

- .1 Comply with requirements of this Section when performing following Work:
 - .1 Removal of texture coat applied to cement board.
 - .2 Removal of cement board fume hoods if unable to remove without breakage.
 - .3 Do not allow asbestos fibres to be discharged to the air. Air at and adjacent to the Asbestos Abatement Work Area may be monitored by the Departmental Representative and must report asbestos levels not exceeding 0.01 fibres/cm³, as determined by NIOSH Method 7400-A Phase Contrast Microscopy (PCM) report.

1.3 REFERENCE STANDARDS

- .1 Canadian Occupational Health and Safety (COHS) Regulations, Part X, Division II.
- .2 CSA Group (CSA)
- .3 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
 - .2 SOR/2018-196 Prohibition of Asbestos and Products Containing Asbestos Regulations.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 WHMIS Safety Data Sheets (SDS).
- .5 Nova Scotia Environment:
 - .1 Managing Asbestos in Buildings Code of Practice.
 - .2 Removal of Friable Asbestos Containing Materials - Code of Practice.
- .6 Nova Scotia Environmental Act, 1995, Asbestos Waste Management Regulations, N.S. Reg. 53/95 (amended 2017).
- .7 Public Services and Procurement Canada Asbestos Management Directive, dated June 5, 2017.
- .8 Public Services and Procurement Canada Asbestos Management Standard, dated June 5, 2017.

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- .9 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .10 Underwriters' Laboratories of Canada (ULC)
- .11 U.S. Department of Health and Human Services/Centers for Disease Control and Prevention (CDC)/National Institute for Occupational Safety and Health (NIOSH)
 - .1 NIOSH 94-113-February 2020, NIOSH Manual of Analytical Methods (NMAM), 5th Edition.

1.4 DEFINITIONS

- .1 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 2 m apart.
- .2 Amended Water: water with a non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.
- .3 Asbestos Containing Materials (ACMs): materials that contain 0.5% asbestos and are identified under Existing Conditions including fallen materials and settled dust.
- .4 Asbestos Work Areas: area where work takes place which will, or may disturb ACMs.
- .5 Authorized Visitors: Departmental representatives, and representatives of regulatory agencies.
- .6 Competent worker: in relation to specific work, means a worker who:
 - .1 Is qualified because of knowledge, training and experience to perform the work.
 - .2 Is familiar with the federal and provincial laws and with the provisions of the regulations that apply to the work.
 - .3 Has knowledge of all potential or actual danger to health or safety in the work.
- .7 Curtained doorway: arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed as follows:
 - .1 Place two overlapping sheets of polyethylene over existing or temporarily framed doorway, secure each along top of doorway, secure vertical edge of one sheet along one vertical side of doorway, and secure vertical edge of other sheet along opposite vertical side of doorway.
 - .2 Reinforce free edges of polyethylene with duct tape and weight bottom edge to ensure proper closing.
 - .3 Overlap each polyethylene sheet at openings not less than 1.5 m on each side.
- .8 DOP Test: testing method used to determine integrity of Negative Pressure unit using dioctyl phthalate (DOP) HEPA-filter leak test.

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- .9 Friable Materials: means material that:
 - .1 When dry can be crumbled, pulverized or powdered by hand pressure, or
 - .2 Was a non-friable material that has been crumbled, pulverized or powdered.
- .10 Glove Bag: prefabricated glove bag as follows:
 - .1 Minimum thickness 0.25 mm (10 mil) polyvinyl-chloride bag.
 - .2 Integral 0.25 mm (10 mil) 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.
- .11 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .12 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.
 - .1 System to maintain minimum pressure differential of 5 Pa relative to adjacent areas outside of work areas, be equipped with alarm to warn of system breakdown, and be equipped with instrument to continuously monitor and automatically record pressure differences.
- .13 Non-Friable Materials: material that when dry cannot be crumbled, pulverized or powdered by hand pressure does not include debris or broken material.
- .14 Occupied Areas: any area of building or work site that is outside Asbestos Work Area.
- .15 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.
- .16 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must be appropriate capacity for scope of work.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Before beginning work:
 - .1 Obtain from appropriate agency and submit to Departmental Representative necessary permits for transportation and disposal of asbestos waste. Ensure that dump operator is fully aware of hazardous nature of material being dumped, and proper methods of disposal. Submit proof satisfactory to Departmental Representative that suitable

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arrangements have been made to receive and properly dispose of asbestos waste.

- .2 Submit proof satisfactory to Departmental Representative that all asbestos workers have received appropriate training and education by a competent person on hazards of asbestos exposure, good personal hygiene, entry and exit from Asbestos Work Area, aspects of work procedures and protective measures while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing. Submit proof of attendance in form of certificate.
- .3 Ensure supervisory personnel have attended asbestos abatement course, of not less than two days duration, approved by Departmental Representative. Submit proof of attendance in form of certificate. Minimum of one Supervisor for every ten workers.
- .4 Submit layout of proposed enclosures and decontamination facilities to Departmental Representative for review.
- .5 Submit documentation including test results for sealer proposed for use.
- .6 Submit a letter to Nova Scotia Department of Labour and Advanced Education to inform them of the project and planned scope of work and provide a copy to the Departmental Representative.
- .7 Submit proof of Contractor's Asbestos Liability Insurance.
- .8 Submit proof satisfactory to Departmental Representative that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.
- .9 Submit Worker's Compensation Board status and transcription of insurance.
- .10 Submit documentation including test results, fire and flammability data, and WHMIS Safety Data Sheets (SDS) for chemicals or materials including but not limited to following:
 - .1 Encapsulants.
 - .2 Amended water.
 - .3 Slow drying sealer.

1.6 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 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
 - .2 Safety Requirements: worker and visitor protection.
 - .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area includes:

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- .1 Powered air purifying respirator (PAPR) with P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced before being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.
- .2 Disposable type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area, and the protective clothing to consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing. It includes suitable footwear, and it to be repaired or replaced if torn. 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 work suits 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

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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.
- .2 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
- .3 Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures before commencing actual asbestos abatement.
- .4 Provide and post in Clean Change Room and in Equipment and Access Room the procedures described in this Section, in both official languages.
- .5 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.
- .6 Visitor Protection:
 - .1 Provide protective clothing. Authorized Visitors are required to provide their own approved respirators.
 - .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.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

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- .3 Collect and separate for disposal paper, corrugated cardboard, plastic, polystyrene, packaging material in appropriate on-site bins for recycling.
- .4 Separate for reuse and recycling and place in designated containers.
- .5 Place materials defined as hazardous or toxic in designated containers.
- .6 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .7 Fold up metal banding, flatten and place in designated area for recycling.
- .8 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial, and Municipal regulations. Dispose of asbestos waste in sealed double thickness 0.15 mm bags or leak proof drums. Label containers with appropriate warning labels.
- .9 Provide manifests describing and listing waste created. Transport containers by approved means to licenced landfill for burial.

1.8 EXISTING CONDITIONS

- .1 Refer to Section 02 61 33 for existing conditions information. Notify Departmental Representative of suspect asbestos containing material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative.

1.9 SCHEDULING

- .1 Not later than ten (10) days before beginning Work on this Project notify following in writing:
 - .1 Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.
 - .2 Regional Office of Labour Canada.
 - .3 Provincial/Department of Labour.
 - .4 Disposal Authority.
- .2 Inform sub-trades of presence of asbestos containing materials identified in Existing Conditions.
- .3 Submit to Departmental Representative copy of notifications before start of Work.

1.10 PERSONNEL TRAINING

- .1 Before beginning Work, provide to Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene including dress and showers, in entry and exit from Asbestos Work Area, in aspects of work procedures including glove bag procedures, and in use, cleaning, and disposal of respirators and protective clothing.
- .2 Instruction and training related to respirators includes, at minimum:
 - .1 Proper fitting of equipment.

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- .2 Inspection and maintenance of equipment.
- .3 Disinfecting of equipment.
- .4 Limitations of equipment.
- .3 Instruction and training must be provided by competent, qualified person.
- .4 Supervisory personnel to complete required training.

Part 2 Products

2.1 MATERIALS

- .1 Polyethylene: minimum 0.15 mm thick unless otherwise specified; in sheet size to minimize joints.
- .2 Fibre Reinforced (FR) polyethylene: minimum 0.15 mm thick, woven fibre reinforced fabric bonded both sides with polyethylene.
- .3 Tape: fibreglass - 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 material approved by Departmental Representative, mixed with water in concentration to provide adequate penetration and wetting of asbestos containing material.
- .5 Waste Containers: contain waste in two separate containers.
 - .1 Inner container: 0.15 mm thick sealable polyethylene bag or where glove bag method is used, glove bag itself.
 - .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
 - .3 Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site. Label containers in accordance with Canadian Occupational Health and Safety Regulations, Part X, Division II. Label in both official languages.
- .6 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 The glove bag to be equipped with:
 - .1 Sleeves and gloves that are permanently sealed to the body of the bag to allow the worker to access and deal with the insulation and maintain a sealed enclosure throughout the work period.
 - .2 Valves or openings to allow insertion of a vacuum hose and the nozzle of a water sprayer while maintaining the seal to the pipe, duct or similar structure.

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- .3 A tool pouch with a drain.
- .4 A seamless bottom and a means of sealing off the lower portion of the bag.
- .5 A high strength double throw zipper and removable straps, if the bag is to be moved during the removal operation.
- .7 Tape: tape suitable for sealing polyethylene to surfaces under both dry and wet conditions using amended water.
- .8 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.
- .9 Sealer: flame spread and smoke developed rating less than 50 and be compatible with new fireproofing.
- .10 Encapsulants:
 - .1 Lock Down Encapsulant: translucent to facilitate future inspections of structural members and any items requiring surface visibility exposure for future inspection. Encapsulant shall be capable of accepting paint in the event that painting of surface is required at a future date.

Part 3 Execution

3.1 PREPARATION

- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .2 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 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.
 - .3 The spread of dust from the work area to be prevented by:
 - .1 Using enclosures of polyethylene or other suitable material that is impervious to asbestos (including, if the enclosure material 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.
 - .2 Using curtains of polyethylene sheeting or other suitable material that is impervious to asbestos, fitted on each side of each entrance or exit from the work area.

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- .4 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. The system to maintain a negative air pressure of 0.02 inches / 5 Pa of water, relative to the area outside the enclosed area. The system to be inspected and maintained by a competent person prior each use to ensure that there is no air leakage, and if the filter is found to be damaged or defective, it to be replaced before the ventilation system is used.
 - .5 Seal off openings such as corridors, doorways, windows, skylights, ducts, grilles, and diffusers, with polyethylene sheeting sealed with tape.
 - .6 Build airlocks at entrances to and exits from work areas so that work areas are always closed off by one curtained doorway when workers enter or exit.
 - .7 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 ASBESTOS HAZARD AREA (25 mm) NO UNAUTHORIZED ENTRY (19 mm) WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)".
 - .8 Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to Provincial Fire Marshall having jurisdiction.
 - .9 Where application of water is required for wetting asbestos containing materials, shut off electrical power, provide ground fault interrupter circuits on power source separate circuit from the NUAs and tools being used, in accordance with applicable CSA Standard. Ensure safe installation of electrical lines and equipment.
 - .10 After preparation of work areas and Decontamination Enclosure Systems, remove texture coat on ceilings, including cement board, and dispose of as contaminated waste in specified containers. Spray asbestos debris and immediate work area with amended water to reduce dust, as work progresses.
 - .11 If fume hoods can not be dismantled without breaking the cement board panels a maximum precaution enclosure is required for the abatement of this material.
- .3 Worker Decontamination Enclosure System:
- .1 Worker 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 areas, with two curtained doorways, one to Shower Room and one to work areas. Install portable toilet, waste receptor, and storage facilities for workers' shoes and protective clothing to be reworn in work areas. Build Equipment and Access Room large enough to accommodate

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- 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 one to Equipment and Access Room. Provide one shower for every five workers. Provide constant supply of hot and cold water. Pump waste water through 5 micrometre filter system acceptable to Departmental Representative before directing into 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 workers' street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install mirror to permit workers to fit respiratory equipment properly.
- .4 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, labelling 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 waste containers 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.
- .5 Construction of Decontamination Enclosures:

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- .1 Build suitable framing for enclosures or use existing rooms where convenient, and line with polyethylene sheeting sealed with tape.
- .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.
- .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 Departmental Representative.
- .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 areas 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 contaminated areas is possible.
 - .7 Notifications have been completed and other preparatory steps have been taken.

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 containing 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.

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- .2 Remove saturated asbestos material in small sections. Do not allow saturated asbestos to dry out. As it is being removed pack material in sealable plastic bags 0.15 mm minimum thick and place in labelled containers for transport.
- .3 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 areas dressed in clean coveralls.
- .4 After completion of stripping work, wire brushed and wet sponged surfaces from which asbestos has been removed to remove visible material. During this work keep surfaces wet.
- .5 Work is subject to visual inspection and air monitoring by the third party environmental professional retained by the Contractor. Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.
- .6 Cleanup:
 - .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 asbestos containing 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 Provincial/Territorial and Federal 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.
 - .5 Perform final thorough clean-up of Asbestos Work Areas and adjacent areas affected by Work using HEPA vacuum.

3.4 FINAL CLEANUP

- .1 Following cleaning specified above, and when air sampling by the third party environmental professional retained by the Contractor shows that asbestos levels on both sides of seals 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 7400-A, proceed with final cleanup.
- .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 labelled 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 clean-up 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 and carry out air monitoring again to ensure that asbestos levels in building do not exceed 0.01 fibres/cc. Repeat cleaning using HEPA vacuum equipment, or wet cleaning methods where feasible, in conjunction with sampling until levels meet this criteria.
- .7 As work progresses, and to prevent exceeding available storage capacity on site, remove sealed and labelled 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 AIR MONITORING

- .1 From beginning of Work until completion of cleaning operations, a third party environmental professional supplied by the Contractor, will perform air monitoring, inside and outside of the Work Area following methods applicable with Federal (COHS) as well as Provincial Occupational Health and Safety Regulations. COHS requires daily air samples in the clean room and at least one perimeter air sample. COHS also requires periodic air sampling from inside the enclosure; for this project periodic is at least one per enclosure and each week following if the enclosure is present for more than seven days. Perimeter and clean room samples are to be low-flow (2 litre/min) collected over an 8 hour period.
- .2 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.
- .3 During course of Work, a third party environmental professional, supplied by the Contractor, will perform air monitoring, inside and outside of the Work Area to measure fibre means air samples analyzed by Phase Contrast Microscopy (PCM).

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- .1 Stop Work when PCM measurements exceed 0.01 fibres/cm³, as determined by NIOSH Method 7400-A Phase Contrast Microscopy (PCM).
- .4 Final air monitoring to be conducted as follows: After Asbestos Work Area has passed visual inspection by the Departmental Representative the Contractor is to apply an acceptable coat of slow-drying sealer to surfaces within enclosure. After an appropriate setting period of no less than 12 hours has passed the Departmental Representative will perform air monitoring within Asbestos Work Area by aggressive methods, where federal and provincial regulations require.
 - .1 Final air monitoring results must show fibre levels of less than 0.01 fibres/cm³, as determined by NIOSH Method 7400-A Phase Contrast Microscopy (PCM) report.
 - .2 Contractor will be responsible to hire third party environmental professional to conduct all air monitoring, clearance testing and abatement verifications, including the submittal of reports for approval by the Departmental Representative. Copies of proficiency certificates are required for each staff member preparing analytical reports for air sampling.
 - .3 If air monitoring results show fibre levels in excess of 0.01 fibres/cm³, re-clean work area and apply another acceptable coat of slow-drying sealer to surfaces.
 - .4 Repeat at no additional cost as necessary until fibre levels are less than 0.01 fibres/cm³.
 - .5 Clearance air testing shall be in compliance with latest Nova Scotia guidance documents.

3.6 INSPECTION

- .1 Perform inspection of Asbestos Work Area to confirm compliance with specification and governing authority requirements. Deviations from these requirements that have not been approved in writing by Departmental Representative may result in Work stoppage, at no cost to Owner.
- .2 Departmental Representative 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.
- .3 When asbestos leakage from Asbestos Work Area has occurred or is likely to occur Departmental Representative 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

Part 1 General

1.1 WORK INCLUDED

- .1 This Section specifies requirements and procedures, if needed, for miscellaneous hazardous waste abatement of potential and confirmed hazardous waste at Bedford Institute of Oceanography (BIO) Fish Lab Building on Baffin Boulevard in Dartmouth, Nova Scotia, which are identified in the summary table located in Section 02 61 33.

1.2 SUMMARY

- .1 Remove and dispose of all lead-, PCB-, mercury-, ODS-containing materials, as well as mould, silica, and animal waste. The Contractor will be responsible for accurately verifying/calculating the amount of each hazardous material and confirming the removal and disposal of all the identified materials or products are included in their bid price.
- .2 Comply with requirements of this Section when performing the following Work:
 - .1 Handling, packaging, and transferring materials containing lead, PCBs, mercury, and ODSs. Such as, but not limited to, solder on copper piping; switch gear and transformers, light tubes, thermostats; and equipment containing ODS.
 - .2 Several areas with minor amounts of surficial mould growth were observed in 2018, at the time of the assessment. It is the Contractor's responsibility to determine the presence or absence of mould growth currently within the project area. There may be concealed mould or apparent mould. Notify Departmental Representative of suspected mould growth discovered during Work. Do not disturb such material until instructed by Departmental Representative.
 - .3 Spill response: conduct spill response training and have a plan in place and maintain sufficient equipment and materials on-site to respond to a discharge of materials which occurs during waste handling.

1.3 REFERENCE STANDARDS

- .1 Handbook on PCBs in Electrical Equipment, EPS, 2004.
- .2 Canadian Council of Ministers of the Environment:
 - .1 Guidelines for the Management of Wastes Containing Polychlorinated Biphenyl (PCBs), EPS 9/HA/1, September 1989.
- .3 Identification of Lamp Ballasts Containing PCBs, Environment Canada's Document (EPS/CC/2, August 1991).
- .4 Department of Justice
 - .1 Transportation of Dangerous Goods Act, 1992 (1992, c. 34)
- .5 Nova Scotia

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- .1 Occupational Health and Safety Act, 1996, and Amendments.
- .6 Environmental Contaminants Act, Environment Canada and Health and Welfare Canada.
- .7 Canadian Environmental Protection Act, C 33, 1999, and all Amendments.
- .8 Guidelines for Disposal of Contaminated Solids in Landfills, March 22, 1994 (and all amendments), Nova Scotia Department of Environment.
- .9 Solid Waste-Resource Management Regulations, Nova Scotia Department of Environment.
- .10 Ozone Layer Protection Regulations, N.S. Reg. 54/95, 1995.
- .11 Federal Halocarbon Regulations, 2003 SOR/2003-289 (and all amendments).
- .12 Ozone-depleting Substances and Halocarbon Alternatives Regulations, SOR/2016-137
- .13 Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems, April 2015.
- .14 Mould Guidelines for the Canadian Construction Industry, Canadian Construction Association, 2004 (and all amendments).
- .15 Silica on Construction Projects, Ontario Ministry of Labour, Training and Skills Development, September 2004 (and all amendments).

1.4 REMOVAL QUALIFICATIONS

- .1 Where contact with hazardous materials is expected, instruct personnel in handling procedures, safety precautions, use of safety equipment and applicable Provincial Federal legislation and regulations.

1.5 MANAGEMENT OF WASTES

- .1 Provide the containers for use in the transportation and disposal of lead containing materials and equipment.
- .2 Provide the containers for use in the transportation and disposal of PCB-containing materials and equipment.
- .3 Provide the containers for use in the transportation and disposal of mercury containing materials and equipment.
- .4 Provide the containers for use in the transportation and disposal of ODS containing materials and equipment.
- .5 Be responsible for the pick-up and delivery of the containers from and to the proposed hazardous materials handling facility.
- .6 All other containers and the disposal of all other hazardous and non-hazardous materials is the responsibility of the Contractor unless indicated otherwise in this and other sections of the specifications.

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1.6 REGULATORY REQUIREMENTS

- .1 Comply with the Following:
 - .1 Canadian Environmental Protection Act (Canada) and pursuant regulations.
 - .2 Transportation of Dangerous Goods Act (Canada).
 - .3 All other legislation and regulations which apply to the performance of the Work of this section.

1.7 HANDLING AND WORKERS PROTECTION

- .1 Follow Provincial and Federal regulations relating to proper personal protective equipment and Work procedures for removal, handling, and disposal of hazardous materials; provided that in case of conflict among these requirements or with these specifications the more stringent requirements applies. Comply with regulations in effect at the time the Work is performed.
- .2 Provide workers with additional protective clothing and equipment where contact with hazardous materials may occur. Provide clothing and equipment appropriate for the potential level of exposure.
- .3 Inform personnel removing hazardous materials of the hazards associated with exposure to the materials and the procedures that are to be followed if they come in contact with the hazardous material.

Part 2 Products

2.1 MATERIALS

- .1 Absorptive Material: PCBs absorptive material that creates a quasi-solid product which can be swept or shoveled. Acceptable materials include:
 - .1 Sawdust.
 - .2 Vermiculite (confirmed to be non-asbestos).
 - .3 Activated Charcoal.
 - .4 Oclansorb.
 - .5 Imbibitor Beads.
 - .6 Hi-Dry.
 - .7 Desorb.
 - .8 Stay-Dry.
 - .9 Oil-Dry.
 - .10 Conwed.
 - .11 3M Matting.
 - .12 Graboil.
- .2 Disposal containers for PCBs-containing ballasts:
 - .1 200 litre capacity metal drums.

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- .3 Polyethylene Sheeting: 0.15 mm (6 mil) minimum thickness unless otherwise specified.
- .4 Hazardous waste bags: minimum 0.15 mm thick polyethylene bags complete with wire ties. All hazardous waste, as well as materials contaminated with Hazardous Materials, must be double bagged. Each bag must be wire-tie closed.

Part 3 Execution

3.1 PREPARATION

- .1 The Work Area will be isolated during the removal of hazardous materials.
- .2 Maintain emergency and fire exits from Work Area.

3.2 REMOVAL OF LEAD-CONTAINING MATERIALS

- .1 Identify all lead-containing materials and submit to the Departmental Representative, a list of the identified materials at the Work Area.
- .2 Lead concentrations in olive green paint on drywall substrate, blue paint on concrete floor, and green decorative paint on drywall and concrete substrate were found to contain lead above the Canadian Surface Coating Materials Regulations (90 mg/kg), however, lead was below the landfill disposal guideline (1,000 mg/kg). Appropriate worker protection is required if generating dust from well adhered paint.
- .3 Remove materials and dispose in a manner approved by Departmental Representative, and in accordance with regulations of Authorities having jurisdiction.

3.3 REMOVAL OF ODS-CONTAINING MATERIALS

- .1 Identify all ODS-containing materials and submit to the Departmental Representative, a list of the identified materials at the Work Area.
- .2 Remove materials and dispose in a manner approved by Departmental Representative, and in accordance with regulations of Authorities having jurisdiction.

3.4 REMOVAL OF MERCURY-CONTAINING MATERIALS

- .1 Identify all mercury-containing materials (thermostats, switches, etc.) and submit to the Departmental Representative, a list of the mercury contaminated materials identified at the Work Area. Fluorescent lighting may be present in the building and is suspected to contain mercury vapour. During the 2018 assessment the majority of the light fixtures were noted to be LED style bulbs.
- .2 For materials containing mercury, follow Provincial and Federal regulations regarding removals with respects to respiratory gear, proper clothing, handling of materials, ventilation, etc. The procedure for handling these materials must be submitted to the Departmental Representative prior to removals.

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- .3 All workers are to be given an orientation to the project including a discussion of exposure, routes, the toxicity of mercury, and the protective equipment to be used during removals. These procedures will also include the hazards associated with mercury spills and the proper method of clean up if a spill occurs and the medical procedures used by the worker if the spilled mercury comes in contact with the worker's skin.
- .4 Carefully remove all materials containing mercury from their operating position with special attention not to damage the container holding the mercury material and to avoid having mercury come in contact with the worker. Carefully place items containing mercury in a 0.15 mm thick plastic bag, double bagged and sealed tightly with a wire tie or alternately may be wrapped in polyethylene sheeting and sealed with tape.
- .5 Be responsible for the proper disposal of mercury-containing materials.
- .6 Tubes must be collected for recycling/disposal in accordance with the Code of Practice for the Environmentally Sound Management of End-of-Life Lamps Containing Mercury and ballasts checked for the presence of PCBs to determine disposal.

3.5 REMOVAL OF PCB-CONTAINING MATERIALS

- .1 Examine fluorescent light fixtures upon removal. Verify the total number of PCBs-containing ballasts. Identify ballasts containing PCBs with reference to Identification of fluorescent lamp ballasts containing PCBs EPS/CC/2, August 1991 or through contact with manufacturer.
- .2 For materials containing PCBs, follow provincial and federal regulations regarding removals with respects to respiratory gear, proper clothing, handling of materials, ventilation, etc. The procedure for handling these materials must be submitted to the Departmental Representative prior to removal.
- .3 All ballasts which cannot be identified as non PCBs-containing, with reference to above, will be treated as containing PCBs.
- .4 Submit a list to the Departmental Representative showing the total number of light ballasts containing PCBs complete with model number and date codes.
- .5 Remove all PCBs-containing ballasts as follows:
 - .1 Remove entire ballast, including capacitor, for fluorescent lights.
 - .2 Cut off excess wire and dispose of as construction waste.
 - .3 Place ballast into plastic lined disposal drums.
- .6 Pack drum with sufficient absorbent material to absorb any PCBs which may leak from ballasts.
- .7 Dispose of PCBs-contaminated gloves and work clothes in drums as PCBs waste. Contaminated gloves and other personal protective equipment (PPE) will be stored in separate drums to facilitate disposal.

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- .8 Label drums containing waste PCBs in accordance with CCME Guidelines for the Management of Wastes Containing Polychlorinated Biphenyl (PCBs), EPS 9/HA/1, September 1989.
- .9 Seal drum and store in a designated storage area pending transportation.
- .10 Be responsible for the proper disposal of PCB-containing materials.
- .11 All non PCBs-containing ballasts will be disposed of by the contractor.

3.6 REMOVAL OF OTHER HAZARDOUS MATERIALS

- .1 Be responsible for the removal, handling and disposal of all other hazardous materials present in the structure, in accordance with requirements of Authorities having jurisdiction, unless specified. Stockpiling of hazardous waste on site is prohibited unless authorized by Departmental Representative, or Provincial and Federal Environmental Departments.
- .2 Appropriate worker protection is required when disturbing silica-containing materials. Ensure workers performing activities that generate silica dust such as cutting, sanding, or abrading are not exposed to materials containing crystalline silica in excess of the ACGIH TLV-TWA limit of 0.025 mg/m³ for occupational exposure by providing respiratory protection and skin protection. Silica does not require special disposal requirements. A third party environmental professional, supplied by the Contractor, will perform air monitoring during the work. The Departmental Representative will collect a clearance air sample at the conclusion of the Project.
- .3 Appropriate worker protection is required when disturbing mould-impacted materials. Mould does not require special disposal requirements.
- .4 Rodent droppings were noted above the ceiling tiles in some areas. The dust from dry rodent droppings may present health risks to exposed workers and appropriate measures must be taken to prevent the dust from becoming airborne during renovation activities. This may require the development of a safe work practice, which contains the methods of control, including dust suppression and the use of personal protective equipment (notably respiratory protection). Prior to reinstatement of new materials, the area should be thoroughly cleaned. There are no special disposal requirements.

END OF SECTION