HWDSB

HVAC AND BOILER UPGRADES TO

GLENDALE SECONDARY SCHOOL

145 RAINBOW DRIVE, HAMILTON, ON

ARCHITECTURAL SPECIFICATIONS

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HVAC and Boiler Upgrades to GLENDALE SECONDARY SCHOOL

145 Rainbow Drive, Hamilton, ON

HAMILTON-WENTWORTH DISTRICT SCHOOL BOARD *February 2024*

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ARCHITECTURAL ITEMS:

1.1 Description of Work

.1 Work under this Contract in general covers, but is not limited to, HVAC and Boiler upgrades and associated works to Glendale Secondary School for the Hamilton-Wentworth District School Board.

a) The project includes new rooftop units, new unit ventilators, new boilers, new ductwork, new ceilings and lighting all in accordance with the Contract Documents.

1.2 Documents Required

.1 Maintain at job site, one copy each of following:

a) Contract drawings
b) Specifications
c) Addenda
d) Reviewed shop drawings
e) Change Orders and Contemplated Change Notices
f) Site/Field Instructions
g) Other modifications to contract
h) Field test reports
i) Copy of approved work schedule
j) Manufacturers' installation and application instructions.
k) List of Sub-contractors
l) As-built Drawings
m) Minutes of Site Meetings

1.3 Specifications

.1 Portions of Specifications are written in short form. Therefore, it shall be understood that where item of Work is stated in heading followed by material, equipment, component, or operation, words "shall be", "shall consist of" or similar words or phrases are implied which denote supply, fabricate and supply, install, provide or commission of such materials, equipment or operations for component of Work designated by heading.

.2 Whenever used in Specifications following definitions shall apply:

a) SUPPLY - Procurement or fabrication of standard components not to special design of materials, equipment, or components, or performance of services to extent indicated. Where used with respect to materials, equipment, or components, term shall include delivery to Site but is not intended to include installation of item, either temporary or final.

b) FABRICATE AND SUPPLY - Fabrication of materials, equipment or component, to special customized design to extent indicated including delivery to Site, assisting in form of supervision to those Section(s) installing materials, equipment or component. Term does not include installation of item either temporary or final.

c) INSTALL - Placement of materials, equipment, or components, including receiving, unloading, transporting, storage, uncrating and installing, and performance of such testing and finish work as is compatible with degree of installation specified complete ready for use.

d) PROVIDE - To Supply and Install, compete and in place, including accessories, finishes, tests and services as required to render item so specified complete ready for use.

e) COMMISSION - Startup and initial operation of equipment as required and/or as specified in respective Sections, to demonstrate satisfactory operation of components and entire system including calibration of any control instrumentation as required to maintain operations.

.3 Drawings, Lists or Schedules of Items are intended to show scope and arrangement of work. For location of item described refer to such Drawings, Lists or Schedules unless location stipulated in Specifications.

.4 Wherever words "acceptable", "approved", "reviewed", "satisfactory", "selected", "directed", "designated", "permitted", "inspected", "instructed", "clarification", "required", "report", "submit", "obtain", "consult", "advise", or similar words or phrases are used in Standards or in Contract Documents, it shall be understood that, unless context provides otherwise words "by/to/with/from the Architect shall follow them as applicable.

1.4 Work Schedule .1 No work shall commence on the project or portion of the project without assurance that the delivery of critical materials to complete the project is in place.
It is the expectation of the Hamilton Wentworth District School Board (HWDSB) that the Contractor will order the necessary materials upon award of the Contract.

.2 Provide within 10 working days after Contract award, schedule showing anticipated progress stages and final completion of work within time period stated on the Tender Form.

.3 In accordance with schedule and in form acceptable to the Architect provide within (14) working days after contract award, schedule showing dates for:

a) Submission of shop drawings, material lists, and samples.
b) Delivery of the following items of equipment and materials (as required for project)

.3 Interim reviews of work progress on work schedule will be conducted as described by Architect and schedule updated by Contractor in conjunction with and with approval of Architect.

1.5 Contractor's Use

.1 USE OF SITE: Limit to those areas of the site designated by the Owner. Operators and activities should allow for storage, parking, deliveries, exits, fire safety and construction.

.2 Do not unreasonably encumber site with materials or equipment.

.3 Obtain and pay for use of additional storage or work areas needed for operations.

1.6 Partial Occupancy of Use

.1 Contractor to coordinate the Work with the continuing use of the remainder site.

1.7 Standards

.1 Where reference is made to specification standards produced by various organizations, conform to edition of standards specified or, if not specified, to latest edition as amended and revised to date of Contract.

.2 If requested provide copy on Site of such standard(s).

.3 Where standard designated authorities such as "Engineer", Designer", "Purchaser" or some other such designation, these designations shall be taken to mean "Architect".

1.8 Building Code

.1 Comply with The Building Code Act, as amended; and the Building Code, as amended; and Regulations and by-laws of other authorities having jurisdiction including latest amendments thereto: all hereafter referred to as Code where Code or Contract Documents do not cover particular requirement which is covered by National Building Code, 2005 conform to requirements of NBC including its related supplements. Where Drawings and/or Specifications exceed Code requirements satisfy such additional requirements.

.2 Where material is designated in Contract Documents for certain application, unless otherwise specified, that material shall conform to standards designated in Code and in absence of more restrictive requirement comply with "Housing and Small Buildings Part 9" of Code. Similarly, unless otherwise specified, and not required otherwise by Code, installation methods and standards of workmanship shall also conform to standards of

Part 9. Where specific requirements for a material are not specified for certain use select from choice offered in Part 9.

1.9 Project Meetings

.1 Hold project meetings at times and locations requested by the Architect. Allow for bi-weekly meetings during construction.

.2 Notify all parties concerned of meetings.

.3 Record minutes of meetings, and distribute to all parties within 72 hours of meeting.

1.10 Setting Out of Work

.1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.

.2 Provide devices needed to lay out and construct work.

.3 Supply such devices as ladders, measuring tapes, straight edges and templates required to facilitate Architect's inspection of work.

.4 Supply stakes and other survey markers required for laying out work.

.5 Any deviation from line and level shall be corrected without additional cost, to the Architect's satisfaction.

1.11 Location of Equipment and Fixtures

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate. Do not scale drawing for locating of position. Obtain Architect's direction.

.2 Locate equipment, fixtures, and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access, and maintenance.

.3 Inform Architect of impending installation and obtain his approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Architect.

1.12 Concealment

.1 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.13 Cutting, Fitting, Patching

.1 Execute cutting including excavation, fitting, and patching required to make work fit properly together.

.2 Obtain Engineer's approval before cutting, boring or sleeving load-bearing members.

.3 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

.4 Fit work airtight to pipes, sleeves, ducts, and conduits.

.5 Cutting and patching to be by tradesmen qualified in the respective sections of the work.

1.14 Existing Services

.1 Before commencing Work, establish location and extent of existing services in area of Work and notify Architect.

.2 Whenever it is necessary to cut, interfere with, or connect to existing services or facility do so at hours and times recommended by governing authorities and approved by Architect; and with minimum disturbance to occupants, pedestrian and vehicular traffic and public and private property.

.3 Submit schedule to and obtain approval from Architect for each proposed shut-down of active service or facility. Adhere to approved schedule and provide notice to affected parties.

.4 If unknown services are encountered, immediately notify Architect and confirm findings in writing and/or on Drawings. Obtain Architect's written direction if such services require cutting, capping or relocation to do Work.

.5 Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Architect.

.6 Protect and record locations of maintained or rerouted service lines. Record locations of abandoned service lines.

1.15 Additional Drawings

.1 Architect may furnish additional drawings to assist proper execution of work. These drawings will be issued for clarification only. Such drawings shall have same meaning and intent as if they were included with plans referred to in Contract Documents.

1.16 Relics and Antiquities

.1 Relics and antiquities and items of historical or scientific interest such as cornerstones and contents commemorative plaques, inscribed tablets, and similar objects found on site or in buildings to be demolished, shall remain property of Owner. Protect such articles and request directives from Architect.

1.17 Coordination

.1 The Contractor will coordinate the work of all sub-contractors, including mechanical and electrical trades.

.2 Coordinate work of each Section as required for satisfactory and expeditious completion of Work. Take field dimensions. Take into account existing installations to assure best arrangements of components in available space. Consult before commencing Work in critical locations. Fabricate and erect Work to suit field dimensions and field conditions.

.3 Provide forms, templates, anchors, sleeves, inserts and accessories or other components required to be fixed to or inserted in Work. As applicable set them in place or instruct related Sections as to their location.

.4 Pay cost of extra work caused by, and make up time lost as result of failure to comply with these requirements at proper time.

.5 Cutting and patching as specified in sub-section above.

1.18 Modular Coordination

.1 Where work incorporates metric modular components following rules apply:

a) Actual opening dimensions in masonry including doors, windows, walls, louvres and actual room sizes are 10 mm (3/8") greater than nominal dimensions given on Drawings. Actual thicknesses of walls, piers and overall lengths of walls or buildings are 10 mm (3/8") less than nominal dimensions given on Drawings unless indicated otherwise.

b) Unless indicated otherwise Drawing details at scales of 1:10 and less indicate "actual" rather than "nominal" dimensions.

1.19 Examination

.1 Examine work upon which your work depends. Report in writing defects in such work. Application of your work shall be deemed acceptance of work upon which your work depends.

.2 Drawings are, in part, diagrammatic and are intended to convey scope of Work and indicate general and approximate location, arrangement and sizes of fixtures, equipment, ducts, piping, conduit and outlets and similar items. Obtain more accurate information about locations, arrangement and sizes from study and coordination of Drawings, including shop drawings and manufacturers' literature and become familiar with conditions and spaces affecting these matters before proceeding with Work.

.3 Where job conditions require reasonable changes in indicated locations and arrangements, make such changes with approval of Architect at no additional cost to Client. Similarly, where existing conditions interfere with new installation and require relocation, such relocation is included in Work.

.4 Install and arrange fixtures, equipment, ducts, piping and conduit to conserve as much headroom and space as possible, and avoid interference and obstruction of access. Observe good installation practice for safety, access, maintenance and follow manufacturer's recommendations. Make changes requested to comply with these requirements at no additional cost to Client.

.5 If requested by Architect, and before installation, relocate equipment, services, doors, openings, furring and other work at no additional cost to Client; providing such relocation involves only reasonable minor adjustments and reasonable advance notice is given in writing.

1.20 Cold Weather Work

.1 Construction to continue work including winter months, if applicable, until Work is completed and accepted to meet the schedule. No additional costs for cold weather heating will be entertained.

1.21 Materials, Plant and Equipment

.1 Materials, plant and equipment specified shall form basis of Bid and Contract. Where more than 1 brand or manufacturer is named in Specifications, or on Drawings, choice is Bidders/Contractors provided requirements of Drawings and Specifications are met.

.2 Refer to front end for substitution or alternate requirements.

.3 Materials, plant and equipment shall not be damaged or defective and shall be of quality compatible with Specifications for purpose intended. If requested provide evidence as to type, source and quality. Remove and replace defective products, at
own expense, regardless of previous inspections, and be responsible for delays and expenses caused thereby.

.4 Replace factory finished equipment, or parts thereof, whose paint finish is damaged and cannot be reasonably remedies by paint touch-up.

1.22 Material Storage and Handling

.1 Store packaged materials in original, undamaged containers with manufacturer's labels and seals intact. Handle and store materials in accordance with manufacturer's and suppliers' recommendations and in manner to prevent damage to materials during storage and handling.

1.23 Concealment of Work

.1 Conceal pipes, ducts conduits, tubing, wiring and other items requiring concealment in floor, wall and ceiling construction of finished areas except where indicated or specified otherwise. If in doubt as to method of concealment, or intention of Contract Documents in this connection, request clarification from Architect before proceeding with work in question.

.2 Lay out mechanical and electrical work in advance of concrete placement and furring installation to allow for its proper concealment.

.3 Test and inspect work before applying pipe covering and before Work is concealed.

1.24 Lines, Levels and Dimensions

.1 Have registered Ontario Land Surveyor establish 1 permanent bench marks on Site, referenced to established bench marks by survey control points. Provide and maintain control lines and level required.

.2 Lay out work in accordance with lines. levels and dimensions indicated and/or provided on bench marks established by survey.

.3 Verify lines, levels and dimensions. Report errors or inconsistencies in Drawings and obtain direction before commencing Work.

.4 Except as provided by survey, provide lines, levels and dimensions necessary to relate your work to work of other Sections.

1.25 General Workmanship

.1 Do Work in accordance with industry practice for type of work unless Contract Documents stipulate more precise requirements.

.2 Do Work in neat and careful manner to retain Work plumb, square and straight.

.3 Ensure Work is properly related to form close joints and appropriately aligned junctions, edges and surfaces and is free of warp, twist, wind, wave or other irregularities.

.4 When required by Specifications or by manufacturer's recommendations, have manufacturer, supplier or accredited agent, inspect work which incorporates their products.

.5 Do not permit materials to come in contact with other materials whether in presence of moisture or otherwise if conditions will result in corrosion, stain or discolouration or deterioration of completed Work. Provide compatible, durable separators

where such contact is unavoidable.

1.26 Fasteners

.1 Supply appropriate fasteners, anchors, accessories and adhesives required for fabrication and erection of Work.

.2 Unless specified otherwise use exposed metal fasteners and accessories of same texture, colour and finish as product being fastened.

.3 Use metal fasteners of same material as metal component being fastened, or of metal which will not generate electrolytic action and cause damage to fastener or metal component under moist conditions. In general use noncorrosive or hot dip galvanized steel anchors occurring on or in exterior wall, slab or other exterior locations, unless higher standard is indicated or specified.

.4 Fastening devices or adhesives shall be of appropriate type, used in sufficient quantity and in such manner to provide positive, permanent fastening which will not shift, work loose or fail during occupancy of building due to vibration or other causes resulting from normal use of building. Install anchors at spacing to provide required load/stress carrying capacity. Do not use wood plugs.

.5 Lay out fasteners neatly, evenly spaced and aligned. Keep exposed fasteners to minimum.

.6 Supply adequate instructions and templates and, if necessary supervise installation, where fasteners or accessories for your Section are required to be built into work of other Sections.

.7 Do not use fasteners which will cause spalling, cracking, or deformation or deterioration of material being fastened by or to.

.8 Do not use powder actuated fastening devices, which are used in tension, without approval. Take stringent safety precautions when using powder actuated fasteners. Use only low velocity plunger-type devices.

.9 Use adhesives specified, or if not specified, those recommended by manufacturer of materials involved, compatible with materials to be joined, and effective in forming permanent joint of adequate strength.

.10 Use screws, nails, staples and other similar, driven fasteners suitable to materials to be joined and to conditions under which they are installed and used. Ensure that in finished work, fasteners are sized to take durable hold under stress to be

encountered without damage to, or weakening of, elements secured together, and that fastenings will not corrode or cause staining of exposed surfaces.

.11 Do brazing or soldering to form durable connections of strength adequate to resist stresses to be encountered without deformation of elements joined. Prepare base metals and use methods and materials to ensure clean joint, and to prevent staining, corrosion, discolouration, deformation or other damage to finished Work.

.12 Do welding to CSA W59-M89 (for steel) or CSA W59.2-M91 (for aluminum) for material and methods, unless specified otherwise. Have welding performed by industry certified operatives to CSA W47.1-83 or CSA W47.2-M87.

1.27 Accessories

.1 Provide accessory items or materials required, such as brackets, cleats, connectors, sealants, lubricants, cleaners, protection, and similar items, whether specified or not, so that Work is complete and will perform as required.

1.28 Design and Safety Requirements for Temporary Work

.1 Be responsible for design, erection, operation, maintenance and removal of temporary structural and other temporary facilities. Engage and pay for registered Professional Engineering personnel skilled in appropriate disciplines to perform these functions where required by law or by the Contract Documents; and in cases where such temporary facilities and their method of construction are of such nature that Professional Engineering skill is required to produce safe and satisfactory results.

1.29 Protection and Safety

.1 Comply with requirements of Acts and Regulations with respect to health and safety including Occupational Health and Safety Act, as amended, and Workplace Hazardous Materials Information System (WHIMIS) Regulation, including following:

a) Before commencement of Work, and throughout Contract, maintain on Site, and readily accessible to all those who may be exposed to hazardous materials, list of hazardous materials proposed for use on Site or Workplace together with current Materials Safety Data Sheet (MSDS).
b) Ensure hazardous materials used and/or supplied on Site are labelled in accordance with WHIMIS requirements.

c) Know and be aware of the procedures for safe handling, storage and use of such hazardous materials including special precautions, safe clean-up and disposal procedures. Conform to Environmental Protection Act for disposal requirements.

d) ensure that those who handle, and/or are exposed to, or are likely to handle or be exposed to, hazardous materials are fully instructed and trained in accordance with WHIMIS requirements.

2. Protect excavation, trenches and building from damage from rainwater, ground water, backing up of drains or sewers and other water, frost and other weather conditions. Provide sheeting, piling, shoring, pumps, equipment, temporary drainage, protective covering and enclosures. Provide necessary pumps including spare pump for keeping project free of water throughout construction period.

.3 Protect, relocate and maintain existing, active services wherever they are encountered. Wherever inactive services are encountered, cap them off and remove unwanted portion, with approval of authorities having jurisdiction or public utility concerned in manner approved by them.

.4 Load no part of structure during construction with load greater than it is calculated to bear safely when completed. Make every temporary support as strong as permanent support. Place no load on concrete structure until it has sufficient strength to safely carry such load.

.5 Adequately protect floors and roofs from damage. Take special measures when moving heavy loads or equipment on them.

.6 Keep floors free of oils, grease or other materials likely to discolour them or affect bond of applied surfaces including fumes generated by temporary heating devices. Take care not to spill or allow oil, grease, gasoline, diesel and fuel oil, chemicals and other substances to contaminate soil or water on or adjacent to Site. Should such contamination accidentally occur report it immediately and clean up to satisfaction of Architect.

.7 Protect work of other Sections from damage resulting from your work.

.8 Damaged work shall be made good wherever possible by Section whose work is damaged but at expense of those causing damage.

.9 Protect glass and other finishes against heat, slag and weld splatter using suitable protective shields or covers.

.10 Prior to beginning of construction, design fire safety plan in conjunction with local Fire Chief. Post fire plan throughout construction and recommended. Do not allow accumulation of waste that may constitute fire hazard.

.11 Conform to Construction Safety Association of Ontario's manual on Propane in construction. Watch work area for minimum of 30 minutes after hot work is completed. Provide Site fire security when required by local building department and/or municipal fire department. Ensure that water supply is adequate for fire fighting.

.12 Provide and maintain in working order, suitable Underwriters' labelled fire extinguishers and locate in suitable positions, to approval of authorities having jurisdiction.

.13 Provide minimum of 3 safety helmets for Architect and any other authorized visitors to Site if required.

.14 Protect public and those employed on Work from injury. Equipment (mobile) when not in use shall have keys removed and locked up in secure location.

1.30 Scaffolding

.1 Erect scaffolding independent of walls. Use it in manner as to interfere as little as possible with other Sections. When not in use, move it as necessary to permit installation of other work. Construct and maintain scaffolding in rigid, secure and safe manner. Remove it promptly when no longer required

1.31 Temporary Cleaning

.1 Keep Site and building, including concealed spaces, free from accumulation of dirt, debris, garbage and excess material. Remove oily rags and waste from premises at close of each day, or more often if required.

1.32 Manufacturers Directions

.1 Except where specified otherwise, use each product in accordance with manufacturer's published or written instructions, specifications or recommendations regarding handling, storage, preparation, Site conditions, ancillary products or accessories, methods of installation, protection and cleaning. Submit coy of such instructions, and indicate if and where there is discrepancy between them and requirements of Specifications and obtain direction.

1.33 Spare Products

.1 Where specified in other Sections, provide spare materials and

products for future repair and replacement.

.2 Ensure such materials are of same production run as those incorporated in Work.

.3 Deliver quantities required, in separate labelled containers, and store where directed.

.4 Labels shall state material description, colour, pattern and location of installation.

1.34 Environmental Practices

.1 Take active role in implementing environmentally sound business practices and producing goods and services that lessen burden on environment in production, use and final disposition. Support implementation of reduction, reuse and recycling strategies and use of environmentally sound products. Reduce or eliminate excessive packaging and promote use of environmentally responsible packaging practices.

a)Environmentally Sound Products: Product that is made, used and disposed of in a manner that significantly reduces harm it would otherwise cause the environment. Product may be certified as environmentally sound because it is made in a way that improves energy efficiency, reduces hazardous by-products, uses recycled material, or because the product itself can be recycled or reused, or in some way is environmentally benign.

b) Packaging requirements: Implement waste reduction by reducing or eliminating excessive packaging practices.

c) Use, where appropriate, combination of packaging materials such as re-usable containers, blanket wrap or cushioning material provided that all reasonable requirements of materials handling, transportation and storage are observed.

d) Packaging materials such as kraft paper and corrugated cartons shall be made from reclaimed products to facilitate recycling of secondary materials.

e) Packaging material shall be clearly labelled to display their recycled content and recyclability.

f) Ensure that packaging materials are removed from Site and disposed of in environmentally responsible manner.

1.35 Waste Disposal

.1 Do not burn rubbish on Site. Obtain approval and use following off-Site disposal alternatives, depending upon materials involved; burying, composting, Municipal collection or local dump or sanitary landfill site.

1.36 Polychlorinated

.1 In event of unexpected discovery of PCB's immediately notify

Biphenyl (PCB's)

Architect and Owner orally and in writing and do not handle, disturb or remove items containing PCB's. Architect will authorize remedial work, if any, in writing. Do such remedial work as addition to Contract.

1.37 Spill Response Procedures

.1 The Contractor shall have written spill response procedures and material on-site to respond to pollutants and contaminants Into the natural environment in excess of levels permitted in regulations or cause or are likely to cause an adverse effect.

1.38 Silica

.1 The general contractor and sub-trades are required to ensure all work is performed in accordance with the Silica on Construction Projects guideline, as published on the Province of Ontario's website.
https://www.ontario.ca/document/silicaconstruction-projects#

End of Section 01005

1.1 Allowance Overview

.1 Expend each General Contingency and each cash allowance as directed and authorized by the Architect, and confirm in writing.

.2 Unexpended amount(s) of General Contingency and cash allowances may be relocated to other specified cash allowances at the sole discretion of the Architect.

.3 Unexpended amount(s) of General Contingency and cash allowances shall be deducted from the Contract Price at completion of the work.

.4 Overhead and Profit for the General Contingency will be as set out in Section 00710.2.12.

.5 Do not include overhead and profit for work to be done under Cash Allowance Items noted below.

Except for the General Contingency, General Contractors and their Sub-contractors will not be allowed to include for overhead and profit for cash allowances as listed in this section.

Overhead and Profit on cash allowances only applies when the cash allowance expenditure exceeds the sum stated for the particular allowance.

Then the overhead and profit on the excess amount will be allowed for the allowance in question as set out in Section 00710.2.12.

.6 General Contingency and all cash allowances do not include H.S.T. It is understood that 13% is to be added to the General Contingency and Cash Allowances.

1.2 Pre-Purchase Allowance

.1 **Trane Equipment:** (Allowance by the Mechanical Contractor) For the supply of equipment to the site. Offloading and installation and all connections by mechanical contractor. Refer to packages included. Include the sum of $624,400.00

1.2 Cash Allowances

.1 **GENERAL ALLOWANCE: (Allowance by the General Contractor):**
Includes cash allowance for roofing repairs, and other site related items:

Include the sum of $ 30,000.00 [thirty-thousand dollars]

End of Section 01020

1 GENERAL

1.1. GENERAL

.1 The Hamilton Wentworth District School Board (HWDSB) (the owner) has pre-ordered HVAC equipment for this project. The payments for the equipment include shipping and insurance by the Vendor F.O.B, the curbside at the School site.

.2 It is the intent that the bidding Contractors shall carry the Trane quotation for Replacement air handlers (AHU 9,10,11,12), New shop ERV (ERV-1), Custom gym air handlers (RTU-1, RTU-2), class room UVs (UV-1, UV-2) and corresponding condensing unit (CU-1) (Quote to follow in Addenda) and related value thereon for the HVAC equipment purchase for items to turned over to the successful Contractor.

.3 This Contractor shall include for the following services of materials and labour in order to install and render the HVAC systems operational as per the equipment manufacturer's design intent.

.4 All rigging and crane supply to lift equipment of the delivery vehicle shall be included in the tender costs.

.5 The contractor will assume the one year parts and labour for the manufacturer's warranties for pre-ordered equipment.

.6 Commissioning of all pre-purchased equipment is included in the contractors scope of work.

.7 The specifications for the pre-ordered equipment have been included as part of this specification package for reference by all trades. All details regarding servicing are included in the tender scope of work. No extras will be allowed for work described either on the drawings or in the equipment specifications.

2 PRODUCTS

2.1. MECHANICAL EQUIPMENT

.1 Mechanical Contractor to carry following scope of work with reference to all pre-ordered equipment as shown in mechanical schedule and plan drawings.

.1 Contractor shall coordinate with equipment manufacturer representative the delivery of the equipment.

.2 Contractor to be present at the site premises at the time of equipment delivery and take over the equipment, offload and transport to classroom as required. Contractor to include for rigging equipment to raise and lower unit to allow transfer into classroom location.

.3 Contractor is responsible to unload unit from delivery vehicle and unit shall be stored in a clean, dry place protected from construction traffic in accordance with the Installation, Operation, and Maintenance manual. Contractor to site verify path of unit travel to allow for turns, ceiling and doors clearances. Contractor is responsible to protect unit and school building from any damages to transport unit into final location.

.4 Contractor is responsible to carry over equipment warranty for the period of one year on behalf of the school board.

.5 Contractor is responsible to carry labour warranty for the period of one year from the date of hand over.

.6 Review shop drawings and be familiar with the units.

.7 The contractor shall coordinate with equipment manufacturer representative and shall be responsible for inspecting the units upon arrival at the job-site. Any deficiencies and/or freight damage shall be documented to the equipment manufacturer representative within 24 hours of delivery. All field work, including but not limited to, rigging, installation, controls and electrical field work and field start-up work shall be executed or coordinated by mechanical contractor under the direct supervision of the manufacturer representative.

.8 Installation, operation and maintenance manual shall be supplied with the unit.

.9 Installing contractor shall install unit, including field installed components, in accordance with installation, operation and maintenance manual instructions.

.10 Startup and maintenance requirements shall be complied with to ensure safe and correct operation of the unit.

END OF SECTION

1.1 Samples

.1 **Mandatory Sample Approval:**
Submit samples in sizes and quantities specified in all related sections as noted elsewhere herein. Samples are to be submitted for all interior and exterior building finishes unless noted otherwise. All samples are to be approved by the Architect before the related items are ordered and put into production as applicable. No items are to be installed on site without prior sample approvals by the Architect's office. Any installed items (not previously approved by sample submittal to the Architect) are subject to full rectification (to all aspects of the drawings, specifications, schedules and related Contract Documents) at no additional expense.

.2 **Verification of Product Names and Codes:**
All trades and sub-trades are responsible to verify that supplied and specified product *names* and *colour names* reconcile to the *numeric product codes* also provided throughout. All discrepancies between product names and codes (i.e. written description and product ordering numbers) are to be reported to the Architect prior to product ordering, fabrication and installation.

1.2 Co-ordination Submissions

.1 **Prior to first draw for payment being processed, the full list of all shop drawings for the project shall be submitted and approved by all consultants. Updated shop drawing schedule to be submitted with each draw until all shop drawings have been processed.**

.2 Review shop drawings, product data and of samples prior to submission.

.3 Verify:
(a) Field measurements
(b) Field Construction Criteria
(c) Catalogue numbers and similar data

.4 Co-ordinate each submission with requirements of work and Contract documents. Individual shop drawings will not be reviewed until all related drawings are available.

.5 Contractor's responsibility for errors and omissions in submission is not relieved by Architect's review of submittals.

.6 Contractor's responsibility for deviations in submission from requirements of contract documents is not relieved by Architect's review of submission, unless Architect gives written acceptance of specified deviations.

.7 Notify Architect, in writing at time of submission, of deviation from requirements of Contract documents.

.8 After Architect's review, distribute copies.

1.3 Submission Requirements

.1 Schedule submissions at least twenty-one (21) days before dates reviewed submissions will be needed.

.2 Submit shop drawings via pdf document for consultant review.

.3 Accompany submissions with transmittal letter, containing:
- (a) Date
- (b) Project title and number
- (c) Contractor's name and address
- (d) Number of each shop drawing, product data and sample submitted.

.4 Where additional copies of shop drawings or product data are required for distribution, they shall be marked by the Contractor to accord with the copies reviewed by Consultants.

.5 Submissions shall include:

(a) Date and revision dates
- (b) Project title and number
- (c) Name of:
  - (i) Contractor
  - (ii) Sub-contractor
  - (iii) Supplier
  - (iv) Manufacturer
- (d) Identification of product or material
- (e) Relation to adjacent structure or materials
- (f) Field Dimensions, clearly identified as such
- (g) Specification Section number
- (i) Contractor's stamp, initialed or signed, certifying review of submission, verification of field measurements and compliance with Contract documents.

.6 Final copy of shop drawings to the Client for record purposes.

.7 Shop Drawings not stamped with the Contractor's "Approved" stamp will be rejected.

.8 Shop Drawings requested to have Engineer’s seal submitted without said seal will be rejected.

End of Section 01340

1.1 Access

.1 Provide and maintain adequate access to project site.

.2 Do not encumber corridors with materials and keep clean.

1.2 Contractor's Site Offices

.1 The General Contractor shall provide for their own site offices and workshops for the entire length of Construction if required. Areas of work within the school are not available.

.2 Maintain in clean condition. Sweep daily.

.3 This facility not to be used for material storage.

1.3 Sanitary Facilities

.1 Sanitary facilities will not be designated for contractor's use within the school.

.2 It is the Contractor's full responsibility to ensure it is secured to avoid damage and vandalism. The Owner will not be held liable for any damage and/or vandalism.

1.6 Parking

.1 The parking lot is at full capacity during school hours most days and parking can not be guaranteed. Contractor to arrange for their own off-site parking if applicable.

.2 Do not interfere with adjacent and local existing traffic patterns including such items as bus routes, drop-off/pick-up lanes, etc.

1.7 Enclosure of Structure

.1 Provide temporary weather tight enclosures and protection for exterior openings until permanently enclosed.

.2 Provide and maintain dustproof and sound resistant barriers or partitions between the Work and existing occupied building.

1.8 Power

.1 Existing electrical power and lighting systems may be used for construction requirements with prior approval of Owner provided that guarantees are not affected. Make good damage. Replace lamps which have been used over a period of 3 months.

1.9 Water Supply

.1 Water supply is available.

1.10 Heating and ventilation

.1 Provide temporary heat and ventilation in enclosed areas as required to:

(a) Facilitate progress of work.
(b) Protect work and products against dampness and cold.
(c) Prevent moisture condensation on surfaces.

(d) Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
(e) Provide adequate ventilation to meet health regulations for safe working environment.

.3 Maintain minimum temperature of 10°C or higher where specified as soon as finishing work is commenced and maintain until acceptance of structure by Architect.

.4 Ventilating:
(a) Prevent hazardous accumulations of dust, fumes, mists, vapours, or gases, in areas occupied during construction.
(b) Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
(c) Provide mechanical ventilation to accelerate drying out of building if necessary to maintain schedule.
(d) Ventilate storage spaces containing hazardous or volatile materials.
(e) Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful elements.

.5 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
(a) Conform with applicable codes and standards
(b) Enforce safe practices
(c) Prevent abuse of services
(d) Prevent damage to finishes
(e) Vent direct-fired combustion units to outside.

1.11 Site Signs and Notices

.1 Only project identification and approved job sign and notices for safety or instruction are permitted on site.

.2 Signs and notices for safety or instructions to be in the English language, or commonly understood graphic symbols.

.3 Maintain sign and notices for duration of project. Remove sign and deliver to Owner off site on completion of project.

1.12 Scaffolding

.1 Construct and maintain scaffolding in rigid, secure and safe manner.

.2 Erect scaffolding independent of walls. Remove promptly when no longer required. Refer to Section 01545 for safety requirements for scaffolding.

End of Section 01500

1.1 Construction Safety Measures

.1 Observe and enforce construction safety measures required by the Ontario Building Code, Provincial Government, Worker's Compensation Board and Municipal Statutes and authorities.

.2 In event of conflict between any provision of the above authorities the most stringent provision will apply.

1.2 Fire Safety Requirements

.1 Provide and maintain in good working order, sufficient fire fighting equipment, tools, and extinguishers to contain an outbreak of fire.

.2 Comply with all requirements of the local authorities having jurisdiction in the storage and handling of flammable materials.

.3 Ensure all persons working at the site are conversant with action to be taken in the event of an outbreak of fire at the Work.

1.3 Overloading

.1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

1.4 Falsework

.1 Design and construct falsework in accordance with CSA S269.1-1975.

1.5 Scaffolding

.1 Design and construct scaffolding in accordance with CSA S269.2-M1980.

1.6 Smoking

.1 Smoking or vaping is not permitted anywhere on School Board Property.

End of Section 01545

1.1 General

.1 Use new material and equipment unless otherwise specified or directed in writing by the Architect.

.2 Within (7) days of written request by Architect, submit the following information for any or all material and products proposed for supply:

(a) Name and address of manufacturer
(b) Trade name, model, and catalogue number
(c) Performance, descriptive and test data
(d) Manufacturer's installation or application instructions
(e) Evidence of arrangements to procure

.3 Provide material and equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.

.4 Use products of one manufacturer for equipment or material of same type or classification unless otherwise specified.

1.2 Manufacturer's Instructions

.1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

.2 Notify Architect in writing of any conflict between these specifications and manufacturers' instructions. Architect will designate which document is to be followed.

1.3 Fasteners - General

.1 Provide metal fasteners and accessories in same texture, colour and finish as base metal in which they occur. Prevent electrolytic action between dissimilar metals. Use non-corrosive fasteners, anchors and spacers for securing exterior work.

.2 Space anchors within limits of load bearing or shear capacity and ensure that they provide positive permanent anchorage. Wood plugs not acceptable.

.3 Keep exposed fasteners to minimum, space evenly and lay out neatly.

.4 Fasteners which cause spalling or cracking of material to which anchorage is made are not acceptable.

.5 Obtain Architect's approval before using explosive actuated fastening devices. If approval is obtained comply with CSA Z166-1975.

.6 Use fasteners of standard commercial Equipment sizes and patterns with material and finish suitable for service.

.7 Use heavy hexagon heads, semi-finished unless otherwise specified. Use no. 304 stainless steel for exterior areas.

.8 Bolts may not project more than one diameter beyond nuts.

.9 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur and resilient washers with stainless steel.

1.4 Delivery and Storage

.1 Deliver, store and maintain packaged material and equipment with manufacturers' seals and labels intact.

.2 Prevent damage, adulteration and soiling of material and equipment during delivery, handling and storage. Immediately remove rejected material and equipment from site.

.3 Store material and equipment in accordance with suppliers' instructions and Section 01500.

.4 Touch-up damaged factory finished surfaces to Architect's satisfaction. Use primer or enamel to match original. Do not paint over name plates.

1.5 Substitution

.1 Proposals will be considered by Architect if:

(a) Products selected by tenderer from those specified, are not available, or

(b) Delivery date of products selected from those specified would unduly delay completion of Contract, or

(c) Alternate products to those specified, which are brought to attention of, and considered by Architect as equivalent to those specified and will result in credit to Contract amount.

.2 Should proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on project. Pay for design or drawing changes required as result of substitution.

.3 Amounts of all credits arising from approval of substitutions will be determined by Architect and Contract price will be reduced accordingly. No substitutions will be permitted without prior written approval of Architect.

.4 The Owners reserve the right not to allow substitutions. Products specified are Boards standards and are consistent with systems standards.

1.6 Construction Equipment and Plant

.1 On request, prove to the satisfaction of Architect that the construction equipment and plant are adequate to manufacture, transport, place and finish work to quality and production rates specified. If inadequate, replace or provide additional equipment or plant as directed.

.2 Maintain construction equipment and plant in good operating order.

1.7 Work Surfaces

Millwork or other similar permanent surfaces, including loose or fixed and installed furniture and equipment are not to be used as work surfaces. Contractors and Subcontractors shall provide their own temporary work surfaces as required.

End of Section 01600

1.1 General

.1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

.2 Store volatile wastes in covered metal containers and remove from premises daily.

.3 Prevent accumulations of wastes which create hazardous conditions.

.4 Provide adequate ventilation during use of volatile or noxious substances.

.5 Contractors shall shift items (furniture or misc. items) that would otherwise impede or obstruct work area to provide space for completion of work. Tarp areas, including fixed and loose furniture accordingly to protect from dust and debris. Items to be placed back into original locations after work complete in that area.

1.2 Materials

.1 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

1.3 Cleaning During Construction

.1 On a daily basis maintain premises free from debris and waste material.

.2 Maintain project site and public properties free from accumulations of waste materials and rubbish.

.3 Provide on-site container for collection of waste materials and rubbish.

.4 Remove waste materials, and rubbish from site at regular intervals, or when container is full.

.5 Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for substantial completion or occupancy.

.6 Schedule cleaning operations so that resulting dust and other contaminants will not fall on areas prepared for finishes and/ or wet, newly painted surfaces.

.7 Exterior areas of building must be free of any construction debris including all sharp items (nails, glass, etc..) Pathways used to access exterior waste bins for demolition should take precautions to ensure routes are protected and clear of debris.

1.4 Final Cleaning

.1 In preparation for substantial completion or occupancy, conduct inspection of sight-exposed interior surfaces.

.2 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from sight-exposed interior finished surfaces including glass and other polished surfaces, resulting from own work.

.3 Broom clean paved surfaces; rake clean other surfaces of grounds.

.4 Remove debris and surplus materials from accessible concealed spaces.

.5 Replace broken, damaged or scratched glass and mirrors, which are part of the Work.

.6 Use appropriate apparatus and cleaning materials. Clean Work in accordance with applicable Sections and/or manufacturer's directions.

.7 Upon completion of final cleaning, remove cleaning equipment, materials and debris from building and Site.

End of Section 01700

1.1 Record Drawings

.1 Contractor will provide with two sets of white prints at the outset of construction for the progressive recording of items deviating from the drawings. At the completion of construction, this set of record drawings should reflect final 'as-built' conditions.

.2 Maintain project record drawings by accurately and progressively recording deviations from Contract documents caused by site conditions, and changes subsequent to Tender.

.3 Mark changes in coloured (red) ink.

.4 Record following information:

(a) Location and nature of mechanical and electrical building systems and related components not otherwise shown on the drawings.
(b) Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.
(c) Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
(d) Field changes of dimension and detail.
(e) All changes made by Change Order.

.5 At completion of project and prior to final inspection, neatly transfer notations from the original working set of drawings to the second final set. Submit both sets to Architect.

.6 The General Contractor and Mechanical Contractor shall each note a $2,000.00 Hold Back value (to be identified in all draws) to cover final submission and of as-built drawings and Operation and Maintenance Manuals. Hold back values will be released upon consultant review and approval of completed submittal requirements.

END OF SECTION 01720

1.1 Maintenance

.1 On completion of project submit to Architect 1 digital copy of Operating and Maintenance Manuals in English, made up as follows:

a) Enclose title sheet, labeled "Operating and Maintenance Data Manual", project name, date and list of contents.

b) Organize contents into applicable sections of work to parallel project specification breakdown. Mark each section by labeled tabs projected and celluloid covers fastened to hard paper dividing sheets.

.2 Include the following information:

a) Maintenance instruction for finished surfaces and materials.

b) Copy of hardware and Paint Schedules, paint layout drawings, Interior and Exterior Colour and Finish Schedules

c) Description, operation and maintenance instructions for equipment and systems, including complete list of equipment and parts list. Indicate nameplate information such as make, size, capacity and serial number.

d) Names, addresses and phone numbers of Sub-contractors and Suppliers.

e) Guarantees, warranties and bonds showing:
   i) Name and address of projects
   ii) Guarantee commencement date (date of Final Certificate of Completion).
   iii) Duration of guarantee.
   iv) Clear indication of what is being guaranteed and what remedial action will be taken under guarantee.
   v) Signature and seal of Contractor.

.3 Neatly type all information. Use clear diagrams or manufacturer's literature.

.4 Final payments will not be made until complete packages, as described at 1.1.1. to 1.1.3, are received by the Board. Promptness and completeness of these packages will be taken into account as part of pre-qualification applications for future Board projects regarding the 'past performance' criteria.

.5 *The General Contractor Mechanical Contractor shall each note a* ***$2,000.00 Hold Back value*** *(to be identified in all draws) will be retained to cover final submission and approval of as-built drawings and Operation and Maintenance Manuals. Hold back values will be released upon consultant review and approval of completed submittal requirements.*

END OF SECTION 01730

1.1 General

.1 Work of this Section includes demolition and removal from site of materials, finishes, fixtures, equipment etc., [related to the proposed scope of work] which may or may not be specifically spelled out on drawings.

.2 Division One [General Requirements] applies as if repeated herein.

1.2 Description

.1 Work included in this section but not limited to may involve the following:

- the demolition of portions of the existing building items, related services and associated features as noted on drawings and/or as required for completion of the scope of work outlined in the Contract Documents
- the salvaging of items (denoted for removal not intended for re-integration into the project) to be offered to Owner for first right of refusal prior to discarding
- the removal of items from site and subsequent discard at an approved sanitary landfill site, recycling depot or similar approved facility suited to the nature of materials being removed

The work of this division shall include all temporary and permanent service disconnects required by items being demolished and/or disconnected as part of the scope of work illustrated in the Contract Documents.

.2 Clarify all unclear and ambiguous items with Architect immediately prior to demolition and construction.

1.3 Relocation

.1 Ensure that all items to be relocated (as per drawings), are carefully removed and stored on site for future relocation complete with all related components and accessories integral to their operation. Protect items during the course of construction to ensure their safety.

.2 Clarify all items, which may be ambiguous or unclear with the Architect and/or respective Engineer prior to any removal activity on the site.

1.4 Examination

.1 Examine site and premises and be satisfied as to condition of premises and means of access to same, and nature and quantity of work required.

.2 Examine drawings and documents and report ambiguous items and/or possible errors or omissions to the Architect immediately for clarification.

1.5 Coordination

.1 Coordinate all demolition activities with Building Owner relative to hours of operation and acceptable level of impact on ongoing building operations (as/if applicable). Work cooperatively with Owner and/or Occupants to determine acceptable hours and activities.

1.6 Protection

.1 Protect building occupants from demolition activities via construction hoarding or other means deemed acceptable to the Owner. Hoarding provisions to conform to related specification sections elsewhere herein.

.2 Throughout demolition, protect all existing building items and areas adjacent to demolition as required to prevent or minimize adverse impact on materials otherwise to remain. Repair and make good all existing finishes damaged throughout the course of construction to pre-construction condition and/or as designated by the Architect.

1.7 Utilities

.1 Where required, ensure that water, sewer, mechanical and electrical services are cut off and properly capped before commencing remainder of work, and notify appropriate authorities, building owner, building occupants etc. as required.

1.8 Removal of Debris

.1 All debris from the site and structure demolition, shall be removed from site immediately. There shall be no accumulation of demolished materials any shape or form in any location. All debris shall be removed in accordance with Section 01005 and related divisions as prescribed elsewhere herein.

1.9 Hazardous Materials

.1 (IF APPLICABLE) All hazardous materials shall be removed from the facilities prior to demolition otherwise required for the scope of work. Refer to related Specifications and Appendix items contained herein for Designated Substances, Hazardous Materials Abatement and associated items.

END OF SECTION 02100

HAZARDOUS MATERIALS ABATEMENT SCOPE AND DETAILS

Glendale Secondary School
145 Rainbow Drive
Hamilton, Ontario

Submitted to:

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ECOH Project No.: 28228

December 1, 2023

LIST OF CONTENTS

1. GENERAL

1.1 General and Related Work

1.1.1 All sections of the specifications form a part of the Contract Document and shall be read to determine their effect upon the work of this section.

1.1.2 Related Work Specified Elsewhere

Division 02	Section 02 82 01	Type 1 Asbestos Abatement
Division 02	Section 02 82 02	Type 2 Asbestos Abatement
Division 02	Section 02 82 03	Type 2 Asbestos Abatement (Glove Bag)
Division 02	Section 02 82 04	Type 3 Asbestos Abatement
Division 02	Section 02 83 01	Lead Abatement
Division 02	Section 02 84 01	Other Hazardous Materials

Attachment A:

1) *Pre-Renovation Designated Substances & Hazardous Materials Survey Report*, ECOH Management Inc., December 1, 2023.

1.1.3 This specification fulfils the requirements of the report required by *Designated Substance – Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations*, Ontario Regulation (O. Reg.) 278/05, Section 10.

1.1.4 The Contractor is responsible to verify all materials and measurements for removal and cleaning purposes. Materials, measurements, and quantities provided herein are for reference only.

1.1.4.1 The removal and disposal or decontamination of all asbestos-containing material (ACM), hazardous materials (Polychlorinated Biphenyls (PCBs), lead, mercury, etc.), and all materials that have been contaminated by ACM, or by other hazardous materials (e.g. lead), either during or prior to work of this section.

1.2 Site Conditions

1.2.1 Refer to Attachment A, "*Pre-Renovation Designated Substances & Hazardous Materials Survey Report"*, ECOH Management Inc., December 1, 2023, for details of site conditions and description of asbestos-containing materials and hazardous materials present in the Project Area.

NOTE: Attachment A is for reference purposes only. The Contractor is to verify site conditions and all requirements necessary to complete abatement. Report all discrepancies to the Project Manager.

1.2.2 **Asbestos-Containing Materials**

1.2.2.1 Asbestos-containing plaster is present on ceilings ands beams in select locations within the Project Area. This material is expected to be disturbed during renovation work.

1.2.2.2 Asbestos-containing parging cement fittings are present in select locations within the Project Area. This material is expected to be disturbed during renovation work.

1.2.2.3 Asbestos-containing parging cement on air handling unit is present in Mechanical Room 2090A within the Project Area. This material is expected to be disturbed during renovation work.

1.2.2.4 Asbestos-containing 9" x 9" vinyl floor tile (brown with black streaks) is present in Storage Room 1050B (Loc. 4047) within the Project Area. This material is expected to be disturbed during renovation work.

1.2.2.5 Asbestos-containing Transite panels are present in Corridor 1048 (Loc. 4049) within the Project Area. This material is expected to be disturbed during renovation work.

1.2.2.6 Presumed asbestos-containing flexible duct connectors are present in select locations within the project Area. This material is expected to be disturbed during renovation work.

1.2.3 **Lead Containing Materials**

1.2.3.1 Yellow paint on gas pipe was determined to be lead-based. This material is expected to be disturbed during renovation work.

1.2.3.2 Blue paint on floor was determined to be lead-containing. This material is expected to be disturbed during renovation work.

1.2.3.3 Grey paint on ducts and AHU was determined to be lead-based. This material is expected to be disturbed during renovation work.

1.2.3.4 Lead may be present in wiring connectors and electric cable sheathing, piping and solder joints on copper piping, ceramic tiles and other paint products. These materials are not expected to be disturbed during renovation work.

1.2.4 **Polychlorinated Biphenyls (PCBs)**

1.2.4.1 PCBs may be present in fluorescent light ballasts in multiple locations throughout the facility and in the Project Area. This material is not expected to be disturbed during these renovations.

1.2.5 **Other Hazardous Materials**

1.2.5.1 Free crystalline silica, in the form of common construction sand, is present in all concrete and masonry products within the facility and in the Project Area. This material is not expected to be disturbed during these renovations.

1.2.5.2 Mercury is present in the facility in minor quantities as a vapour within compact fluorescent light bulbs and may be present in thermometer switches. This material is not expected to be disturbed during these renovations.

1.2.5.3 Paint, adhesives, plastics and fuel residue present in the facility and throughout the Project Area may contain trace amounts of Acrylonitrile, Arsenic, Benzene, Ethylene Oxides, Isocyanates, Lead, Mercury and/or Vinyl Chloride Monomer. These materials are not expected to be disturbed during these renovations.

1.3 Outline of Work

The following outlines designated substances and hazardous materials that are present throughout the Project Area specifically which are scheduled for removal.

1.3.1 The General Contractor will utilize and carry a HWDSB Pre-Qualified Asbestos Abatement Contractor as a sub-contractor for any abatement work pertaining to this project.

1.3.2 Co-operate fully with the on-site Environmental Abatement Consultant in confirming work areas and methods to be used in performing work.

1.3.3 Protect all surfaces, building fabric and items not affected by work of this project.

1.3.4 Clean all surfaces of any potentially containing material.

1.3.5 Replace or repair any items damaged during work of this project that will not be subject to renovation.

1.3.6 **Asbestos and Lead Containing Materials & Recommendations**

Refer to Table 1 Below for a summary of ACM and Lead-Containing materials scheduled for removal or disturbance; All quantities are approximated. The successful contractor is responsible for verifying all quantities and materials on site.

System	Material	Approximate Quantity	Location	Type of Asbestos	Asbestos Abatement Procedures
Ceilings/Structure	Plaster	To be Confirmed by Contractor	Various Locations	0.5-5% Chrysotile	Type 2 (<1m^2), Type 2 (Power tool with HEPA attachment), or Type 3 (≥1m^2)
Ceiling	Transite Panels	Removal of Approx. 250 Square Feet (ft^2)	Corridor 1048 (Loc.4049)	Asbestos-Containing	Type 1 (Manual) or Type 2 (Drill with HEPA Attachment)
Piping	Parging Cement on Fittings	Removal of Approx. 35 fittings	Mechanical Room 2090A and Mechanical Room 2090	55-70% Chrysotile	Type 2 (Glove Bag) or Type 3
Mechanical Equipment	Parging Cement on Air Handling Unit	Removal of Approx. 400 Square feet (ft$^{2)}$	Mechanical Room 2090A	55% Chrysotile	Type 3
Floor	9”x9” Vinyl Floor Tile (Brown with Black Streak)	Removal of Approx. 20 Square Feet (ft^2)	Storage Room 1050B (Loc. 4049)	8% Chrysotile	Type 1 (Manual) or Type 2
Ductwork	Flexible Duct Connectors	Removal of Approx.15 Units	Various Locations	Presumed	Type 1 (manual)
Floor, Mechanical, Ductwork, Piping	Blue Paint on Floor, Grey Paint on Ducts and AHUs, Yellow Paint on Pipes	To be Confirmed by Contractor	Various Locations	1400 - 34000 ppm	Class 1 or Class 2A

1.4 Schedule

1.4.1 The specific schedule to complete work will be determined by the Owner and/or the Contractor and/or the Abatement Consultant at a later date.

1.4.2 Specific hours of operation to complete any phase of designated substance or hazardous material abatement will be determined by the Owner and/or the Contractor and/or the Abatement Consultant at a later date.

1.4.3 The Contractor shall provide a schedule for removal work. The schedule shall be subject to approval and acceptance by the Abatement Consultant.

1.5 Supervision

1.5.1 The Construction Contractor shall provide one on-site Superintendent that has the authority to oversee all aspects of the work, including but not limited to, negotiation of Variation to the contract, scheduling, manpower, equipment, production, communication and co-ordination with the Abatement Consultant.

1.5.2 The Abatement Consultant reserves the right to reject or accept any Superintendent without explanation.

1.5.3 The Construction Contractor shall ensure that:

1.5.3.1 Every worker involved in a Type 3 operation has successfully completed the Asbestos Abatement Worker Training Program approved by the Ministry of Training, Colleges and Universities (MTCU),

1.5.3.2 Every supervisor of a worker involved in a Type 3 operation has successfully completed the Asbestos Abatement Supervisor Training Program approved by the MTCU,

1.5.3.3 Every worker and supervisor successfully completed the appropriate program required before performing or supervising the work to which the program relates,

1.5.3.4 A copy of the document issued by the MTCU, showing that a worker has successfully completed the above-mentioned program or has successfully completed equivalent training in another province or territory of Canada, is provided to the Abatement Consultant.

1.5.4 In addition to the above training requirements, the Construction Contractor shall ensure that all workers and supervisors receive asbestos awareness refresher training course at reasonable time intervals, when appropriate. The asbestos awareness refresher training course shall meet the requirements of O. Reg. 278/05. Copies of the Certificates issued at successful completion of the asbestos awareness refresher training course shall be provided to the Abatement Consultant.

1.5.5 All supervisors and workers shall have training corresponding to work related to the handling of other designated substances and hazardous materials.

1.5.6 Supervisory personnel must be on site at all times during work that may disturb designated substances and hazardous materials.

1.5.7 The Construction Contractor cannot replace supervisory personnel without written approval from the Abatement Consultant.

1.6 Quality Assurance

1.6.1 Ensure the removal and handling of designated substances and hazardous materials, or materials contaminated by designated substances and hazardous materials, are performed by trained and competent personnel. The Abatement Consultant reserves the right to remove any personnel that, in their opinion, does not meet these qualifications.

1.6.2 All related work of this section shall be performed by licensed persons, experienced and qualified for the work required.

1.6.3 The Abatement Consultant is empowered to order work to stop when prescribed health and safety measures and/or health and safety procedures and/or health and safety facilities are not, or are likely not to be, fully implemented. Cost of additional work by the Construction Contractor and/or the Abatement Consultant to fully re-establish health and safety measures and/or health and safety procedures and/or health and safety facilities shall be the burden of the Construction Contractor.

1.6.4 The Construction Contractor is solely responsible for the control of the project, construction practices, their Sub Construction Contractors or their agents, employees or other persons performing any of the Work.

1.7 Regulations

1.7.1 Comply with Federal, Provincial, and local requirements pertaining to designated substance removal and general demolition activities, provided that in any case of conflict among those requirements, or with these specifications, the more stringent requirement shall apply. The regulations and guidelines shall include but not be limited to the latest edition, version or update of the following references:

1.7.1.1 Ontario Environmental Protection Act, R.S.O. 1990, c.E.19.

1.7.1.2 Ontario Dangerous Goods Transportation Act, R.S.O. 1990 c. D1.

1.7.1.3 Ontario Occupational Health and Safety Act, R.S.O. 1990 c. O.1.

1.7.1.4 O. Reg. 164/99, Electrical Safety Code.

1.7.1.5 O. Reg. 213/07, Fire Code.

1.7.1.6 O. Reg. 213/91, Construction Projects.

1.7.1.7 O. Reg. 278/05, Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations.

1.7.1.8 O. Reg. 347, General – Waste Management.

1.7.1.9 O. Reg. 362, Waste Management – PCBs.

1.7.1.10 O. Reg. 490/09, Designated Substances.

1.7.1.11 O. Reg. 833, Control of Exposure to Biological or Chemical Agents

1.7.1.12 O. Reg. 860, Workplace Hazardous Materials Information Systems (WHMIS).

1.7.1.13 O. Reg. 164/99, Electrical Safety Code.

1.7.1.14 Ministry of Labour (MOL) Guideline, Occupation Health and Safety Branch, "*Silica on Construction Projects*", April 2011.

1.7.1.15 MOL document "*Guideline - Lead on Construction Projects"*, dated April 2011.

1.7.1.16 Environmental Abatement Council of Canada (EACC) document; "*Lead Guideline for Construction, Renovation, Maintenance or Repair*", dated October 2014.

1.7.1.17 EACC document; "*Construction Worker Hygiene Practices Guideline*", dated 2014.

1.7.1.18 EACC document; "*DOP / PAO Testing Guideline*", dated 2013.

1.7.1.19 Canadian Transportation of Dangerous Goods Act, (S.C. 1992, c. 34)

1.7.1.20 Canadian Transportation of Dangerous Goods Regulations, SOR/2001-286.

1.7.1.21 Canadian Surface Coating Materials Regulations, SOR/2005-109.

1.7.1.22 Canadian PCB Regulations, SOR/2008-273.

1.8 Notification

1.8.1 The Contractor shall, not later then ten (10) calendar days prior to commencing a Type 3 operation of asbestos material is to be removed, notify, orally and in writing, an inspector at the office of the MOL nearest the workplace of the operation. The Contractor must receive a signed Notice of Project (NOP) signed by the Ontario MOL.

1.8.2 The Contractor shall notify Sanitary Landfill site as per O. Reg. 347, as amended, under the Environmental Protection Act.

1.8.3 The Contractor shall notify immediately the MOL, as required by O. Reg. 278/05, Section 10(7), if ACM not identified in the site conditions are discovered during the project.

1.8.4 The Contractor shall notify any Subcontractors of all ACM or other designated substances in the work area or in an area in which they may come into contact with it.

1.9 Submittals

1.9.1 The Contractor shall prepare prior to commencing work and submit upon request:

1.9.1.1 A site-specific Health and Safety Plan (HASP), to address safety issues, including but not limited to the following:

1.9.1.1.1 Access and emergency evacuation routes from work areas.

1.9.1.1.2 Creating and maintaining clear routes for work area access and emergency evacuation.

1.9.1.1.3 Work site communication.

1.9.1.2 Permits for transportation of asbestos waste and location of landfill.

1.9.1.3 Proof that workers have received WHMIS training.

1.9.1.4 Work Place Safety and Insurance Clearance Certificates.

1.9.1.5 Pre-removal survey of damage in all areas where asbestos abatement will take place or waste will be transported.

1.9.1.6 Proposed schedule including all stages of work.

1.9.1.7 Waste and worker decontamination facilities, platform and hoarding layouts, Material Safety Data Sheets (MSDS) for chemicals or materials used in the course of the project.

1.9.1.8 Negative air unit and/or vacuum cleaner performance data and results of D.O.P. tests as required.

1.9.1.9 Certificate proving that each worker on-site has been fit tested for the respirator appropriate for the work being performed.

1.9.2 The Contractor shall submit names of supervisory personnel who will be responsible for asbestos work area(s). One of these supervisors must remain on site at all times asbestos removal or clean-up is occurring.

1.9.3 Submit proof that supervisory personnel have attended training course on asbestos control (3-day minimum duration) and have performed supervisory function on at least 5 other asbestos abatement projects.

1.10 Waste Transport and Disposal

1.10.1 The Contractor shall ensure asbestos-containing, hazardous material or asbestos-contaminated materials, removed during abatement are treated, packaged, transported and disposed of as asbestos waste.

1.10.2 The Contractor is responsible for the disposal of all waste generated as per regulation.

1.10.3 The Contractor shall drop garbage bins at designated locations and keep bins covered and enclosed while at the site. The bin loading area shall be kept clean at all times.

1.10.4 The Contractor shall pick-up and drop off garbage bins at pre-approved times and must not interfere with the Owner's operations.

1.10.5 The Contractor shall conform to requirements of Regulations under Environmental Protection Act for Waste Management, transporting and disposal of hazardous waste.

1.10.6 The Contractor shall ensure shipment of containers to dump is taken by waste hauler licensed to transport asbestos waste.

1.10.7 The Contractor shall provide a bill of lading showing the type and weight of hazardous waste being transported for each load.

1.10.8 The Contractor shall check with dump operator to determine type of waste containers acceptable.

1.10.9 The Contractor shall ensure dump operator is fully aware of hazardous material being dumped.

1.10.10 The Contractor shall co-operate with Ministry of Environment inspectors and immediately carry out instructions for remedial work, where required, to maintain environment, at no additional cost to Owner.

End of Section

ASBESTOS ABATEMENT TYPE 1

SECTION 02 82 01

LIST OF CONTENTS

1. GENERAL

1.1 General and Related Work

1.1.1 All sections of the specifications form a part of the Contract Document and shall be read to determine their effect upon the work of this section.

1.1.2 Related Work Specified Elsewhere

Division 02	Section 02 82 00	Abatement Scope and Details
Division 02	Section 02 82 02	Type 2 Asbestos Abatement
Division 02	Section 02 82 02	Type 2 Asbestos Abatement (Glove Bag)
Division 02	Section 02 82 04	Type 3 Asbestos Abatement
Division 02	Section 02 83 01	Lead Abatement
Division 02	Section 02 84 01	Other Hazardous Materials

Attachment A:

1) *Pre-Renovation Designated Substances & Hazardous Materials Survey Report*, ECOH Management Inc., December 1, 2023.

1.1.3 This specification fulfils the requirements of the report required by Designated Substance – *Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations*, Ontario Regulation 278/05, Section 10.

1.1.1 The Contractor is responsible to verify all measurements for removal, cleaning, and disposal purposes. Measurements and quantities provided herein are for reference only.

1.1.2 It is the intent that work performed as per this section will result in the removal and disposal or decontamination of all asbestos-containing material (ACM) and mould-contaminated materials, as well as all materials that have been contaminated by ACM or mould either during or prior to work of this section.

1.1.3 Refer to Section 02 82 00, Abatement Scope and Details, for the following information and requirements;

1.1.3.1 Site Conditions,

1.1.3.2 Outline of Work,

1.1.3.3 Schedule,

1.1.3.4 Supervision,

1.1.3.5 Quality Assurance,

1.1.3.6 Regulations,

1.1.3.7 Notification,

1.1.3.8 Submittals, and

1.1.3.9 Waste Transport and Disposal.

1.2 Definitions

1.2.1 Air Monitoring: The process of measuring the fibre content of a specific volume of air.

1.2.2 Amended Water: Water with a non-ionic surfactant wetting agent added to reduce water surface tension to 35 or less dynes, to allow thorough wetting of asbestos fibres.

1.2.3 Asbestos: The serpentine and amphibole asbestiform varieties including chrysotile, actinolite, amosite, anthophyllite, crocidolite and tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.

1.2.4 Asbestos Abatement Consultant: The Owner or person designated by the owner to provide inspection and air monitoring of the Contractor's work.

1.2.5 Asbestos-Containing Material (ACM): Any material that contains 0.5 per cent or more asbestos, of any type or mixture of types, by dry weight.

1.2.6 Asbestos-Containing Waste Material: Any material which is or is suspected of being or any material contaminated with an asbestos-containing material which is to be removed from a work area for disposal.

1.2.7 Asbestos Debris: Pieces of ACM that can be identified by colour, texture, or composition, or means dust, if the dust is determined by an accredited Asbestos Abatement Consultant to be ACM.

1.2.8 Asbestos Work Area: Where the actual removal, sealing and enclosure of asbestos-containing materials takes place.

1.2.9 Authorized Visitor: The Owner or his approved representative and/or persons representing regulatory agencies.

1.2.10 Barrier: Any surface that seals off the work area to inhibit the movement of fibres.

1.2.11 Clean Area: Either an operating area or an area in which removal work has already been completed.

1.2.12 Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.

1.2.13 Disposal Bag: A properly labelled 6 mil thick leak-tight plastic bag used for transporting asbestos waste from the work area to the disposal site.

1.2.14 DOP / PAO Test: Dioctylphthalate / Poly Alpha Olefin aerosol challenge of a HEPA filter system and is used to establish the integrity and effectiveness of the system to filter out asbestos fibres.

1.2.15 Encapsulant: A material that surrounds or embeds asbestos fibres in an adhesive matrix, to prevent release of fibres.

1.2.16 Encapsulation: Applying an encapsulant to asbestos-containing materials.

1.2.17 Filter: A media component used in respirators, vacuum cleaners or negative pressure filter fan units to remove solid or liquid particles from the inspired air.

1.2.18 Friable Asbestos Material: Material that contains asbestos that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

1.2.19 HEPA Filter: High Efficiency Particulate Aerosol filter that is at least 99.97 percent efficient in collecting a 0.3 micrometre aerosol.

1.2.20 Occupied Area: Any area of the building outside the Asbestos Work Area.

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

1.2.22 Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

1.2.23 Type 1 Asbestos Operations: Defined by Ontario Regulation 278/05, Section 12, includes the following operations:

1.2.23.1 Installing or removing ceiling tiles that are asbestos-containing material, if the tiles cover an area less than 7.5 square metres and are installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.

1.2.23.2 Installing or removing non-friable asbestos-containing material, other than ceiling tiles, if the material is installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.

1.2.23.3 Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if,

1.2.23.3.1 the material is wetted to control the spread of dust or fibres, and

1.2.23.3.2 the work is done only by means of non-powered hand-held tools.

1.2.23.4 Removing less than one square metre of drywall in which joint-filling compounds that are asbestos-containing material have been used.

1.2.23.5 Work on ceiling tiles, drywall or friable asbestos-containing material is classified according to the total area on which work is done consecutively in a room or enclosed area, even if the work is divided into smaller jobs.

1.2.24 Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning

utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.

1.2.25 Work: Includes all services, labour and material required to complete the work as specified in the contract.

1.3 Worker Protection

1.3.1 Prior to commencing work instruct workers in all aspects of work procedures and protective measures.

1.3.2 Provide workers who request a respirator with personally issued respiratory equipment acceptable to the Occupational Health and Safety Division of the Ontario Ministry of Labour, suitable for the Asbestos exposure.

1.3.3 Ensure that suitable respiratory protective equipment is worn by every worker, who has requested a respirator, and who enters the Asbestos Work Area. A respirator provided by an employer and used by a worker shall be:

1.3.3.1 One of the following types depending on the classification of work and method removal;

1.3.3.1.1 Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filters;

1.3.3.1.2 Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, R-100 or P-100 particulate filters;

1.3.3.1.3 Negative pressure (demand) supplied air respirator equipped with a full-facepiece;

1.3.3.1.4 Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece);

1.3.3.2 fitted so that there is an effective seal between the respirator and the worker's face;

1.3.3.3 assigned to a worker for the worker's exclusive use, if practicable;

1.3.3.4 used and maintained in accordance with written procedures that are established by the employer and are consistent with the manufacturer’s specifications;

1.3.3.5 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;

1.3.3.6 free of damaged or deteriorated parts. Damaged or deteriorated parts are to be replaced prior to being used by a worker;

1.3.3.7 be stored in a convenient, clean and sanitary location; when not in use;

1.3.3.8 certified by the US National Institute for Occupational Safety and Health (NIOSH) for exposure to airborne asbestos fibre.

1.3.4 If respirators are used in the workplace,

1.3.4.1 The employer shall establish written procedures regarding the selection, use and care of respirators; and

1.3.4.2 A copy of the procedures shall be provided to and reviewed with each worker who is required to wear a respirator.

1.3.5 A worker shall not 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.

1.3.6 Provide workers who request protective clothing with full body disposable coveralls.

1.3.7 Ensure that full body disposable coveralls are worn by every worker, who has requested protective clothing, and who enters the Asbestos Work Area. The protective clothing provided by an employer and used by a worker shall be:

1.3.7.1 made of a material which does not readily retain nor permit penetration of asbestos fibres;

1.3.7.2 shall consist of 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;

1.3.7.3 shall include suitable footwear;

1.3.7.4 shall be repaired or replaced if torn.

1.3.8 Do not eat, drink, smoke or chew except in established locations outside the Asbestos Work Area.

1.4 Visitor Protection

1.4.1 Provide clean protective clothing and equipment and approved respirators to Authorized Visitors when requested.

1.4.2 Ensure Authorized Visitors have received required training for entry into Asbestos Work Area.

1.5 Air Monitoring

1.5.1 Air monitoring will be performed following the National Institute for Occupational Safety and Health method 7400.

1.5.2 The contractor shall cooperate fully with the asbestos abatement consultant in the collection of air monitoring samples, including the collection of personal worker samples, if required.

1.5.3 Results of PCM samples of 0.04 fibres per millilitre of air (fibre/mL) or greater, outside of Asbestos Work Area, will indicate asbestos contamination of these areas. The contaminated areas shall be isolated and cleaned in the same manner applicable to the Asbestos Work Area, at no cost to the Owner.

2. PRODUCTS

2.1 Materials and Equipment

2.1.1 All tools, equipment, materials and supplies brought to work site must be in good condition and free of asbestos, asbestos debris, and fibrous materials.

2.1.2 Disposable tools, equipment, materials and supplies must be of new materials only.

2.1.3 Asbestos Waste Containers: Containers for dust and waste shall be, dust tight, suitable for the type of waste, impervious to asbestos and any chemicals used during the removal process, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before being removed from the work area, and removed from the workplace frequently and at regular intervals.

2.1.3.1 Waste shall be contained in two separate containers. The inner container shall be a sealable polyethylene bag. Where there are sharp objects included in the waste material, the outer container shall be a sealable fibre type drum, otherwise the outer container may be a sealable polyethylene bag.

2.1.3.2 Container must be new materials only.

2.1.3.3 Containers shall be as follows:

2.1.3.3.1 Polyethylene Waste Bag: 0.15 mm (6 mil) thick leak-tight polyethylene bags.

2.1.3.3.2 Fibre Drums: 55 US gallon capacity heavy-duty leak tight fibre drums with tight sealing locking metal top and metal bottom.

2.1.3.3.3 Labels: Waste containers shall have a pre-printed cautionary asbestos warning label, acceptable to local dump authorities, clearly visible when ready for removal to disposal site.

2.1.4 Drop Sheets: In polyethylene type and size appropriate for the work being performed.

2.1.5 First Aid Supplies: Comply with governing regulations and recognized recommendations within the construction industry.

2.1.6 HEPA Vacuum: Vacuum with all necessary fittings, tools and attachments. All air must be filtered by HEPA filter before discharge.

2.1.7 Lockdown Sealer: Slow-drying sealer shall be a non-staining, clear, water dispersible type that remains tacky on the surface for a minimum of 8 hours for the purpose of trapping any residual airborne fibres during the settling period. Lock-down agent shall be compatible with replacement insulation or fireproofing where required and capable of withstanding service temperature of substrate. The product must have flame spread and smoke development ratings both less than 50 and shall leave no stain when dry. Also referred to as “Lockdown Agent”.

2.1.8 Polyethylene Sheeting: 6 mil (0.15 mm) minimum thickness unless otherwise specified, in sheet size to minimize joints.

2.1.8.1 Fibre-Reinforced (Rip-Proof) Polyethylene Sheeting: 8 mil (0.20mm) fabric made up from one layer of 5 mil (0.13 mm) weave and two layers of 1.5 mil (0.04 mm) poly laminate or approved equal. In sheet size to minimize on-site seams and overlaps.

2.1.9 Protective Coveralls: Disposable full body coveralls complete with hoods manufactured of a material which does not permit penetration of asbestos fibres.

2.1.10 Sprayer: Garden-type portable manual sprayer or water hose with spray attachment if suitable.

2.1.11 Tape: Reinforced cloth or fibreglass reinforced tape, or vinyl tape, in 2" or 3" widths suitable for sealing polyethylene sheeting under both wet conditions using amended water, and dry conditions.

3. EXECUTION

3.1 Site Preparation

3.1.1 Establish personal hygiene facilities for workers to wash their hands and face. Washing facilities to include sufficient supplies of disposable hand towels, hand soap, a waste receptacle and a mirror.

3.1.2 Provide to the Asbestos Abatement Consultant an itemized list of pre-existing damage in Work Area.

3.1.3 Moving of equipment, tools, supplies, and stored materials which can be performed without disturbing ACM will be performed by the contractor.

3.1.4 Visible dust shall be removed with a damp cloth/mop or a vacuum equipped with a HEPA filter from any surface in the work area, including

the thing to be worked on, if the dust on that surface is likely to be disturbed.

3.1.5 The spread of debris and dust from the work area shall be controlled by measures appropriate to the work to be done including the use of drop sheets of fibre-reinforced (rip-proof) polyethylene or other suitable material that is impervious to asbestos. Replace, or overlay, additional layers of fibre reinforced (rip-proof) polyethylene sheeting as required to maintain an efficient and continuous barrier.

3.1.6 In the case of the removal of less then one square meter of drywall with asbestos-containing drywall joint compound, the material shall be wetted before and kept wet during the work to control the spread of dust or fibres, unless wetting would create a hazard or cause damage.

3.1.7 Prepare sufficient quantities of water mixed with a wetting agent, which is to be used frequently and at regular intervals, to control the spread of debris and dust.

3.1.8 Cover floors and furnishings with polyethylene sheeting or Rip-Proof Polyethylene Sheeting before disturbing non-friable ACM.

3.2 Removal

3.2.1 Prior to removal, wet all materials scheduled for removal. Allow materials scheduled for removal sufficient time to absorb wetting agent.

3.2.2 All removal work must be completed manually with non-powered hand tools.

3.2.3 Undo or remove fasteners if necessary to remove materials.

3.2.4 Break materials only if unavoidable.

3.2.5 Wet freshly exposed edges of broken materials.

3.2.6 Remove material adhered to substrate or supports.

3.2.7 Frequently and at regular intervals during the doing of the work, debris and dust waste shall be cleaned up and removed using a vacuum equipped with a HEPA filter, or by damp mopping or wet sweeping, and placed in an asbestos waste container.

3.2.8 Clean Asbestos Work Area frequently with HEPA vacuum or with wet cleaning methods.

3.2.9 Compressed air shall not be used to clean up and remove debris or dust from any surface.

3.2.10 Eating, drinking, chewing or smoking shall not be permitted in the work area.

3.2.11 Maintain all work areas in a neat and orderly fashion at all times.

3.3 Work Area Clean Up and Exit from the Work Area

3.3.1 Immediately upon completion of the work, debris and dust waste shall be cleaned up and removed using a vacuum equipped with a HEPA filter, or by damp mopping or wet sweeping, and placed in an asbestos waste container.

3.3.2 Following visual acceptance of the removal work, by the Asbestos Abatement Consultant, spray the entire surface, where ACM have been removed, with lock-down sealer.

3.3.3 Drop sheets shall not be reused.

3.3.4 Drop sheets shall be wetted and placed in an asbestos waste container as soon as practicable after completion of the preceding Items of this Section.

3.3.5 Carefully roll drop sheets toward the centre of work area. Remove visible debris by means of HEPA vacuum as polyethylene is rolled away.

3.3.6 After the work is completed, polyethylene sheeting and similar materials used for barriers and enclosures shall not be reused, but shall be wetted and placed in an asbestos waste container as soon as practicable following completion of the preceding Items of this Section.

3.3.7 Barriers and portable enclosures shall not be reused unless they are rigid and can be cleaned thoroughly.

3.3.8 After the work is completed, barriers and portable enclosures that will be reused shall be cleaned, by using a vacuum equipped with a HEPA filter or by damp wiping, as soon as practicable following completion of the preceding Items of this Section.

3.3.9 All tools, equipment, materials and supplies that will NOT be reused shall be placed in an asbestos waste container as soon as practicable following completion of the preceding Items of this Section.

3.3.10 All tools, equipment, materials and supplies that will be reused shall be cleaned, by using a vacuum equipped with a HEPA filter or by damp wiping, as soon as practicable following completion of the preceding Items of this Section.

3.3.11 Workers who are provided with protective clothing shall complete the following before leaving the work area;

3.3.11.1 Decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing.

3.3.11.2 If the protective clothing is to be reused, it shall be stored in a sealable plastic bag.

3.3.11.3 If the protective clothing will NOT be reused, place it in an asbestos waste container immediately prior to leaving the work area.

3.3.12 Immediately after leaving the work area, all workers shall proceed directly to the established washing facilities to wash hands and face.

3.3.13 All workers who requested respiratory protection shall wash, remove and store respirators as per the written procedures that have been established by the employer and as is consistent with the manufacturer's specifications.

3.3.14 Reinstall objects and items removed to facilitate removal of ACM.

End of Section

ASBESTOS ABATEMENT TYPE 2

SECTION 02 82 02

LIST OF CONTENTS

1. GENERAL

1.1 General and Related Work

1.1.1 All sections of the specifications form a part of the Contract Document and shall be read to determine their effect upon the work of this section.

1.1.2 Related Work Specified Elsewhere

1.1.1 Related Work Specified Elsewhere

Division 02	Section 02 82 00	Abatement Scope and Details
Division 02	Section 02 82 01	Type 1 Asbestos Abatement
Division 02	Section 02 82 03	Type 2 Asbestos Abatement (Glove Bag)
Division 02	Section 02 82 04	Type 3 Asbestos Abatement
Division 02	Section 02 83 01	Lead Abatement
Division 02	Section 02 84 01	Other Hazardous Materials

Attachment A:

1) Pre-Renovation Designated Substances & Hazardous Materials Survey Report, ECOH Management Inc., December 1, 2023*.*

1.1.2 This specification fulfils the requirements of the report required by Designated Substance – *Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations*, Ontario Regulation 278/05, Section 10.

1.1.3 The Contractor is responsible to verify all measurements for removal, cleaning, and re-insulation purposes. Measurements and quantities provided herein are for reference only.

1.1.4 It is the intent that work performed as per this section will result in the removal and disposal or decontamination of all asbestos-containing material (ACM) and all materials that have been contaminated by ACM either during or prior to work of this section.

1.1.5 Refer to Section 02 82 00, Scope and Details Specification, for the following information and requirements;

1.1.5.1 Site Conditions,

1.1.5.2 Outline of Work,

1.1.5.3 Schedule,

1.1.5.4 Supervision,

1.1.5.5 Quality Assurance,

1.1.5.6 Regulations,

1.1.5.7 Notification,

1.1.5.8 Submittals, and

1.1.5.9 Waste Transport and Disposals

1.2 Definitions

1.2.1 Airlock: A system for permitting ingress or egress without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways at least 1.5 m apart.

1.2.2 Air Monitoring: The process of measuring the fibre content of a specific volume of air.

1.2.3 Amended Water: Water with a non-ionic surfactant wetting agent added to reduce water surface tension to 35 or less dynes, to allow thorough wetting of asbestos fibres.

1.2.4 Asbestos: The serpentine and amphibole asbestiform varieties including chrysotile, actinolite, amosite, anthophyllite, crocidolite and tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.

1.2.5 Asbestos Abatement Consultant: The Owner or person designated by the owner to provide inspection and air monitoring of the Contractor's work (ECOH Inc).

1.2.6 Asbestos-Containing Material (ACM): Any material that contains 0.5 per cent or more asbestos, of any type or mixture of types, by dry weight.

1.2.7 Asbestos-Containing Waste Material: Any material which is or is suspected of being or any material contaminated with an asbestos-containing material which is to be removed from a work area for disposal.

1.2.8 Asbestos Debris: Pieces of ACM that can be identified by colour, texture, or composition, or means dust, if the dust is determined by an accredited Asbestos Abatement Consultant to be ACM.

1.2.9 Asbestos Work Area: Where the actual removal, sealing and enclosure of asbestos-containing materials takes place.

1.2.10 Authorized Visitor: The Owner or his approved representative and/or persons representing regulatory agencies.

1.2.11 Barrier: Any surface that seals off the work area to inhibit the movement of fibres.

1.2.12 Clean Area: Either an operating area or an area in which removal work has already been completed.

1.2.13 Curtained Doorway: An arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement

between rooms, typically constructed by placing two overlapping sheets of polyethylene over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one sheet along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway. All free edges of polyethylene shall be reinforced with duct tape and the bottom edge shall be weighted to ensure proper closing. Each polyethylene sheet shall overlap openings not less than 1.5 m on each side.

1.2.14 Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.

1.2.15 Disposal Bag: A properly labelled 6 mil thick leak-tight plastic bag used for transporting asbestos waste from the work area to the disposal site.

1.2.16 D.O.P. Test: Dioctylphthalate aerosol challenge of a HEPA filter system and is used to establish the integrity and effectiveness of the system to filter out asbestos fibres.

1.2.17 Encapsulant: A material that surrounds or embeds asbestos fibres in an adhesive matrix, to prevent release of fibres.

1.2.17.1 Bridging Encapsulant: An encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.

1.2.17.2 Penetrating Encapsulant: An encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.

1.2.17.3 Removal Encapsulant: A penetrating encapsulant specifically designed to minimize fibre release during removal of asbestos-containing materials rather than for in situ encapsulation.

1.2.18 Encapsulation: Applying to asbestos-containing materials, with an encapsulant.

1.2.19 Enclosure: 6 mil polyethylene sheeting installed to fully isolate the Type 2 Asbestos Work Area. Enclosure may be a prefabricated self supporting structure or constructed with a rigid frame, or, when applicable, supported by the ceiling grid. Enclosure shall have polyethylene sheeting as a top at locations where the enclosure does not extend up to the underside of the ceiling or underside of structure.

1.2.20 Filter: A media component used in respirators, vacuum cleaners or negative pressure filter fan units to remove solid or liquid particles from the inspired air.

1.2.21 Fitting: Unless otherwise described in Site Conditions, all connections of a pipe which include elbows, ends, caps, valves, hangers, tees and unions, etc.

1.2.22 Friable Asbestos Material: Material that contains asbestos that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

1.2.23 HEPA Filter: High Efficiency Particulate Aerosol filter that is at least 99.97 percent efficient in collecting a 0.3 micrometre aerosol.

1.2.24 Negative Pressure: A system which extracts air directly from the work area, filters such extracted air through a High Efficiency Particulate Air filtering system, and discharges this air directly outside work area to exterior of building. This system shall maintain a minimum pressure differential of 0.02 inches Water Gauge relative to adjacent areas outside of work areas, be equipped with an alarm to warn of system breakdown (i.e. excessive negative pressure or insufficient negative pressure), and be equipped with an instrument to continuously monitor and automatically record pressure differences.

1.2.25 Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.

1.2.26 Occupied Area: Any area of the building outside the Asbestos Work Area.

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

1.2.28 Positive Pressure Respirator: A respirator in which the air pressure inside the respiratory inlet covering is positive during inhalation and exhalation in relation to the air pressure of the outside atmosphere.

1.2.29 Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

1.2.30 Straight run pipes: Part of the building system not included under the description of Fitting, including but not limited to straight, angled or curved sections of pipe, pumps, headers and reducers.

1.2.31 Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

1.2.32 Water Filtration System: A multi-stage filtration system for filtering shower and wastewater. Typically constructed with at least two filters, the primary stage retains 20 microns or larger particles and the final stage removes 5 micron or larger particles.

1.2.33 Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.

1.2.34 Work: Includes all services, labour and material required to complete the work as specified in the contract.

1.3 Worker Protection

1.3.1 Prior to commencing work instruct workers in all aspects of work procedures and protective measures.

1.3.2 Provide workers a respirator with personally issued respiratory equipment acceptable to the Occupational Health and Safety Division of the Ontario Ministry of Labour, suitable for the Asbestos exposure.

1.3.3 Ensure that suitable respiratory protective equipment is worn by every worker who enters the Asbestos Work Area. A respirator provided by an employer and used by a worker shall be:

1.3.3.1 an air purifying half-mask respirator with N-100, R-100 or P-100 particulate filters, or better;

1.3.3.2 fitted so that there is an effective seal between the respirator and the worker's face;

1.3.3.3 assigned to a worker for the worker's exclusive use if practicable;

1.3.3.4 used and maintained in accordance with written procedures that are established by the employer and are consistent with the manufacturer’s specifications;

1.3.3.5 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;

1.3.3.6 free of damaged or deteriorated parts. Damaged or deteriorated parts are to be replaced prior to being used by a worker;

1.3.3.7 be stored in a convenient, clean and sanitary location; when not in use;

1.3.3.8 certified by the US National Institute for Occupational Safety and Health (NIOSH) for exposure to airborne asbestos fibre.

1.3.4 The employer shall establish written procedures regarding the selection, use and care of respirators.

1.3.5 A copy of the procedures shall be provided to and reviewed with each worker.

1.3.6 A worker shall not 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.

1.3.7 Provide all workers with full body disposable coveralls.

1.3.8 Ensure that full body disposable coveralls are worn by every worker who enters the Asbestos Work Area. The protective clothing provided by an employer and used by a worker shall be:

1.3.8.1 made of a material which does not readily retain nor permit penetration of asbestos fibres;

1.3.8.2 shall consist of 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;

1.3.8.3 shall include suitable footwear;

1.3.8.4 shall be repaired or replaced if torn.

1.3.9 Provide other body protection required under applicable safety regulations.

1.3.10 Personnel must be fully protected at all times when possibility of disturbance of asbestos exists.

1.3.11 Provide and post the procedures described under Worker Protection.

1.3.12 Do not eat, drink, smoke or chew except in established locations outside the Asbestos Work Area.

1.3.13 <u>Asbestos Abatement Work Area Entry Procedures</u>

1.3.13.1 Use asbestos abatement precautions at all times when possibility of disturbance of ACM exists.

1.3.13.2 Put on respirator with new or tested filters, coveralls and head covers before entering contaminated Asbestos Work Area. Protective coveralls shall cover all hair and any re-usable clothing.

1.3.14 <u>Asbestos Abatement Work Area Exit Procedures</u>

1.3.14.1 Remove gross contamination from protective clothing using HEPA vacuum or wet wiping.

1.3.14.2 Remove all contaminated clothing and equipment except respirator.

1.3.14.3 Exit site and proceed to wash area while wearing respirator.

1.3.14.4 Wash exposed skin and respirator with soap and water.

1.3.14.5 Remove respirator filters from respirator. Cover inlet side of respirator with tape for storage and re-use or dispose of as asbestos waste.

1.4 <u>Visitor Protection</u>

1.4.1 Provide clean protective clothing and equipment and approved respirators to Authorized Visitors.

1.4.2 Ensure Authorized Visitors have received required training for entry into Asbestos Work Area.

1.5 Air Monitoring (If required)

1.5.1 Air monitoring will be performed following the National Institute for Occupational Safety and Health method 7400.

1.5.2 The contractor shall cooperate fully with the asbestos abatement consultant in the collection of air monitoring samples, including the collection of personal worker samples, if required.

1.5.3 Results of PCM samples of 0.02 fibres per millilitre of air (fibre/mL) or greater, outside of Asbestos Work Area, will indicate asbestos contamination of these areas. The contaminated areas shall be isolated and cleaned in the same manner applicable to the Asbestos Work Area, at no cost to the Owner.

2. PRODUCTS

2.1 Materials and Equipment

2.1.1 All tools, equipment, materials and supplies brought to work site must be in good condition and free of asbestos, asbestos debris, and fibrous materials.

2.1.2 Disposable tools, equipment, materials and supplies must be of new materials only.

2.1.3 Airless Sprayer: Spray equipment for amended water: for application to asbestos-containing materials for saturation prior to removal. Airless spray units are only acceptable, such as Grace Hydrospray or approved equal.

2.1.4 Asbestos Waste Containers: Containers for dust and waste shall be, dust tight, suitable for the type of waste, impervious to asbestos and any chemicals used during the removal process, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before being removed from the work area, and removed from the workplace frequently and at regular intervals.

2.1.4.1 Waste shall be contained in two separate containers. The inner container shall be a sealable polyethylene bag (or where the glove bag method is used, the glove bag itself). Where there are sharp objects included in the waste material, the outer container shall be a sealable fibre type drum, otherwise the outer container may be a sealable polyethylene bag.

2.1.4.2 Container must be new materials only.

2.1.4.3 Containers shall be as follows:

2.1.4.3.1 Polyethylene Waste Bag: 0.15 mm (6 mil) thick leak-tight polyethylene bags.

2.1.4.3.2 Fibre Drums: 55 US gallon capacity heavy duty leak tight fibre drums with tight sealing locking metal top and metal bottom.

2.1.4.3.3 Labels: Waste containers shall have a pre-printed cautionary asbestos warning label, acceptable to local dump authorities, clearly visible when ready for removal to disposal site.

2.1.5 Caulking: One component non-staining acrylic polymer sealant to conform to GSB Specification 19GP-5M.

2.1.6 Drop Sheets: In polyethylene type and size appropriate for the work being performed.

2.1.7 Electrical Power Cords: Use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas of work.

2.1.8 Encapsulant: Type 1 penetrating Class A water based encapsulant conforming to CGSB 1-GP-205M and approved by the Fire Marshall having flame spread and smoke development ratings both less than fifty (50). Acceptable products: Ocean 666, Decadex Fire Check equivalent or better.

2.1.9 Fine Atomizing Spray Nozzle: Nozzle for airless sprayer capable of delivering not less than 1 gallon per minute of fine particle spray of amended water.

2.1.10 First Aid Supplies: Comply with governing regulations and recognized recommendations within the construction industry.

2.1.11 Flame-Resistant Polyethylene Sheeting: A single polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films, 0.15 mm (6 mils) thickness.

2.1.12 Garden Sprayer: A hand pump type pressure-can garden sprayer fabricated out of either metal or plastic, equipped with a metal wand at the end of a hose that can deliver a stream or fine spray of liquid of amended water under pressure.

2.1.13 Ground Fault Panel: Electrical panel, installed by licensed electrician and equipped as follows:

2.1.13.1 Ground fault circuit interrupters of sufficient capacity to power temporary electrical equipment and lights in Asbestos Work Area.

2.1.13.2 Interrupters to have a 5 mA ground fault protection.

2.1.13.3 Necessary accessories including main switch disconnect, ground fault interrupter lights, test switch to ensure unit is working, and reset switch.

2.1.13.4 Openings sealed to prevent moisture or dust penetration.

2.1.14 HEPA Vacuum: Vacuum with all necessary fittings, tools and attachments. All air must be filtered by HEPA filter before discharge.

2.1.15 Lockdown Sealer: Slow-drying sealer shall be a non-staining, clear, water dispersable type that remains tacky on the surface for a minimum of 8 hours for the purpose of trapping any residual airborne fibres during the settling period. Lock-down agent shall be compatible with replacement insulation or fireproofing where required and capable of withstanding service temperature of substrate. The product must have flame spread and smoke development ratings both less than 50 and shall leave no stain when dry. Also referred to as “Lockdown Agent”.

2.1.16 Negative Air Unit: Portable air handling system which extracts air directly from the Asbestos Work Area and discharges the air to the exterior of the Asbestos Work Area. Equipped as follows:

2.1.16.1 Prefilter and HEPA filter. Air must pass HEPA filter before discharge.

2.1.16.2 Pressure differential gauge to monitor filter loading.

2.1.16.3 Auto shut off and warning system for HEPA filter failure.

2.1.16.4 Separate hold down clamps to retain HEPA filter in place during change of prefilter.

2.1.17 Polyethylene Sheeting: 6 mil (0.15 mm) minimum thickness unless otherwise specified, in sheet size to minimize joints.

2.1.17.1 Fibre-Reinforced (Rip-Proof) Polyethylene Sheeting: 8 mil (0.20mm) fabric made up from one layer of 5 mil (0.13 mm) weave and two layers of 1.5 mil (0.04 mm) poly laminate or approved equal. In sheet size to minimize on-site seams and overlaps.

2.1.17.2 Flame-Resistant Polyethylene Sheeting: A single polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films, 6 mil (0.15 mm) thickness.

2.1.18 Power Washer: Spray equipment for saturation of asbestos-containing material with amended water for cleaning of surfaces in abatement work area after asbestos removal, capable of delivering an airless stream of water at a pressure of not less than 1200 psi or exceeding 2500 psi.

2.1.19 Protective Coveralls: Disposable full body coveralls complete with hoods manufactured of a material which does not permit penetration of asbestos fibres.

2.1.20 Scaffolding: The type, erection and use of all scaffolding shall comply with all applicable OSHA provisions.

2.1.21 Spray Cement: Spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

2.1.22 Tape: Reinforced cloth or fibreglass reinforced tape in 2" or 3" widths suitable for sealing polyethylene sheeting under both wet conditions using amended water, and dry conditions.

2.1.23 Temporary Lighting: Provide general service incandescent lamps or fluorescent lamps of wattage required for adequate illumination as required by the work. Protect lamps with guard cages grounded together to distribution panel or tempered glass enclosures.

2.1.24 Wetting Agent: Non-sudsing surface active agent. Acceptable product Aqua-Gro or approved equal.

3. EXECUTION

3.1 Preparation Prior to Contamination

3.1.1 Establish personal hygiene facilities for workers to wash their hands and face. Washing facilities to include sufficient supplies of disposable hand towels, hand soap, a waste recepticle and a mirror.

3.1.2 Visible dust shall be removed with a damp cloth/mop or a vacuum equipped with a HEPA filter from any surface in the work area, including the thing to be worked on, if the dust on that surface is likely to be disturbed.

3.1.3 Moving of equipment, tools, supplies, and stored materials which can be performed without disturbing ACM will be performed by the contractor.

3.1.4 Disable air handling system affecting Asbestos Work Area. Seal ventilation ducts to and from the work area. The air handling system shall not be enabled until completion of work.

3.1.5 Shut off the source of heat for piping systems (i.e. boiler or steam line header), where possible.

3.1.6 Shut off and lock out electrical power within the enclosure.

3.1.7 For operations requiring either 1) removing all or part of a false ceiling to obtain access to a work area, if ACM is likely to be lying on the surface of the false ceiling, or 2) the removal or disturbance of one square metre of less of friable ACM, and where the enclosure is prepared with opaque materials (i.e. orange rip-proof polyethylene), the enclosure shall include one or more transparent (clear) window areas to allow observation of the entire work area from outside the enclosure.

3.1.8 Erect polyethylene hoarding walls between Occupied Area and Work Area to create the Asbestos Work Area Enclosure. Construct a frame for the enclosure from 50 mm x 100 mm (2" x 4") construction grade wood studs and polyethylene. If the potential exists for the disturbance of ACM during the construction of the enclosure, wear a respirator and suitable protective clothing; ensure that the enclosure is of adequate size to permit the storage of equipment and waste.

3.1.9 Support polyethylene sheeting enclosures as required or as directed by Asbestos Abatement Consultant.

3.1.10 Seal all below deck openings, including opening at the deck, to the work area using polyethylene, spray adhesive, tape, caulking, etc.

3.1.11 Provide a sealed polyethylene top for free standing enclosures.

3.1.12 Enclosure may be supported from the deck system(s), if applicable.

3.1.13 Install temporary lighting as required in Asbestos Work Area Enclosure.

3.1.14 Cover floor and wall surfaces and other articles inside enclosure or forming the enclosure with polyethylene sheeting. Lay floor sheeting first and return up wall surface in a fashion that wall sheeting will overlap by at least 12".

3.1.15 Overlap perimeter polyethylene to form flap doorway.

3.1.16 Construct a transfer room for entry to and exit from the enclosure when it is necessary to move workers or materials between Occupied Areas and the Asbestos Work Area.

3.1.17 Establish negative pressure in Asbestos Work Areas as follows:

3.1.17.1 Use HEPA Vacuum, or HEPA Negative Air Unit if requested by the Asbestos Abatement Consultant, which has been DOP tested.

3.1.17.2 Insert vacuum hose into Enclosure. Provide enough hose to reach all areas of Enclosure.

3.1.17.3 Operate HEPA vacuum continuously until dismantling of Enclosure.

3.1.17.4 Provide sufficient negative air pressure to exchange a volume of air equivalent to that of the Asbestos Work Area a minimum of every 20 minutes.

3.1.18 Post signs at doorways leading into a contaminated area.

Such signs shall read:

CAUTION
Asbestos Hazard Area
No Unauthorized Entry
Wear assigned protective equipment
Breathing asbestos dust may cause serious bodily harm

3.2 Preparation of Portable Type 2 Enclosure (if required)

3.2.1 In addition to the aforementioned, components of the portable Type 2 enclosure include the following for a Portable Type 2 Enclosure;

3.2.1.1 Rigid floor to consist of plywood or similar product with appropriate durability. Floor of enclosure is to be protected with 6mm polyethylene.

3.2.1.2 Heavy duty casters with foot brakes to ensure mobility

3.2.1.3 Framing to consist of aluminium poles. The bottom frame is to contain corner sleeves and locking pins for secure pole retention. Adjustable spring loaded upright poles must extend to the underside of the ceiling system (assume 10 feet maximum).

3.2.1.4 Height and width of side walls to be suitable to fit through typical doorways.

3.2.1.5 Walls of the enclosure to consist of 6mm polyethylene. Clear plastic observation window to be installed on a minimum of one wall.

3.2.1.6 Contractor to provide a ladder with a minimum height of 6 feet.

3.2.1.7 Entry and exit doorway to consist of zipper flap

3.2.1.8 Establish negative pressure using a HEPA vacuum as follows:

3.2.1.9 Use HEPA Vacuum which has been DOP tested.

3.2.1.10 Insert vacuum hose into Enclosure. Provide enough hose to reach all areas of Enclosure.

3.2.1.11 Operate HEPA vacuum continuously until relocating to new location.

3.2.1.12 Re-establish ceiling systems prior to dismantling enclosures.

3.3 Asbestos Removal

3.3.1 Before beginning work, remove visible dust from surfaces in the work area. Use HEPA vacuum, or damp cloths where damp cleaning is considered more appropriate. The use of compressed air is strictly forbidden.

3.3.2 All removal work must be completed manually with non-powered hand tools.

3.3.3 Undo or remove fasteners if necessary to remove materials.

3.3.4 Wet materials containing asbestos to be removed, disturbed, or sealed, with amended water. Use garden type low velocity fine mist sprayer. Perform work in a manner to reduce the creation and spread of dust. Keep material wetted as work proceeds and as additional layers of material are exposed.

3.3.5 Break materials only if unavoidable.

3.3.6 Wet freshly exposed edges of broken materials.

3.3.7 Remove material adhered to substrate or supports.

3.3.8 Place waste directly into waste disposal bags. Wherever possible, asbestos-containing material should be removed in sections as intact as possible. Do not allow material to fall to floor.

3.3.9 Frequently and at regular intervals during the doing of the work, debris and dust waste shall be cleaned up and removed using a vacuum equipped with a HEPA filter, or by damp mopping or wet sweeping, and placed in an asbestos waste container.

3.3.10 Clean surfaces where asbestos has been removed by means of wire brushes, steel wool, or other suitable tools.

3.3.11 Immediately after completion of the work, clean up dust and waste containing asbestos using a HEPA vacuum or by damp wiping.

3.3.12 Double bag all waste as it is taken out of the Asbestos Work Area Enclosure.

3.3.13 Clean the entire Asbestos Work Area by means of HEPA vacuuming or wet wiping when removal of ACM is complete.

3.3.14 All tools, equipment, materials and supplies that will NOT be reused shall be placed in an asbestos waste container as soon as practicable following completion of the preceeding Items of this Section.

3.3.15 All tools, equipment, materials and supplies that will be reused shall be cleaned, by using a vacuum equipped with a HEPA filter or by damp wiping, as soon as practicable following completion of the preceding Items of this Section.

3.3.16 Place materials used to form Enclosure, disposable coveralls, and other contaminated waste in asbestos waste bags for disposal. All waste is to be double bagged and independently sealed.

3.3.17 Apply a heavy coat of sealant using a fine mist sprayer to all surfaces in the work area.

3.3.18 The Enclosure shall remain erected until the sealant has dried or, if required, until an air sample is collected inside the enclosure, and the levels are below 0.04f/cc.

3.3.19 Compressed air shall not be used to clean up and remove debris or dust from any surface.

3.3.20 Eating, drinking, chewing or smoking shall not be permitted in the work area.

3.3.21 Maintain all work areas in a neat and orderly fashion at all times.

3.4 Teardown of Enclosure and Exit from the Work Area

3.4.1 Carefully roll polyethylene toward the centre of enclosure. Remove visible debris by means of HEPA vacuum as polyethylene is rolled away.

3.4.2 Drop sheets shall not be reused.

3.4.3 Drop sheets shall be wetted and placed in an asbestos waste container as soon as practicable after completion of the preceding Items of this Section.

3.4.4 After the work is completed, polyethylene sheeting and similar materials used for barriers and enclosures shall not be reused, but shall be wetted and placed in an asbestos waste container as soon as practicable following completion of the preceeding Items of this Section.

3.4.5 Barriers and portable enclosures shall not be reused unless they are rigid and can be cleaned thoroughly.

3.4.6 After the work is completed, barriers and portable enclosures that will be reused shall be cleaned, by using a vacuum equipped with a HEPA filter or by damp wiping, as soon as practicable following completion of the preceeding Items of this Section.

3.4.7 Prior to leaving the work area, workers shall decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing.

3.4.7.1 If the protective clothing is to be reused, it shall be stored in a sealable plastic bag.

3.4.7.2 If the protective clothing will NOT be reused, place it in an asbestos waste container immediately prior to leaving the work area.

3.4.8 Immediately after leaving the work area, all workers shall proceed directly to the established washing facilities to wash hands and face.

3.4.9 All workers shall wash, remove and store respirtors as per the written procedures that have been established by the employer and as is consistent with the manufacturer’s specifications.

3.4.10 Reinstall objects and items removed to facilitate removal of ACM.

End of Section

ASBESTOS ABATEMENT TYPE 2 (GLOVE BAG)

SECTION 02 82 03

LIST OF CONTENTS

1. GENERAL

1.1 General And Related Work

1.1.1 All sections of the specifications form a part of the Contract Document and shall be read to determine their effect upon the work of this section.

1.1.2 Related Work Specified Elsewhere

Division 02,	Section 02 82 00	Scope and Details
Division 02,	Section 02 82 01	Asbestos Abatement – Type 1
Division 02,	Section 02 82 02	Asbestos Abatement – Type 2
Division 02,	Section 02 82 04	Asbestos Abatement – Type 3
Division 02,	Section 02 83 01	Lead Abatement
Division 02,	Section 02 84 01	Other Hazardous Materials

Attachment A:

1) *Pre-Renovation Designated Substances & Hazardous Materials Survey Report*, ECOH Management Inc., December 1, 2023.

1.1.3 This specification fulfils the requirements of the report required by Designated Substance – *Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations*, Ontario Regulation 278/05, Section 10.

1.1.4 The Contractor is responsible to verify all materials and measurements for removal, and cleaning purposes. Materials, measurements, and quantities provided herein are for reference only.

1.1.5 It is the intent that work performed as per this section will result in the removal and disposal or decontamination of all asbestos-containing material (ACM) and all materials that have been contaminated by ACM either during or prior to work of this section.

1.1.6 Refer to Section 02 82 00, Scope and Details, for the following information and requirements.

1.2 Definitions

1.2.1 Airlock: A system for permitting ingress or egress without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways at least 1.5 m apart.

1.2.2 Air Monitoring: The process of measuring the fibre content of a specific volume of air.

1.2.3 Amended Water: Water with a non-ionic surfactant wetting agent added to reduce water surface tension to 35 or less dynes, to allow thorough wetting of asbestos fibres.

1.2.4 Asbestos: The serpentine and amphibole asbestiform varieties including chrysotile, actinolite, amosite, anthophyllite, crocidolite and tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.

1.2.5 Asbestos Abatement Consultant: The Owner or person designated by the Owner to provide inspection and air monitoring of the Contractor's work. The Asbestos Abatement Consultant has the following authorities and duties:

1.2.5.1 To accept or reject the methods and schedules for removal work;

1.2.5.2 To coordinate all aspects of asbestos removal work with the on-site Superintendent provided by the Contractor;

1.2.5.3 To reject the Superintendent without explanation;

1.2.5.4 To remove any personnel that, in their opinion, do not meet the qualifications of a competent and trained person capable of the safe removal and handling of ACM or asbestos contaminated materials;

1.2.5.5 To accept or reject work completed by the contractor;

1.2.5.6 To order work to stop when prescribed health and safety measures and/or health and safety procedures and/or health and safety facilities are not, or are likely not to be, fully implemented;

1.2.6 Asbestos-Containing Material (ACM): Any material that contains 0.5 per cent or more asbestos, of any type or mixture of types, by dry weight.

1.2.7 Asbestos-Containing Waste Material: Any material which is or is suspected of being or any material contaminated with an asbestos-containing material which is to be removed from a work area for disposal.

1.2.8 Asbestos Debris: Pieces of ACM that can be identified by colour, texture, or composition, or means dust, if the dust is determined by an accredited Asbestos Abatement Consultant to be ACM.

1.2.9 Asbestos Work Area: Where the actual removal, sealing and enclosure of asbestos-containing materials takes place.

1.2.10 Authorized Visitor: The Owner or his approved representative and/or persons representing regulatory agencies.

1.2.11 Barrier: Any surface that seals off the work area to inhibit the movement of fibres.

1.2.12 Clean Area: Either an operating area or an area in which removal work has already been completed.

1.2.13 Competent Personnel: a worker who is qualified because of knowledge, training and experience to perform the work; is familiar with the Ontario Occupational Health and Safety Act and with the provisions of the regulations that apply to the work, and; has knowledge of all potential or actual danger to health or safety in the work.

1.2.14 Curtained Doorway: An arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed by placing two overlapping sheets of polyethylene over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one sheet along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway. All free edges of polyethylene shall be reinforced with duct tape and the bottom edge shall be weighted to ensure proper closing. Each polyethylene sheet shall overlap openings not less than 1.5 m on each side.

1.2.15 Disposal Bag: A properly labelled 6 mil thick leak-tight plastic bag used for transporting asbestos waste from the work area to the disposal site.

1.2.16 D.O.P. Test: Dioctylphthalate aerosol challenge of a HEPA filter system and is used to establish the integrity and effectiveness of the system to filter out asbestos fibres.

1.2.17 Encapsulant: A material that surrounds or embeds asbestos fibres in an adhesive matrix, to prevent release of fibres.

1.2.17.1 Bridging Encapsulant: An encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.

1.2.17.2 Penetrating Encapsulant: An encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.

1.2.17.3 Removal Encapsulant: A penetrating encapsulant specifically designed to minimize fibre release during removal of asbestos-containing materials rather than for in situ encapsulation.

1.2.18 Encapsulation: Applying to asbestos-containing materials, with an encapsulant.

1.2.19 Enclosure: 6 mil polyethylene sheeting installed to fully isolate the Type 2 Asbestos Work Area. Enclosure may be a prefabricated self supporting structure or constructed with a rigid frame, or, when applicable, supported by the ceiling grid. Enclosure shall have polyethylene sheeting as a top at locations where the enclosure does not extend up to the underside of the ceiling or underside of structure.

1.2.20 Filter: A media component used in respirators, vacuum cleaners or negative pressure filter fan units to remove solid or liquid particles from the inspired air.

1.2.21 Fitting: Unless otherwise described in Site Conditions, all connections of a pipe which include elbows, ends, caps, valves, hangers, tees and unions.

1.2.22 Friable Asbestos Material: Material that contains asbestos that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

1.2.23 Glove Bag: A sack with inward projecting long sleeve gloves, which are designed to enclose an object from which an asbestos-containing material is to be removed.

1.2.24 HEPA Filter: High Efficiency Particulate Aerosol filter that is at least 99.97 percent efficient in collecting a 0.3 micrometre aerosol.

1.2.25 Negative Pressure: A system which extracts air directly from the work area, filters such extracted air through a High Efficiency Particulate Air filtering system, and discharges this air directly outside work area to exterior of building. This system shall maintain a minimum pressure differential of 0.02 inches Water Gauge relative to adjacent areas outside of work areas, be equipped with an alarm to warn of system breakdown (i.e. excessive negative pressure or insufficient negative pressure), and be equipped with an instrument to continuously monitor and automatically record pressure differences.

1.2.26 Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative

during inhalation in relation to the air pressure of the outside atmosphere.

1.2.27 Occupied Area: Any area of the building outside the Asbestos Work Area.

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

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1.2.31 Straight run pipes: Part of the building system not included under the description of Fitting, including but not limited to straight, angled or curved sections of pipe, pumps, headers and reducers.

1.2.32 Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

1.2.33 Training (For Workers and Supervisors, Prior to November, 2007): The Contractor shall ensure that training is provided by a competent person from a recognized asbestos training course (minimum 3 day duration) for all workers involved with asbestos operations. In addition, all workers must complete a recent asbestos awareness refresher course that meets the requirements of Ontario Regulation 278/05. Copies of the Certificates issued at successful completion of the training shall be provided to the Asbestos Abetment Consultant.

1.2.34 Training (For Workers, Subsequent to November, 2007): In addition to the above training requirements, the Contractor shall ensure that:

1.2.34.1 every worker involved in a Type 3 operation has successfully completed the Asbestos Abatement Worker Training Program approved by the Ministry of Training, Colleges and Universities,

1.2.34.2 every supervisor of a worker involved in a Type 3 operation has successfully completed the Asbestos Abatement Supervisor Training Program approved by the Ministry of Training, Colleges and Universities,

1.2.34.3 every worker and supervisor successfully completed the appropriate program required before performing or supervising the work to which the program relates,

1.2.34.4 a copy of the document issued by the Ministry of Training, Colleges and Universities, showing that a worker has successfully completed the above-mentioned program or has successfully completed equivalent training in another province or territory of Canada, is provided to the Asbestos Abatement Consultant.

1.2.35 Type 2 Asbestos-Related Work, as detailed in Ontario Regulation 278/05, includes the following operations;

1.2.35.1 The removal or disturbance of one square metre or less of friable asbestos-containing material during the repair, alteration, maintenance or demolition of all or part of machinery or equipment or a building, aircraft, locomotive, railway car, vehicle or ship;

1.2.35.2 Enclosing friable asbestos-containing material;

1.2.35.3 Applying tape or a sealant or other covering to pipe or boiler insulation that is asbestos-containing material;

1.2.35.4 Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if,

1.2.35.4.1 the material is not wetted to control the spread of dust or fibres, and

1.2.35.4.2 the work is done only by means of non-powered hand-held tools;

1.2.35.5 Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters;

1.2.35.6 Removing insulation that is asbestos-containing material from a pipe, duct or similar structure using a glove bag;

1.2.35.7 Cleaning or removing filters used in air handling equipment in a building that has sprayed fireproofing that is asbestos-containing material;

1.2.35.8 An operation that,

1.2.35.8.1 is not mentioned in any of the preceding Items,

1.2.35.8.2 may expose a worker to asbestos, and

1.2.35.8.3 is not classified as a Type 1 or Type 3 operation.

1.2.36 Water Filtration System: A multi-stage filtration system for filtering shower and wastewater. Typically constructed with at least two filters, the primary stage retains 20 microns or larger particles and the final stage removes 5 micron or larger particles.

1.2.37 Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.

1.2.38 Work: Includes all services, labour and material required to complete the work as specified in the contract.

1.3 Worker Protection

1.3.1 Prior to commencing work, the Contractor shall instruct workers in all aspects of work procedures and protective measures.

1.3.2 The Contractor shall provide workers with personally issued marked respiratory equipment acceptable to the Occupational Health and Safety Division of the Ontario Ministry of Labour, suitable for the Asbestos exposure.

1.3.3 The Contractor shall ensure that suitable respiratory protective equipment is worn by every worker who enters the Asbestos Work Area. A respirator provided by an employer and used by a worker shall be:

1.3.3.1 An air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter, or better;

1.3.3.2 Fitted so that there is an effective seal between the respirator and the worker's face;

1.3.3.3 Assigned to a worker for the worker's exclusive use, if practicable;

1.3.3.4 Used and maintained in accordance with written procedures that are established by the employer and are consistent with the manufacturer’s specifications;

1.3.3.5 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;

1.3.3.6 Free of damaged or deteriorated parts. Damaged or deteriorated parts are to be replaced prior to being used by a worker;

1.3.3.7 Be stored in a convenient, clean and sanitary location; when not in use;

1.3.3.8 Certified by the US National Institute for Occupational Safety and Health (NIOSH) for exposure to airborne asbestos fibre.

1.3.4 The Contractor shall establish written procedures regarding the selection, use and care of respirators.

1.3.5 A copy of the procedures shall be provided to and reviewed with each worker by the Contractor.

1.3.6 A worker shall not 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.

1.3.7 The Contractor shall provide all workers with full body disposable coveralls.

1.3.8 The Contractor shall ensure that full body disposable coveralls are worn by every worker who enters the Asbestos Work Area. The protective clothing provided by an employer and used by a worker shall:

1.3.8.1 Be made of a material which does not readily retain nor permit penetration of asbestos fibres;

1.3.8.2 Consist of 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;

1.3.8.3 Include suitable footwear;

1.3.8.4 Be repaired or replaced if torn.

1.3.9 The Contractor shall provide other body protection required under applicable safety regulations.

1.3.10 Personnel must be fully protected at all times when possibility of disturbance of asbestos exists.

1.3.11 The Contractor shall provide and post the procedures described under Worker Protection.

1.3.12 No person shall eat, drink, smoke or chew except in established locations outside the Asbestos Work Area.

1.4 Visitor Protection

1.4.1 The Contractor shall provide clean protective clothing and equipment and approved respirators to Authorized Visitors.

1.4.2 The Contractor shall ensure Authorized Visitors have received required training for entry into Asbestos Work Area.

1.5 Air Monitoring

1.5.1 The Asbestos Abatement Consultant shall ensure that air monitoring is performed following the National Institute for Occupational Safety and Health method 7400.

1.5.2 The Contractor shall cooperate fully with the asbestos abatement consultant in the collection of air monitoring samples, including the collection of personal worker samples, if required.

1.5.3 Results of PCM samples of 0.04 fibres per millilitre of air (fibre/mL) or greater, outside of Asbestos Work Area, will indicate asbestos contamination of these areas. The contaminated areas shall be isolated and cleaned in the same manner applicable to the Asbestos Work Area, at no cost to the Owner.

2. PRODUCTS

2.1 Materials and Equipment

2.1.1 The Contractor shall ensure that disposable tools, equipment, materials and supplies are of new materials only.

2.1.2 Airless Sprayer: Spray equipment for amended water: for application to asbestos-containing materials for saturation prior to removal. Airless spray units are only acceptable, such as Grace Hydrospray or approved equal.

2.1.3 Asbestos Waste Containers: The Contractor shall ensure that containers for dust and waste are: dust tight, suitable for the type of waste, impervious to asbestos and any chemicals used during the removal process, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before being removed from the work area, and removed from the workplace frequently and at regular intervals.

2.1.3.1 The Contractor shall ensure that waste is contained in two separate containers. The inner container shall be a sealable polyethylene bag. Where there are sharp objects included in the waste material, the outer container shall be a sealable fibre type drum; otherwise the outer container may be a sealable polyethylene bag.

2.1.3.2 The Contractor shall ensure that the container is of new materials only.

2.1.3.3 The Contractor shall ensure that the containers are as follows:

2.1.3.3.1 Polyethylene Waste Bag: 0.15 mm (6 mil) thick leak-tight polyethylene bags.

2.1.3.3.2 Fibre Drums: 55 US gallon capacity heavy duty leak tight fibre drums with tight sealing locking metal top and metal bottom.

2.1.3.3.3 Labels: Waste containers shall have a pre-printed cautionary asbestos warning label, acceptable to local dump authorities, clearly visible when ready for removal to disposal site.

2.1.4 Caulking: One component non-staining acrylic polymer sealant to conform to GSB Specification 19GP-5M.

2.1.5 Drop Sheets: In polyethylene type and size appropriate for the work being performed.

2.1.6 Electrical Power Cords: Use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas of work.

2.1.7 Encapsulant: Type 1 penetrating Class A water based encapsulant conforming to CGSB 1-GP-205M and approved by the Fire Marshall having flame spread and smoke development ratings both less than fifty (50). Acceptable products: Ocean 666, Decadex Fire Check equivalent or better.

2.1.8 Fine Atomizing Spray Nozzle: Nozzle for airless sprayer capable of delivering not less than 1 gallon per minute of fine particle spray of amended water.

2.1.9 First Aid Supplies: Comply with governing regulations and recognized recommendations within the construction industry.

2.1.10 Flame-Resistant Polyethylene Sheeting: A single polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films, 0.15 mm (6 mils) thickness.

2.1.11 Garden Sprayer: A hand pump type pressure-can garden sprayer fabricated out of either metal or plastic, equipped with a metal wand at the end of a hose that can deliver a stream or fine spray of liquid of amended water under pressure.

2.1.12 Glove Bag: Safe-T-Strip manufactured by Asbesguard Equipment Inc., Markham Ontario, in configurations suitable for work.

2.1.13 Ground Fault Panel: Electrical panel, installed by licensed electrician and equipped as follows:

2.1.13.1 Ground fault circuit interrupters of sufficient capacity to power temporary electrical equipment and lights in Asbestos Work Area.

2.1.13.2 Interrupters to have a 5 mA ground fault protection.

2.1.13.3 Necessary accessories including main switch disconnect, ground fault interrupter lights, test switch to ensure unit is working, and reset switch.

2.1.13.4 Openings shall be sealed by the Contractor to prevent moisture or dust penetration.

2.1.14 HEPA Vacuum: Vacuum with all necessary fittings, tools and attachments. All air must be filtered by HEPA filter before discharge.

2.1.15 Lockdown Sealer: Slow-drying sealer shall be a non-staining, clear, water dispersible type that remains tacky on the surface for a minimum of 8 hours for the purpose of trapping any residual airborne fibres during the settling period. Lock-down agent shall be compatible with replacement insulation or fireproofing where required and capable of withstanding service temperature of substrate. The product must have flame spread and smoke development ratings both less than 50 and shall leave no stain when dry. Also referred to as "Lockdown Agent".

2.1.16 Polyethylene Sheeting: 6 mil (0.15 mm) minimum thickness unless otherwise specified, in sheet size to minimize joints.

2.1.16.1 Fibre-Reinforced (Rip-Proof) Polyethylene Sheeting: 8 mil (0.20mm) fabric made up from one layer of 5 mil (0.13 mm) weave and two layers of 1.5 mil (0.04 mm) poly laminate or approved equal. In sheet size to minimize on-site seams and overlaps.

2.1.16.2 Flame-Resistant Polyethylene Sheeting: A single polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films, 6 mil (0.15 mm) thickness.

2.1.17 Protective Coveralls: Disposable full body coveralls complete with hoods manufactured of a material which does not permit penetration of asbestos fibres.

2.1.18 Scaffolding: The type, erection and use of all scaffolding shall comply with all applicable OSHA provisions.

2.1.19 Spray Cement: Spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

2.1.20 Tape: Reinforced cloth or fibreglass reinforced tape in 2" or 3" widths suitable for sealing polyethylene sheeting under both wet conditions using amended water, and dry conditions.

2.1.21 Temporary Lighting: Provide general service incandescent lamps or fluorescent lamps of wattage required for adequate illumination as required by the work. Protect lamps with guard cages grounded together to distribution panel or tempered glass enclosures.

2.1.22 Wetting Agent: Non-sudsing surface active agent. Acceptable product Aqua-Gro or approved equal.

3. EXECUTION

3.1 Site Preparation

3.1.1 The glove bag removal method may only be used with approval of the on-site Asbestos Abatement Consultant.

3.1.2 A glove bag shall not be used to remove insulation from a pipe, duct or similar structure if:

3.1.2.1 It may not be possible to maintain a proper seal for any reason including, without limitation:

3.1.2.1.1 The condition of the insulation, or

3.1.2.1.2 The temperature of the pipe, duct or similar structure.

3.1.2.2 The bag could become damaged for any reason including, without limitation:

3.1.2.2.1 The type of jacketing, or

3.1.2.2.2 The temperature of the pipe, duct or similar structure.

3.1.3 The Contractor shall establish personal hygiene facilities for workers to wash their hands and face. Washing facilities to include sufficient supplies of disposable hand towels, hand soap, a waste recepticle and a mirror.

3.1.4 The Contractor shall separate the work place from the rest of the building by placing rope barriers, signage and other appropriate means at the boundary of the designated work area.

3.1.5 The Contractor shall display signage in all areas where access to Asbestos Work Area is possible.

Such signs shall read:

CAUTION
Asbestos Hazard Area
No Unauthorized Entry
Wear assigned protective equipment
Breathing asbestos dust may cause serious bodily harm

3.1.6 Visible dust shall be removed by the Contractor with a damp cloth/mop or a vacuum equipped with a HEPA filter from any surface in the work area, including the thing to be worked on, if the dust on that surface is likely to be disturbed.

3.1.7 The Contractor shall provide to the Asbestos Abatement Consultant an itemized list of pre-existing damage in Work Area.

3.1.8 Moving of equipment, tools, supplies, and stored materials that can be performed without disturbing ACM will be performed by the contractor.

3.1.9 The Contractor or Owner shall disable air-handling system affecting Asbestos Work Area. The Contractor shall seal ventilation ducts to and from the work area. The air handling system shall not be enabled until completion of work.

3.1.10 The Contractor or Owner shall shut off the source of heat for piping systems (i.e. boiler or steam line header), where possible.

3.1.11 The Contractor shall shut off and lock out electrical power within the work area.

3.1.12 The Contractor shall place polyethylene drop sheets on horizontal surfaces in Asbestos Work Area.

3.1.13 The Contractor shall seal with polyethylene, spray adhesive, and tape, diffusers and duct openings in the Asbestos Work Area.

3.2 Insulation Removal

3.2.1 Do not perform glove bag operations on damaged insulations.

3.2.2 Immediately before the glove bag is attached, the insulation jacketing or coating shall be inspected for damage or defects, and if any

damage or defect is present, it shall be repaired by the Contractor using Type 2 asbestos safety precautions.

3.2.3 The glove bag shall be inspected for damage or defects:

3.2.3.1 Immediately before it is attached to the pipe, duct or other similar structure, and

3.2.3.2 At regular intervals during its use.

3.2.4 If damage or defects are observed when the glove bag is inspected, the glove bag shall be disposed of.

3.2.5 If damage or defects are observed when the glove bag inspected, prior to beginning removal work, or at any other time:

3.2.5.1 The use of the glove bag shall be discontinued,

3.2.5.2 The inner surface of the glove bag and the contents, if any, shall be thoroughly wetted,

3.2.5.3 The glove bag and the contents, if any, shall be removed and placed in the asbestos waste container, and

3.2.5.4 The work area shall be cleaned by the Contractor by vacuuming with a vacuum equipped with a HEPA filter before removal work is resumed.

3.2.6 The Contractor shall ensure that any knife to be used inside the glove bag has a retractable blade; and that any saw used inside the glove bag is of the flexible wire type; and any brush used inside a glove bag shall not have metal bristles.

3.2.7 The Contractor shall perform removal operations using the following procedures detailed in this Section and in accordance to the manufacturer's instructions.

3.2.8 Welds and folds of glove bags are to remain intact without modification to manufacturer's design.

3.2.9 The Contractor shall place any tools necessary to remove insulation in the bottom of the glove bag.

3.2.10 The Contractor shall install the glove bag on the pipe, duct or similar structure, using shoulder straps and zipper provided. Duct tape is not to be substituted for shoulder straps. Support the glove bag as

necessary to avoid damage to the pipe, duct or similar structure, or the bag itself.

3.2.11 The Contractor shall insert nozzle of spray pump that is pre-filled and primed with water and surfactant mixture (amended water) into the glove bag through the valve provided. Place hands in gloves and relocate the tools to the tool pouch.

3.2.12 The Contractor shall cut or remove exterior insulation jacket, where applicable, to expose asbestos insulations. Wet exposed insulations with sufficient amended water to suppress any dust. Remove insulation and arrange in bottom of the glove bag to obtain maximum capacity for the glove bag. Wash down exposed portion of the pipe, duct or similar structure, and top section of bag ensuring that insulation in lower portion of the glove bag, as well as any exposed end of insulation, is thoroughly saturated. Use one hand and a cloth or sponge to aid in the washing process.

3.2.13 The Contractor shall ensure that pipe and other surfaces are clean of visible residue, dirt or dust prior to removal or relocation of the glove bag.

3.2.14 The Contractor shall evacuate air from glove bag using a vacuum equipped with a HEPA filter prior to removing bag from pipe.

3.2.15 If the glove bag is ripped, cut or opened in any way, work that may disturb asbestos insulations shall cease immediately. If the rip, cut or opening is small and easy to repair, then the glove bag shall be repaired immediately with tape. Work may continue once the repairs are completed. If the rip, cut or opening is not small and cannot be easily repaired, place the glove bag immediately within a suitable asbestos waste container. Any spilled material containing asbestos shall be cleaned up and removed by using a vacuum equipped with a HEPA filter and/or by wet wiping.

3.2.16 If the glove bag is to be removed from the pipe, duct or similar structure for use on a new section, seal the internal zip-lock prior to removal and reinstall in new location before reopening the zip-lock.

3.2.17 If the glove bag is to be relocated along the pipe, duct or similar structure, reseal to pipe with straps and use double pull zipper to pass hangers. Repeat stripping operation.

3.2.18 To remove glove bag after completion of stripping, wash top section and tools thoroughly. Put all tools in one hand (glove), pull hand out inverted, twist to create a separate pouch, double tape to seal ends, cut and place in the next glove bag, or into a water bucket and open under water and clean and then allow to dry. Tools may also be cleaned and handed out during the movement of the glove bag while taking all precautions to prevent release of asbestos.

3.2.19 While glove bag is still on pipe, duct or similar structure, but after tools have been removed, an appropriately labelled waste disposal bag is slipped up and over the glove bag. The glove bag's straps and zippers are opened and the glove bag opening carefully folded over the lowered into the waste disposal bag. Disposal bag is then sealed with tape.

3.2.20 After removal of the glove bag, the Contractor shall ensure pipe, duct or similar structure is clean of all residue. If necessary after removal of each section of asbestos insulations, vacuum all surface of pipe, duct or similar structure using vacuums equipped with HEPA filters.

3.2.21 The Contractor shall apply a sealant to all surfaces of the pipe, duct or similar structure from which asbestos insulations have been removed. Seal exposed ends of remaining asbestos insulations with encapsulant (lagging compound or tape).

3.3 Work Area Clean Up and Exit from the Work Area

3.3.1 Glove bags, disposal bags, cloth rags and any porous materials are to be handled and disposed of as asbestos waste by the Contractor.

3.3.2 Frequently, and at regular interval during the work, and immediately upon completion of the work, glove bags containing asbestos-contaminated dust and waste shall be placed in a suitable waste container and shall be removed from the workplace by the Contractor.

3.3.3 Immediately after completion of the work, the Contractor shall clean up dust and waste containing asbestos using a HEPA vacuum or by damp wiping.

3.3.4 Drop sheets shall not be reused.

3.3.5 Drop sheets shall be wetted and removed, by folding inward, and placed in an asbestos waste container as soon as practicable after completion of the preceding Items of this Section.

3.3.6 After the work is completed, polyethylene sheeting and similar materials used for barriers shall not be reused, but shall be wetted and placed in an asbestos waste container as soon as practicable following completion of the preceeding Items of this Section.

3.3.7 All tools, equipment, materials and supplies that will NOT be reused shall be placed in an asbestos waste container by the Contractor as soon as practicable following completion of the preceeding Items of this Section.

3.3.8 All tools, equipment, materials and supplies that will be reused shall be cleaned by the Contractor, by using a vacuum equipped with a HEPA filter or by damp wiping, as soon as practicable following completion of the preceding Items of this Section.

3.3.9 Prior to leaving the work area,

3.3.9.1 Workers shall decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing.

3.3.9.2 Remove protective clothing by rolling the clothing outward and downward onto itself so the clean interior of the protective clothing is on the exterior after removal.

3.3.9.3 Workers shall remove all contaminated clothing and equipment except respirator.

3.3.9.4 If the protective clothing is to be reused, it shall be stored in a sealable plastic bag by the worker.

3.3.9.5 If the protective clothing will NOT be reused, the worker shall place it in an asbestos waste container immediately prior to leaving the work area.

3.3.9.6 Immediately after leaving the work area, all workers shall proceed directly to the established washing facilities to wash hands and face while wearing the respirator.

3.3.9.7 Workers shall wash exposed skin and respirator with soap and water.

3.3.9.8 All workers shall wash, remove and store respirators as per the written procedures that have been established by the employer and as is consistent with the manufacturer's specifications. Respirator filters for re-use shall be removed from respirators prior to washing the respirator or shall be disposed of as asbestos waste.

End of Section

ASBESTOS ABATEMENT TYPE 3

SECTION 02 82 04

LIST OF CONTENTS

1. GENERAL

1.1 General and Related Work

1.1.1 All sections of the specifications form a part of the Contract Document and shall be read to determine their effect upon the work of this section.

1.1.2 All sections of the specifications form a part of the Contract Document and shall be read to determine their effect upon the work of this section.

1.1.3 Related Work Specified Elsewhere

Division 02	Section 02 82 00	Abatement Scope and Details
Division 02	Section 02 82 01	Type 1 Asbestos Abatement
Division 02	Section 02 82 02	Type 2 Asbestos Abatement
Division 02	Section 02 82 03	Type 2 Asbestos Abatement (Glove Bag)
Division 02	Section 02 83 01	Lead Abatement
Division 02	Section 02 84 01	Other Hazardous Materials

Attachment A:

1) Pre-Renovation Designated Substances & Hazardous Materials Survey Report, ECOH Management Inc., December 1, 2023*.*

1.1.4 This specification fulfils the requirements of the report required by Designated Substance – *Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations*, Ontario Regulation 278/05, Section 10.

1.1.5 The Contractor is responsible to verify all measurements for removal, cleaning, and re-insulation purposes. Measurements and quantities provided herein are for reference only.

1.1.6 It is the intent that work performed as per this section will result in the removal and disposal or decontamination of all asbestos-containing material (ACM) and all materials that have been contaminated by ACM either during or prior to work of this section.

1.1.7 Refer to Section 02 82 00, Scope and Details Specification, for the following information and requirements;

1.1.7.1 Site Conditions,

1.1.7.2 Outline of Work,

1.1.7.3 Schedule,

1.1.7.4 Supervision,

1.1.7.5 Quality Assurance,

1.1.7.6 Regulations,

1.1.7.7 Notification,

1.1.7.8 Submittals, and

1.1.7.9 Waste Transport and Disposal.

1.2 Definitions

1.2.1 Airlock: A system for permitting ingress or egress without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways at least 1.5 m apart.

1.2.2 Air Monitoring: The process of measuring the fibres content of a specific volume of air.

1.2.3 Amended Water: Water with a non-ionic surfactant wetting agent added to reduce water surface tension to 35 or less dynes, to allow thorough wetting of asbestos fibres.

1.2.4 Asbestos: The serpentine and amphibole asbestiform varieties including chrysotile, actinolite, amosite, anthophyllite, crocidolite and tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.

1.2.5 Asbestos Abatement Consultant: The Owner or person designated by the Owner to provide inspection and air monitoring of the Contractor's work. The Asbestos Abatement Consultant has the following authorities and duties:

1.2.5.1 To accept or reject the methods and schedules for removal work;

1.2.5.2 To coordinate all aspects of asbestos removal work with the on-site Superintendent provided by the Contractor;

1.2.5.3 To reject the Superintendent without explanation;

1.2.5.4 To remove any personnel that, in their opinion, do not meet the qualifications of a competent and trained person capable of the safe removal and handling of ACM or asbestos contaminated materials.

1.2.5.5 To accept or reject work completed by the contractor.

1.2.5.6 To order work to stop when prescribed health and safety measures and/or health and safety procedures and/or health and safety facilities are not, or are likely not to be, fully implemented.

1.2.6 Asbestos-Containing Material (ACM): Any material that contains 0.5 per cent or more asbestos, of any type or mixture of types, by dry weight.

1.2.7 Asbestos-Containing Waste Material: Any material which is or is suspected of being or any material contaminated with an asbestos-containing material which is to be removed from a work area for disposal.

1.2.8 Asbestos Debris: Pieces of ACM that can be identified by colour, texture, or composition, or means dust, if the dust is determined by an accredited Asbestos Abatement Consultant to be ACM.

1.2.9 Asbestos Work Area: Where the actual removal, sealing and enclosure of asbestos-containing materials takes place.

1.2.10 Authorized Visitor: The Owner or his approved representative and/or persons representing regulatory agencies.

1.2.11 Barrier: Any surface that seals off the work area to inhibit the movement of fibres.

1.2.12 Clean Area: Either an operating area or an area in which removal work has already been completed.

1.2.13 Competent Personnel: a worker who is qualified because of knowledge, training and experience to perform the work; is familiar with the Ontario Occupational Health and Safety Act and with the provisions of the regulations that apply to the work, and; has knowledge of all potential or actual danger to health or safety in the work.

1.2.14 Curtained Doorway: An arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed by placing two overlapping sheets of polyethylene over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one sheet along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway. All free edges of polyethylene shall be reinforced with duct tape and the bottom edge shall be weighted to ensure proper closing. Each polyethylene sheet shall overlap openings not less than 1.5 m on each side.

1.2.15 Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.

1.2.16 Disposal Bag: A properly labelled 6 mil thick leak-tight plastic bag used for transporting asbestos waste from the work area to the disposal site.

1.2.17 D.O.P. Test: Dioctylphthalate aerosol challenge of a HEPA filter system and is used to establish the integrity and effectiveness of the system to filter out asbestos fibres.

1.2.18 Encapsulant: A material that surrounds or embeds asbestos fibres in an adhesive matrix, to prevent release of fibres.

1.2.18.1 Bridging Encapsulant: An encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.

1.2.18.2 Penetrating Encapsulant: An encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.

1.2.18.3 Removal Encapsulant: A penetrating encapsulant specifically designed to minimize fibre release during removal of asbestos-containing materials rather than for in situ encapsulation.

1.2.19 Encapsulation: Applying to asbestos-containing materials, with an encapsulant.

1.2.20 Enclosure: 6 mil polyethylene sheeting installed to fully isolate the Type 3 Asbestos Work Area. Enclosure may be a prefabricated self-supporting structure or constructed with a rigid frame, or, when applicable, supported by the ceiling grid. Enclosure shall have polyethylene sheeting as a top at locations where the enclosure does not extend up to the underside of the ceiling or underside of structure.

1.2.21 Filter: A media component used in respirators, vacuum cleaners or negative pressure filter fan units to remove solid or liquid particles from the inspired air.

1.2.22 Fitting: Unless otherwise described in Site Conditions, all connections of a pipe which include elbows, ends, caps, valves, hangers, tees and unions.

1.2.23 Friable Asbestos Material: Material that contains asbestos that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

1.2.24 Glovebag: A sack with inward projecting long sleeve gloves, which are designed to enclose an object from which an asbestos-containing material is to be removed.

1.2.25 HEPA Filter: High Efficiency Particulate Aerosol filter that is at least 99.97 percent efficient in collecting a 0.3 micrometre aerosol.

1.2.26 Negative Pressure: A system which extracts air directly from the work area, filters such extracted air through a High Efficiency Particulate Air filtering system, and discharges this air directly outside work area to exterior of building. This system shall maintain a minimum pressure differential of 0.02 inches Water Gauge relative to adjacent areas outside of work areas, be equipped with an alarm to warn of system breakdown (i.e. excessive negative pressure or insufficient negative pressure) and be equipped with an instrument to continuously monitor and automatically record pressure differences.

1.2.27 Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the

air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.

1.2.28 Occupied Area: Any area of the building outside the Asbestos Work Area.

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

1.2.30 Positive Pressure Respirator: A respirator in which the air pressure inside the respiratory inlet covering is positive during inhalation and exhalation in relation to the air pressure of the outside atmosphere.

1.2.31 Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

1.2.32 Straight run pipes: Part of the building system not included under the description of Fitting, including but not limited to straight, angled or curved sections of pipe, pumps, headers and reducers.

1.2.33 Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

1.2.34 Training (For Workers and Supervisors, Prior to November 1st, 2007): The Contractor shall ensure that training is provided by a competent person from a recognized asbestos training course (minimum 3 day duration) for all workers involved with asbestos operations. In addition, all workers must complete a recent asbestos awareness refresher course that meets the requirements of Ontario Regulation 278/05. Copies of the Certificates issued at successful completion of the training shall be provided to the Asbestos Abetment Consultant.

1.2.35 Training (For Workers, Effective November 1st, 2007): In addition to the above training requirements, the Contractor shall ensure that:

1.2.35.1 Every worker involved in a Type 3 operation has successfully completed the Asbestos Abatement Worker Training Program approved by the Ministry of Training, Colleges and Universities,

1.2.35.2 Every supervisor of a worker involved in a Type 3 operation has successfully completed the Asbestos Abatement Supervisor Training Program approved by the Ministry of Training, Colleges and Universities,

1.2.35.3 Every worker and supervisor successfully completed the appropriate program required before performing or supervising the work to which the program relates,

1.2.35.4 A copy of the document issued by the Ministry of Training, Colleges and Universities, showing that a worker has successfully completed the above-mentioned program or has successfully completed equivalent training in another province or territory of Canada, is provided to the Asbestos Abatement Consultant.

1.2.36 Type 3 Asbestos-Related Work, as detailed in Ontario Regulation 278/05, includes the following operations;

1.2.36.1 The removal or disturbance of more than one square metre of friable asbestos-containing material during the repair, alteration, maintenance or demolition of all or part of a building, aircraft, ship, locomotive, railway car or vehicle or any machinery or equipment;

1.2.36.2 The spray application of a sealant to friable asbestos-containing material;

1.2.36.3 Cleaning or removing air handling equipment, including rigid ducting but not including filters, in a building that has sprayed fireproofing that is asbestos-containing material;

1.2.36.4 Repairing, altering or demolishing all or part of a kiln, metallurgical furnace or similar structure that is made in part of refractory materials that are asbestos-containing materials;

1.2.36.5 Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material, if the work is done by means of power tools that are not attached to dust-collecting devices equipped with HEPA filters;

1.2.36.6 Repairing, altering or demolishing all or part of any building in which asbestos is or was used in the manufacture of products, unless the asbestos was cleaned up and removed before March 16, 1986.

1.2.37 Water Filtration System: A multi-stage filtration system for filtering shower and wastewater. Typically constructed with at least two filters, the primary stage retains 20 microns or larger particles and the final stage removes 5 micron or larger particles.

1.2.38 Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.

1.2.39 Work: Includes all services, labour and material required to complete the work as specified in the contract.

1.3 Worker Protection

1.3.1 Prior to commencing work, the Contractor shall instruct workers in all aspects of work procedures and protective measures.

1.3.2 The Contractor shall provide workers a respirator with personally issued respiratory equipment acceptable to the Occupational Health and Safety Division of the Ontario Ministry of Labour, suitable for the Asbestos exposure.

1.3.3 The Contractor shall ensure that suitable respiratory protective equipment is worn by every worker who enters the Asbestos Work Area. A respirator provided by an employer and used by a worker shall be:

1.3.3.1 Appropriate for the wok being completed and in compliance with Table 2 of Ontario Regulation 278/05.

1.3.3.2 An air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filters, or better, following details of Subsection 14(12) and Subsection 15(11) of Ontario Regulation 278/05.

1.3.3.3 Fitted so that there is an effective seal between the respirator and the worker's face,

1.3.3.4 Assigned to a worker for the worker's exclusive use,

1.3.3.5 Used and maintained in accordance with the procedures specified by the equipment manufacturer,

1.3.3.6 Cleaned, disinfected and inspected after use on each shift, or more often if necessary,

1.3.3.7 Free of damaged or deteriorated parts replaced prior to being used by a worker,

1.3.3.8 Be stored in a convenient, clean and sanitary location; when not in use,

1.3.3.9 Certified by the US National Institute for Occupational Safety and Health (NIOSH) or the British Standards Institution for exposure to airborne asbestos fibre.

1.3.4 The employer shall establish written procedures regarding the selection, use and care of respirators.

1.3.5 A copy of the procedures shall be provided to and reviewed with each worker by the contractor.

1.3.6 A worker shall not 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.

1.3.7 The Contractor shall provide all workers with full body disposable coveralls.

1.3.8 The Contractor shall ensure that full body disposable coveralls are worn by every worker who enters the Asbestos Work Area. The protective clothing provided by an employer and used by a worker shall be:

1.3.8.1 made of a material which does not readily retain nor permit penetration of asbestos fibres;

1.3.8.2 shall consist of 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;

1.3.8.3 shall include suitable footwear;

1.3.8.4 shall be repaired or replaced if torn.

1.3.9 The Contractor shall provide other body protection required under applicable safety regulations.

1.3.10 Personnel must be fully protected at all times when possibility of disturbance of asbestos exists.

1.3.11 The Contractor shall provide and post the procedures described under Worker Protection.

1.3.12 No person shall eat, drink, smoke or chew except in established locations outside the Asbestos Work Area.

1.3.13 Asbestos Abatement Work Area Entry Procedures

The Worker shall:

1.3.13.1 Use asbestos abatement precautions at all times when possibility of disturbance of ACM exists.

1.3.13.2 Remove all clothing including undergarments and footwear in Clean Change Room.

1.3.13.3 Store all street clothes, uncontaminated footwear, towels, etc. in the Clean Change Room.

1.3.13.4 Put on respirator with new or tested filters, and coveralls in Clean Change Room.

1.3.13.5 Proceed into Asbestos Work area through the Shower Unit.

1.3.14 Asbestos Abatement Work Area Exit Procedures

The Worker shall:

1.3.14.1 Decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing.

1.3.14.2 Proceed to Equipment and Access Room and remove all contaminated clothing and equipment except respirator.

1.3.14.3 Remove protective clothing by rolling the clothing outward and downward onto itself so the clean interior of the protective clothing is on the exterior after removal.

1.3.14.4 If the protective clothing is to be reused, it shall be stored in a sealable plastic bag by the worker.

1.3.14.5 If the protective clothing will NOT be reused, the worker shall place it in an asbestos waste container immediately prior to leaving the work area.

1.3.14.6 Store contaminated footwear, hard hats, etc. in Equipment and Access Room.

1.3.14.7 Proceed naked to showers while still wearing respirator

1.3.14.8 While in shower, clean outside of respirator with soap and water. Respirator filters for re-use shall be removed from respirators prior to washing the respirator. Thoroughly wet body, head and hair, remove respirator and wash body, head and hair. Wet clean inside and outside of respirator face piece

1.3.14.9 Cover inlet side of respirator filter(s) with tape prior to entering the Clean Change Room.

1.3.14.10 All workers shall wash, remove and store respirators as per the written procedures that have been established by the employer and as is consistent with the manufacturer's specifications. Respirator filters for re-use shall be removed from respirators prior to washing the respirator or shall be disposed of as asbestos waste.

1.3.14.11 Proceed to the Clean Change Room, dry off and dress in street clothing.

1.4 Visitor Protection

1.4.1 The Contractor shall provide clean protective clothing and equipment and approved respirators to Authorized Visitors.

1.4.2 The Contractor shall ensure Authorized Visitors have received required training for entry into Asbestos Work Area.

1.5 Air Monitoring

1.5.1 The Asbestos Abatement Consultant shall ensure that air monitoring is performed following the National Institute for Occupational Safety and Health method 7400.

1.5.2 The Contractor shall cooperate fully with the asbestos abatement consultant in the collection of air monitoring samples, including the collection of personal worker samples, if required.

1.5.3 Results of PCM samples of 0.01 fibres per millilitre of air (fibre/mL) or greater, outside of Asbestos Work Area, will indicate asbestos contamination of these areas. The contaminated areas shall be isolated and cleaned in the same manner applicable to the Asbestos Work Area, at no cost to the Owner.

1.5.4 Clearance air monitoring samples will be collected after a suitable settling period following application of lock-down agent. Clearance air monitoring will be completed following details of Subsection 18(5) of Ontario Regulation 278/05. Using the phase contrast microscopy method, clearance air samples must not exceed 0.01 fibre/mL for the Work Area to be deemed clean.

2. PRODUCTS

2.1 Materials and Equipment

2.1.1 The Contractor shall ensure that all tools, equipment, materials and supplies brought to work site are in good condition and free of asbestos, asbestos debris, and fibrous materials.

2.1.2 The Contractor shall ensure that disposable tools, equipment, materials and supplies are of new materials only.

2.1.3 Airless Sprayer: Spray equipment for amended water: for application to asbestos-containing materials for saturation prior to removal. Airless spray units are only acceptable, such as Grace Hydrospray or approved equal.

2.1.4 Asbestos Waste Containers: The Contractor shall ensure that containers for dust and waste are: dust tight, suitable for the type of waste, impervious to asbestos and any chemicals used during the removal process, identified as asbestos waste, cleaned with a damp cloth or a

vacuum equipped with a HEPA filter immediately before being removed from the work area, and removed from the workplace frequently and at regular intervals.

2.1.4.1 The Contractor shall ensure that waste is contained in two separate containers. The inner container shall be a sealable polyethylene bag. Where there are sharp objects included in the waste material, the outer container shall be a sealable fibre type drum; otherwise the outer container may be a sealable polyethylene bag.

2.1.4.2 The Contractor shall ensure that the container is of new materials only.

2.1.4.3 The Contractor shall ensure that the containers are as follows:

2.1.4.3.1 Polyethylene Waste Bag: 0.15 mm (6 mil) thick leak-tight polyethylene bags.

2.1.4.3.2 Fibre Drums: 55 US gallon capacity heavy duty leak tight fibre drums with tight sealing locking metal top and metal bottom.

2.1.4.3.3 Labels: Waste containers shall have a pre-printed cautionary asbestos warning label, acceptable to local dump authorities, clearly visible when ready for removal to disposal site.

2.1.5 Caulking: One component non-staining acrylic polymer sealant to conform to GSB Specification 19GP-5M.

2.1.6 Drop Sheets: In polyethylene type and size appropriate for the work being performed.

2.1.7 Electrical Power Cords: Use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas of work.

2.1.8 Encapsulant: Type 1 penetrating Class A water based encapsulant conforming to CGSB 1-GP-205M and approved by the Fire Marshall having flame spread and smoke development ratings both less than fifty (50). Acceptable products: Ocean 666, Decadex Fire Check equivalent or better.

2.1.9 Fine Atomizing Spray Nozzle: Nozzle for airless sprayer capable of delivering not less than 1 gallon per minute of fine particle spray of amended water.

2.1.10 Fire Extinguishers: Provide Type "A" fire extinguishers for temporary offices and similar spaces where there is minimal danger of electrical or grease-oil-flammable liquid fires. In other locations provide type "ABC" dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposures in each case.

2.1.11 First Aid Supplies: Comply with governing regulations and recognized recommendations within the construction industry.

2.1.12 Flame-Resistant Polyethylene Sheeting: A single polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films, 0.15 mm (6 mils) thickness.

2.1.13 Foam: Low density polyurethane expanding foam Froth-Pack or equivalent or better.

2.1.14 Garden Sprayer: A hand pump type pressure-can garden sprayer fabricated out of either metal or plastic, equipped with a metal wand at the end of a hose that can deliver a stream or fine spray of liquid of amended water under pressure.

2.1.15 Ground Fault Panel: Electrical panel, installed by licensed electrician and equipped as follows:

2.1.15.1 Ground fault circuit interrupters of sufficient capacity to power temporary electrical equipment and lights in Asbestos Work Area.

2.1.15.2 Interrupters to have a 5 mA ground fault protection.

2.1.15.3 Necessary accessories including main switch disconnect, ground fault interrupter lights, test switch to ensure unit is working, and reset switch.

2.1.15.4 Openings shall be sealed by the Contractor to prevent moisture or dust penetration.

2.1.16 HEPA Vacuum: Vacuum with all necessary fittings, tools and attachments. All air must be filtered by HEPA filter before discharge.

2.1.17 Lockdown Sealer: Slow-drying sealer shall be a non-staining, clear, water dispersible type that remains tacky on the surface for a minimum of 8 hours for the purpose of trapping any residual airborne fibres during the settling period. Lock-down agent shall be compatible with replacement insulation or fireproofing where required and capable of withstanding service temperature of substrate. The product must have flame spread and smoke development ratings both less than 50 and shall leave no stain when dry. Also referred to as “Lockdown Agent”.

2.1.18 Negative Air Unit: Portable air handling system that extracts air directly from the Asbestos Work Area and discharges the air to the exterior of the Asbestos Work Area. Equipped as follows:

2.1.18.1 Pre-filter and HEPA filter. Air must pass HEPA filter before discharge.

2.1.18.2 Pressure differential gauge to monitor filter loading.

2.1.18.3 Auto shut off and warning system for HEPA filter failure.

2.1.18.4 Separate hold down clamps to retain HEPA filter in place during change of pre-filter.

2.1.19 Polyethylene Sheeting: 6 mil (0.15 mm) minimum thickness unless otherwise specified, in sheet size to minimize joints.

2.1.19.1 Fibre-Reinforced (Rip-Proof) Polyethylene Sheeting: 8 mil (0.20mm) fabric made up from one layer of 5 mil (0.13 mm) weave and two layers of 1.5 mil (0.04 mm) poly laminate or approved equal. In sheet size to minimize on-site seams and overlaps.

2.1.19.2 Flame-Resistant Polyethylene Sheeting: A single polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films, 6 mil (0.15 mm) thickness.

2.1.20 Power Washer: Spray equipment for saturation of asbestos-containing material with amended water for cleaning of surfaces in abatement work area after asbestos removal, capable of delivering an airless stream of water at a pressure of not less than 1200 psi or exceeding 2500 psi.

2.1.21 Protective Coveralls: Disposable full body coveralls complete with hoods manufactured of a material which does not permit penetration of asbestos fibres.

2.1.22 Scaffolding: The type, erection and use of all scaffolding shall comply with all applicable OSHA provisions.

2.1.23 Shower: General shower shall be of the walk through type to permit use by one person at a time.

2.1.23.1 Shower Enclosure: Shower enclosure shall be of a minimum 24 gauge steel walls with baked enamel, galvanized steel, aluminum or stainless steel finish, 16 gauge floor with porcelain enamel finish, brass drain and tapping for mixing valve. Shower installation shall be complete with globe valve for tempered water with a shower head complete with orifice to restrict the flow to 2.5 USGPM.

2.1.23.2 Shower Head and Controls: Provide a factory-made shower head producing a spray of water which can be adjusted for spray size and intensity. Feed shower separately with water from hot and cold supply lines. Arrange so that control of water temperature, flow rate, and shut off is from inside shower without outside aid.

2.1.23.3 Shower Hose Bib: Provide heavy bronze angle type with wheel handle, vacuum breaker, and 3/4" National Standard male hose outlet.

2.1.23.4 Shower Filters: Provide multi-stage cascaded filter units on drain lines from showers or any other water source carrying asbestos-contaminated water from the work area. Provide units with disposable filter elements

where the primary filter passes particle 20 microns and smaller and the final filter passes particles 5 microns and smaller. Connect so that discharged water passes primary filter and output of primary filter passes through secondary filter.

2.1.23.5 Shower Pan: Provide one piece waterproof shower pan of minimum size 4' x 8' by 6" deep. Fabricate from seamless fibreglass minimum 1/16" thick reinforced with wood, 18 ga. stainless or galvanized steel with welded seems or, copper or lead with soldered seams.

2.1.24 Spray Cement: Spray adhesive in aerosol cans that is specifically formulated to stick tenaciously to sheet polyethylene.

2.1.25 Sump Pump: Provide totally submersible waterproof sump pump with integral float switch and shall have a manual switch. Provide unit sized to pump 2 times the flow capacity of all showers or hoses supplying water to the sump, through the filters specified herein when they are loaded to the extent that replacement is required. Provide unit capable of pumping debris, sand, plaster or other materials washed off during decontamination procedures without damage to mechanism of pump.

2.1.26 Tape: Reinforced cloth or fibreglass reinforced tape in 2" or 3" widths suitable for sealing polyethylene sheeting under both wet conditions using amended water, and dry conditions.

2.1.27 Temporary Lighting: Provide general service incandescent lamps or fluorescent lamps of wattage required for adequate illumination as required by the work. Protect lamps with guard cages grounded together to distribution panel or tempered glass enclosures.

2.1.28 Water Heater: ULC rated electric water heater appropriately sized for project to supply hot water for the Decontamination Unit shower. Activate from ground fault panel. Provide with relief valve compatible with water heater operation; pipe relief valve down to drip pan on floor with rigid piping. Drip pans shall consist of a 4’x 4’ x 6" deep pan, made of 19 gauge galvanized steel, with handles.

2.1.29 Wetting Agent: Non-sudsing surface active agent. Acceptable product Aqua-Gro or approved equal.

3. EXECUTION

3.1 Preparation Prior to Contamination

3.1.1 The Contractor shall establish personal hygiene facilities for workers to wash their hands and face. Washing facilities to include sufficient supplies of disposable hand towels, hand soap, a waste recepticle and a mirror.

3.1.2 The Contractor shall provide to the Asbestos Abatement Consultant an itemized list of pre-existing damage in Work Area.

3.1.3 The Contractor shall move equipment, tools, supplies, stored materials, etc. which can be performed without disturbing ACM, to a location designated by the Owner's Representative.

3.1.4 The Contractor shall install the Worker Decontamination Facility. Worker Decontamination Enclosure System shall by comprised of an Equipment and Access Room, a Shower Room, and a Clean Room, as follows:

3.1.4.1 Equipment and Access Room: build an Equipment and Access Room between Shower Room and work areas, with two air locks, one to the Shower Room and one to work areas. The Equipment and Access Room shall be large enough to accommodate the storage of work boots, or any other protective clothing that might be used again, and at least three workers allowing them sufficient space to undress comfortably.

3.1.4.2 Shower Room: build a Shower Room between the Clean Room and Equipment and Access Room, with two air locks, one to the Clean Room and one to Equipment and Access Room. Provide a constant supply of hot and cold water. The Shower Room shall have individual controls inside the room to regulate water temperature and flow. Provide piping and connect to water sources and drains. Pump waste water through a 5 micrometre filter system acceptable to Consultant before directing into drains. Provide soap, clean towels and appropriate containers for disposal of used respirator filters. One shower shall be established for every 6 workers within the Asbestos Work Area.

3.1.4.3 Clean Room: build a Clean Room between the Shower Room and clean areas outside of enclosures, with two air locks, one to outside of enclosures and one to Shower Room. Provide lockers or hangers for workers street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install a mirror to permit workers to fit respiratory equipment properly, and sufficient hangers and hooks.

3.1.5 The Contractor shall construct a three-chamber Decontamination Enclosures as follows:

3.1.5.1 Build suitable framing for enclosures, and line with polyethylene sheeting sealed with tape. Framing shall be constructed of 2" x 4" studs (stud grade) at 24" o/c (max.) with 2" x 4" wood sill and top plates (stud grade) fastened with a minimum of two 3 1/2" common nails per stud end. Use one layer of rip-proof polyethylene on floors. Use 2 layers of opaque rip-proof polyethylene sheeting on walls and ceiling: an inner layer made up of 6 mil poly, and an outer layer made up of rip-proof polyethylene.

3.1.5.2 Build curtained doorways between enclosures.

3.1.6 Erect walls separating Asbestos Work Area from Occupied Areas as follows:

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

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

3.1.6.3 Caulk as required, edges of partition both sides at floor, walls and around fixtures.

3.1.7 The Contractor shall supply water as required for Asbestos Work Area and Decontamination Facilities. Water to be supplied from an existing potable water system. Contractor is responsible for all fittings. Contractor shall install using vacuum breakers or other backflow preventer as required by local authority.

3.1.7.1 Water supply shall be by means of copper pipe and fittings on high-pressure hose and fittings. A master shut-off valve shall be installed adjacent to, and on the clean side, of the decontamination facility. Any hose and hose connections must be for high pressure only and downstream of the master shut-off valve and is not to be left under pressure unattended. Maintain hose connections and outlet valves in leak proof condition. Where finish work below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize the possibility of water damage. The Contractor shall drain water promptly from pans as it accumulates.

3.1.8 The Contractor shall provide and install drainage facilities from temporary shower.

3.1.9 The Contractor shall provide and install drainage in removal work areas as required.

3.1.10 The Contractor shall provide and install a filtration system to filter all water to be disposed of from the removal and decontamination area.

3.1.11 The Contractor shall pre-clean all surfaces in the Asbestos Work Area. Visible dust shall be removed with a damp cloth/mop or a vacuum equipped with a HEPA filter from any surface in the work area, including the thing to be worked on, if the dust on that surface is likely to be disturbed.

3.1.12 The Contractor shall disable fire alarms, heat detectors, and smoke detectors in the Asbestos Work Area. At no time are the above systems to be affected in areas outside the Asbestos Work Area. Coordinate with, and notify Owner. Notify emergency services.

3.1.13 The Contractor shall erect sealed worker platforms where specified as follows, if required:

3.1.13.1 Shop drawings of all platform layouts, hoarding and details to be submitted to Asbestos Abatement Consultant prior to commencing work.

3.1.13.2 Scaffolding and platforms, if required, shall be designed by a professional engineer and built in accordance to the design.

3.1.13.3 Install support bases of sufficient dimension and strength to protect floors. Repair or replace damage caused by erection, weight or dismantling of platform.

3.1.13.4 Install platform supports in and around existing fixtures, walls, doors and equipment so as not to interfere with the operating, use, or maintenance of space or equipment. Leave 36" (900 mm) clear around all operating equipment.

3.1.13.5 Install platform to maintain a minimum clear height of 7’-0” (2135 mm).

3.1.13.6 Construct a framework of metal scaffolding or equivalent on top of which the working platform is to be placed. The working platform shall consist of one layer of rip-proof polyethylene below scaffold boards over which plywood (of sufficient thickness to support personnel and equipment as required by Occupational Health and Safety Act and Regulations) is nailed in place.

3.1.13.7 Caulk and tape plywood seams to provide a barrier to water penetration.

3.1.13.8 Seal platform to prevent any water leakage during removal by covering working platform with moisture impermeable barrier consisting of at least two layers of rip-proof polyethylene.

3.1.13.9 Install Hoarding Walls so as to completely isolate platform from Occupied Area.

3.1.13.10 Install fluorescent lighting at underside of platforms to maintain existing lighting levels.

3.1.13.11 Provide 1 emergency escape hatch for each 500 square feet (50 square meters) of platform. The hatch is to be constructed in a water and air tight manner that can be readily opened in an emergency situation. Provide emergency lighting at each hatch.

3.1.14 The Contractor shall erect tunnels where specified as follows, if required:

3.1.14.1 Minimum interior clear width of tunnel to be 5’-5” (1650 mm) or the width of emergency exit at end of tunnel.

3.1.14.2 Install Hoarding walls at both sides of the tunnel so as to isolate the tunnel from the asbestos work area.

3.1.14.3 Maintain a minimum clear height of 7'-0" (2135 mm) to the underside of the tunnel roof.

3.1.14.4 Install 2" x 6" (50 mm x 150 mm) wood or metal roof joists at 16" (400 mm) o/c. with continuous 2" x 6" (50 mm x 150 mm) headers.

3.1.14.5 Cover roof joists with 3/4" (20 mm) plywood sheeting.

3.1.14.6 Caulk and tape joints in plywood, and cover with two layers of rip-proof polyethylene. One layer to extend continuously over rip-proof polyethylene on the perimeter walls.

3.1.14.7 Install one layer of good one side plywood at underside of joist.

3.1.14.8 Install fluorescent lighting at underside of tunnel to maintain existing lighting levels.

3.1.14.9 Occupied Area side of plywood tunnel walls and ceiling to be painted with two coats of flat white latex paint.

3.1.15 The Contractor shall erect equipment enclosures where specified as follows, if required:

3.1.15.1 Construct walls 24" (610mm) around specified items using 2" x 4" (38 mm x 89 mm) wood or metal studs at 16" (405 mm) o/c. with continuous top and sill plates. Walls to extend 12" (305mm) above specified items.

3.1.15.2 Install ¾" (19mm) plywood sheeting over stud walls except at emergency access to enclosure. Caulk and tape joints in plywood.

3.1.15.3 Install 2 layers of independently supported rip-proof polyethylene over enclosure walls.

3.1.15.4 Installing 2" x 6" (38 mm x 152 mm) wood or metal roof joists at 16" (400 mm) o/c. with continuous 2" x 6" (38 mm x 152 mm) headers, over specified items.

3.1.15.5 Install ¾" (19mm) plywood over roof joists. Caulk and tape joints in plywood.

3.1.15.6 Install two layers of rip-proof polyethylene over roof. Both layers to extend continuously over rip-proof polyethylene on the perimeter walls.

3.1.15.7 Supply adequate amount of clean, dry air to bottom of enclosure adjacent to the normal air entry louvres of equipment, using a negative air machine(s) supplying air from outside the Asbestos Work Area.

3.1.15.8 Draw off exhaust air adjacent to the normal air exhaust louvres of equipment, using a second negative air machine to exhaust the air outside the Asbestos Work Area, for each negative air machine supplying the enclosure.

3.1.15.9 Use flexible ducting for supply and exhaust to individual enclosures.

3.1.16 The Contractor shall carefully protect items scheduled to remain in place using polyethylene, spray adhesive, tape, caulking, etc.

3.1.17 The Contractor shall seal all below deck openings, and openings at deck level, to Asbestos Work Area using polyethylene, spray adhesive, tape, caulking, etc., including but not limited to windows, doors, vents, diffusers, etc.

3.1.18 The Contractor shall seal all openings in floor using plugs, tape, caulking, rip-proof polyethylene, etc. Floor openings are to be sealed independently prior to installation of floor polyethylene. Include floors of duct and service shafts.

3.1.19 Where the work area is not enclosed by walls and where the enclosure is prepared with opaque materials (i.e. orange rip-proof polyethylene), the enclosure shall include one or more transparent (clear) window areas to allow observation of the entire work area from outside the enclosure.

3.1.20 The Contractor shall maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to Fire Commissioner of Canada and Provincial Fire Marshall.

3.1.21 The Contractor shall provide a fire extinguisher at each emergency exit and in both sides of the decontamination facilities.

3.1.22 The Contractor shall install temporary lighting in all work areas at levels that will provide for a safe and efficient use of the work area. Install battery powered emergency lights so as to light exit routes through Asbestos Work Area.

3.1.23 The Contractor shall protect floors as follows, as applicable,

3.1.23.1 Install 1 layer of 6-mil rip proof polyethylene on floors.

3.1.23.2 For all areas, extend floor protection a minimum of 12" up all vertical surfaces in the Asbestos Work Area. Each layer of polyethylene is to be laid and sealed independently of each other.

3.1.24 The Contractor shall install 2 layers of polyethylene on all walls forming the perimeter of the Asbestos Work Area. Each layer of polyethylene is to be laid and sealed independently of each other. Overlap wall polyethylene with floor polyethylene by a minimum of 12” (305 mm) at each layer.

3.1.25 In areas where walls do not enclose the Asbestos Work Area, The Contractor shall erect polyethylene hoarding walls to separate the Work Area from any Occupied Area.

3.1.25.1 Polyethylene sheeting enclosures will be supported as required or as directed by Asbestos Abatement Consultant.

3.1.25.2 The Enclosure may be supported from the deck system(s), if applicable.

3.1.26 The Contractor shall provide a sealed polyethylene top for free standing enclosures. Overlap perimeter polyethylene to form flap doorway.

3.1.27 The Contractor shall Establish negative pressure in Asbestos Work Areas as follows:

3.1.27.1 The Contractor shall distribute negative air filter/fan units evenly around the Asbestos Work Area. Remove windows, if required, and replace with 1/2" plywood with appropriately sized openings for exhaust. Switch the negative air pressure system to the "ON" mode and operate continuously until final completion of the work, including final cleanup. Exhaust air to the outside of the building using sealed ducting. A spare negative air unit will be fully installed and ready to operate as a backup unit. The negative air pressure system must have the capacity to exchange air volume of the work area three times per hour and maintain a minimum of 0.02 inches of water gauge differential. The Contractor shall operate negative pressure system continuously from the time the first polyethylene is installed to seal openings until final completion of the work including final cleanup and air testing. The Contractor shall replace pre-filters and HEPA filters as required and on a regular basis to maintain even and constant draw across negative air unit. The Contractor shall not discharge negative air ducting with-in 25 feet of building access points. The Contractor shall replace windows removed for discharge panels upon completion of project, if window removal was required.

3.1.27.2 The Contractor shall provide sufficient negative air pressure to exchange a volume of air equivalent to that of the Asbestos Work Area a minimum of every 15 minutes.

3.1.27.3 The Contractor shall leak test negative air units in place using DOP method.

3.1.27.4 The Contractor shall not discharge negative air units into Occupied Areas unless specified or with written approval from Asbestos Abatement Consultant.

3.1.28 The Contractor shall isolate at panel and disconnect or ground existing power supply to Asbestos Work Area where necessary. Power supply to remaining areas of building must not be disrupted during work of this section.

3.1.29 The Contractor shall post signs at locations where access to a sealed Asbestos Work Area is possible. Signs shall be installed at Curtained Doorways leading directly into a contaminated area. Such signs shall read:

CAUTION

Asbestos Hazard Area

No Unauthorized Entry
Wear assigned protective equipment
Breathing asbestos dust may cause serious bodily harm

3.1.30 Clean disposal of non-porous, non-asbestos materials shall be conducted by the Contractor as follows:

3.1.30.1 Materials shall be cleaned by using a vacuum equipped with a HEPA filter or by damp wiping, as soon as practicable following removal.

3.1.30.2 Lock Down Agent shall be applied to the materials. The materials will be promptly removed to one of the Decontamination Enclosures where the materials shall remain until the Lock Down Agent is dry.

3.1.30.3 Once the lockdown agent is dry, the materials applied to building items to protect may be disposed of as non-asbestos waste.

3.1.31 The Contractor shall not proceed with work of Contaminated Preparation without obtaining written permission from the Asbestos Abatement Consultant. Provide a minimum of 24 hours notice to consultant for the need of an inspection.

3.2 Contaminated Preparation

3.2.1 The Contractor shall use full personal protective procedures and equipment, amended water and HEPA vacuums during contaminated preparation.

3.2.2 The Contractor shall disable air-handling system affecting Asbestos Work Area. Seal ventilation ducts to and from the work area. The air handling system shall not be enabled until completion of work.

3.2.3 The Contractor shall shut off the source of heat for piping systems (i.e. boiler or steam line header), where possible.

3.2.4 The Contractor shall shut off and lock out electrical power within the enclosure.

3.2.5 The Contractor shall remove and dispose of ceilings and other obstructions to access ducts supplying into and exhausting from the Asbestos Work Area.

3.2.6 The Contractor shall seal ducts supplying into and exhausting from the Asbestos Work Area during one shift, as follows:

3.2.6.1 Cut and cap ducts as close as possible to perimeter of Asbestos Work Area.

3.2.6.2 Cap with metal of gauge equal to sheet metal being capped.

3.2.6.3 Seal seams of cap with duct sealant, tape and polyethylene sheeting.

3.2.7 For HVAC systems to remain active within the Asbestos Work Area, The Contractor shall perform the following:

3.2.7.1 Remove flexible ducts and diffusers attached to systems to remain active.

3.2.7.2 Cap with metal of gauge equal to sheet metal being capped.

3.2.7.3 Seal seams of cap with duct sealant, tape and polyethylene sheeting.

3.2.7.4 Clean outside and seal duct or equipment with rip-proof polyethylene and other products so as to make air tight.

3.2.7.5 Smoke test seals regularly.

3.2.8 The Contractor shall smoke test seals after HVAC system is reactivated. Reseal and retest as required.

3.3 Work above Ceilings

3.3.1 The Contractor shall remove and dispose of ceilings and other obstructions around perimeter to access upper perimeter of the Asbestos Work Area.

3.3.2 Prior to removal of plaster and drywall ceilings, the Contractor shall seal holes in walls neighbouring occupied areas to prevent plaster and drywall dust migration above ceiling.

3.3.3 The Contractor shall remove ceilings in sections equal to the work that can be performed in one shift.

3.3.4 The Contractor shall seal holes in existing perimeter walls, columns, deck, etc. exposed by removal of ceiling at upper perimeter of Asbestos Work Area.

3.3.5 The Contractor shall cover Asbestos Work Area upper perimeter walls with 2 layers of 6-mill rip proof, independently sealed, polyethylene.

3.3.6 The Contractor shall remove and dispose of remaining ceilings, grids and support systems. Cut hanger back to within 15 mm of clip or insert.

3.3.7 The Contractor shall temporarily support and protect with polyethylene, existing items to remain that were previously supported by the ceiling systems.

3.3.8 The Contractor shall protect electrical systems to remain in the Asbestos Work Area with polyethylene and tape, including but not limited to communication systems, coaxial, triaxial, fire and public address systems, wiring, conduit, speakers, heat and smoke detectors, alarms, lights, equipment, junction boxes, speakers, thermostats, etc.

3.3.9 The Contractor shall seal openings in dormant rigid ductwork to remain with rip-proof poly.

3.3.10 The Contractor shall seal holes or penetrations in deck, ducts, etc. when exposed by ceiling removal.

3.4 Asbestos Removal

3.4.1 The Contractor shall spray asbestos material with water containing the specified wetting agent, using airless spray equipment capable of providing a "mist" application to prevent release of fibres. Saturate the asbestos material sufficiently to wet it to the substrate without causing excess dripping. The Contractor shall spray the asbestos material repeatedly during work process to maintain saturation and to minimize asbestos fibre dispersion. The Contractor shall score the outer surface where water does not penetrate the outer layers.

3.4.2 The Contractor shall remove the saturated asbestos material in small sections. The Contractor shall not allow saturated asbestos to dry out. As it is being removed, pack the material in sealable plastic bags 0.15 mm minimum thick and place in labelled containers for transport. Collect waste water from the floor, do not allow it to pool. Mist the air continuously where asbestos is being disturbed with amended water using one dedicated airless sprayer equipped with a fine atomizing nozzle. If fibre levels exceed 2.0 f/cc, then additional dedicated sprayer(s) will be required as directed by the Asbestos Abatement Consultant. Contain waste water in sealable plastic containers, suitable for transport and disposal without leaking or dispose of by pumping into a settling tank, filtering the water using specified filters, and then pumping into a sanitary sewer.

3.4.3 The Contractor shall 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 the holding room by workers who have entered from uncontaminated areas dressed in clean coveralls.

3.4.4 After completion of removal work, all surfaces from which asbestos has been removed shall be wire brushed and wet-sponged to remove all visible material. During this work the surfaces shall be kept wet.

3.4.5 Where the Asbestos Abatement Consultant decides complete removal of asbestos-containing material is impossible due to obstructions such as structural members or major service elements, and provides written direction, the Contractor shall seal the material as directed by the Consultant.

3.4.6 After wire brushing and wet sponging to remove visible asbestos, the Contractor shall wet clean the entire work area including the Equipment and Access Room, and equipment used in the process.

3.4.7 All tools, equipment, materials and supplies that will NOT be reused shall be placed in an asbestos waste container by the Contractor as soon as practicable following completion of the preceeding Items of this Section.

3.4.8 All tools, equipment, materials and supplies that will be reused shall be cleaned by the Contractor, by using a vacuum equipped with a HEPA filter or by damp wiping, as soon as practicable following completion of the preceding Items of this Section.

3.4.9 Compressed air shall not be used to clean up and remove debris or dust from any surface.

3.4.10 Eating, drinking, chewing or smoking shall not be permitted in the work area.

3.4.11 The Contractor shall maintain all work areas in a neat and orderly fashion at all times.

3.4.12 Pre-filters on fan units shall be treated as asbestos waste and disposed of accordingly.

3.4.13 The Contractor shall not proceed with work of applying Lock Down Agent without obtaining written permission from the Asbestos Abatement Consultant indicating a visual clearance inspection has been performed and the site is satisfactory to the Consultant. The Contractor shall provide a minimum of 24 hours notice to consultant for the need of a visual clearance inspection.

3.5 Application of Lock Down Agent

3.5.1 After completion of the final cleaning and after the Asbestos Abatement Consultant has passed a visual cleanliness inspection, The Contractor shall spray sealant (approved by the Asbestos Abatement Consultant) on all surfaces in the Asbestos Work Area.

3.5.2 The Contractor shall allow a 24-hour settling period, or a time period accepted by the Asbestos Abatement Consultant, for the sealant to dry. During this settling period, no entry or activity will be permitted in the work area.

3.5.3 The Contractor shall obtain written permission from Asbestos Abatement Consultant to proceed with Asbestos Work Area Tear Down and Dismantling following acceptable clearance air monitoring results of 0.01 f/mL. Should clearance air monitoring results exceed 0.01 f/mL, the

contractor will, at no cost to the owner, re-clean the entire Asbestos Work Area and apply another coat of Lock Down Agent.

3.6 Asbestos Work Area Teardown And Dismantling

3.6.1 The Contractor shall maintain the perimeter seal and Type 3 procedures and use worker decontamination facility.

3.6.2 The Contractor shall operate negative air units during teardown.

3.6.3 The Contractor shall remove all polyethylene, tape, polyurethane foam, caulking and enclosures from Asbestos Work Area.

3.6.4 The Contractor shall remove asbestos contaminated floor polyethylene by carefully rolling away from walls to centre of Asbestos Work Area.

3.6.5 The Contractor shall cut the lower layer of polyethylene sheeting to expose the baseboards, windowsills, cabinets, shelves and other horizontal surfaces that may be contaminated by fallen ACM.

3.6.6 The Contractor shall carefully roll polyethylene toward the centre of enclosure. Remove visible debris by means of HEPA vacuum as polyethylene is rolled away.

3.6.7 After the work is completed, polyethylene sheeting and similar materials used for barriers and enclosures shall not be reused, but shall be wetted and placed in an asbestos waste container as soon as practicable following completion of the preceeding Items of this Section.

3.6.8 Barriers and portable enclosures shall not be reused unless they are rigid and can be cleaned thoroughly.

3.6.9 The Contractor shall place Polyethylene, tape, cleaning material, clothing and other contaminated waste in asbestos waste containers and dispose of as asbestos waste.

3.6.10 The Contractor shall seal vacuum hoses and fittings, flexible ductwork and all tools used in contaminated work site in 6 mil polyethylene bags prior to removal from Work Area.

3.6.11 The Contractor shall wash equipment used in contaminated Asbestos Work Area to remove all asbestos contamination, or double bag for transportation prior to being removed from Asbestos Work Area, via waste and equipment decontamination facility.

3.6.12 The Contractor shall clean up Asbestos Work Area, Equipment and Access area, washing/Showering Room, and other enclosures that may be contaminated.

3.6.13 The Contractor shall remove polyethylene protection and hoarding walls where hoarding walls separate occupied areas from work area.

3.6.14 Hoarding walls to remain are identified on drawings.

3.6.15 The Contractor shall remove polyethylene sheeting from contaminated side of decontamination facilities.

3.6.16 The Contractor shall wash and mop with clean water all surfaces in the Asbestos Work Area.

3.6.17 The Contractor shall remove all temporary lights, ground fault panels and Negative Pressure Units.

3.6.18 The Contractor shall remove negative air unit pre-filters. Dispose of as asbestos contaminated waste.

3.6.19 Immediately upon shutting down negative air units, the Contractor shall seal air inlet grill and exhaust vent with polyethylene and tape.

3.6.20 The Contractor shall remove decontamination facilities, platforms and platform scaffolding, tunnels, etc.

3.6.21 The Contractor shall damp mop and clean with HEPA vacuum Occupied Areas previously below platforms, tunnels and decontamination facilities with HEPA vacuum.

End of Section

LEAD ABATEMENT

SECTION 02 83 01

LIST OF CONTENTS

1. GENERAL

1.1 General and Related Work

1.1.1 All sections of the specifications form a part of the Contract Document and shall be read to determine their effect upon the work of this section.

1.1.1 Related Work Specified Elsewhere

Division 02	Section 02 82 00	Abatement Scope and Details
Division 02	Section 02 82 01	Type 1 Asbestos Abatement
Division 02	Section 02 82 02	Type 2 Asbestos Abatement
Division 02	Section 02 82 03	Type 2 Asbestos Abatement (Glove Bag)
Division 02	Section 02 82 04	Type 3 Asbestos Abatement
Division 02	Section 02 84 01	Other Hazardous Materials

Attachment A:

1) Pre-Renovation Designated Substance & Hazardous Materials Survey Report, ECOH Management Inc., December 1, 2023*.*

1.1.2 The Contractor is responsible to verify all measurements for removal, cleaning, and disposal purposes. Measurements and quantities provided herein are for reference only.

1.1.3 It is the intent that lead abatement performed as per this section will result in the removal and disposal of all lead paint and lead-based materials as well as any materials that may have been contaminated by lead dust either during or prior to work of this Section.

1.1.4 Refer to Section 02 82 00, Abatement Scope and Details, for the following information and requirements;

1.1.4.1 Site Conditions,

1.1.4.2 Outline of Work,

1.1.4.3 Schedule,

1.1.4.4 Supervision,

1.1.4.5 Quality Assurance,

1.1.4.6 Regulations,

1.1.4.7 Notification, and

1.1.4.8 Submittals.

1.2 Definitions

1.2.1 Airlock: A system for permitting ingress or egress without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways at least 1.5 m apart.

1.2.2 Air Monitoring: The process of measuring the lead-contaminated dust content of a specific volume of air.

1.2.3 Amended Water: Water with a non-ionic surfactant wetting agent added to reduce water surface tension to 35 or less dynes, to allow thorough wetting of settled dust.

1.2.4 Lead-Abatement Work Area: Where the actual removal of lead-containing or lead-contaminated materials takes place.

1.2.5 Authorized Visitor: The Owner or his approved representative and/or persons representing regulatory agencies.

1.2.6 Barrier: Any surface that seals off the Lead-Abatement Work Area to inhibit the movement of dust.

1.2.7 Clean Area: Either an operating area or an area in which removal work has already been completed.

1.2.8 Competent Personnel: a worker who is qualified because of knowledge, training and experience to perform the work; is familiar with the Ontario Occupational Health and Safety Act and with the provisions of the regulations that apply to the work, and; has knowledge of all potential or actual danger to health or safety in the work.

1.2.9 Curtained Doorway: An arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed by placing two overlapping sheets of polyethylene over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one sheet along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway. All free edges of polyethylene shall be reinforced with duct tape and the bottom edge shall be weighted to ensure proper closing. Each polyethylene sheet shall overlap openings not less than 1.5 m on each side.

1.2.10 Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.

1.2.11 Disposal Bag: A properly labelled 6 mil thick leak-tight plastic bag used for transporting lead waste from the Lead-Abatement Work Area to the disposal site.

1.2.12 DOP / PAO Test: Dioctylphthalate / Poly Alpha Olefin aerosol challenge of a HEPA filter system and is used to establish the integrity and effectiveness of the system to filter out lead particles and dust.

1.2.13 Enclosure: 6 mil polyethylene sheeting installed to fully isolate Lead-Abatement Work Area. Enclosure may be a prefabricated self-supporting structure or constructed with a rigid frame, or, when applicable, supported by the ceiling grid. Enclosure shall have polyethylene sheeting as a top at locations where the enclosure does not extend up to the underside of the ceiling or underside of structure.

1.2.14 Filter: A media component used in respirators, vacuum cleaners or negative pressure filter fan units to remove solid or liquid particles from the inspired air.

1.2.15 Fitting: Unless otherwise described in Site Conditions, all connections of a pipe which include elbows, ends, caps, valves, hangers, tees and unions, etc.

1.2.16 HEPA Filter: High Efficiency Particulate Aerosol filter that is at least 99.97 percent efficient in collecting a 0.3 micrometre aerosol.

1.2.17 Negative Pressure: A system which extracts air directly from the Lead-Abatement Work Area, filters such extracted air through a High Efficiency Particulate Air filtering system, and discharges this air directly outside Lead-Abatement Work Area to exterior of building. This system shall maintain a minimum pressure differential of 0.02 inches Water Gauge relative to adjacent areas outside of Lead-Abatement Work Areas, be equipped with an alarm to warn of system breakdown (i.e. excessive negative pressure or insufficient negative pressure) and be equipped with an instrument to continuously monitor and automatically record pressure differences.

1.2.18 Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.

1.2.19 Occupied Area: Any area of the building outside the Lead-Abatement Work Area.

1.2.20 Polyethylene: Sheeting of type and thickness specified sealed with tape along all edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide a continuous polyethylene membrane to protect underlying surfaces from water damage or damage by sealant, and to prevent escape of lead particulate through the sheeting into a clean area.

1.2.21 Positive Pressure Respirator: A respirator in which the air pressure inside the respiratory inlet covering is positive during inhalation and exhalation in relation to the air pressure of the outside atmosphere.

1.2.22 Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

1.2.23 Straight run pipes: Part of the building system not included under the description of Fitting, including but not limited to straight, angled or curved sections of pipe, pumps, headers and reducers.

1.2.24 Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

1.2.25 Type/Class 1 Lead Operations: Defined by the Ministry of Labour document "*Guideline - Lead on Construction Projects"*, dated April 2011, and the Environmental Abatement Council of Canada (EACC) document; "*Lead Guideline for Construction, Renovation, Maintenance or Repair*", dated October 2014, includes the following operations:

1.2.25.1 Removal of lead-containing or lead-based paints and surface coatings with a chemical gel/stripper or paste.

1.2.25.2 Application of lead-containing or lead-based paints and surface coatings with a brush, roller or sponge.

1.2.25.3 Installation or removal of lead sheeting or flashing.

1.2.25.4 Installation or removal of lead-containing packing, babbitt, caulking, gasket or similar material.

1.2.25.5 Removal of materials coated with lead-containing or lead-based paints and surface coatings, using non-powered hand tools, where the material remains chiefly intact and is not crumbled, pulverized or powdered.

1.2.25.6 Operating construction or demolition equipment (e.g. excavator, bulldozer) during building renovation or demolition where lead-based paints or surface coatings are present on building materials and are being disturbed.

1.2.25.7 Soldering with lead solder.

1.2.25.8 Removing lead-containing or lead-based paints or surface coatings with a heat gun.

1.2.25.9 Removing lead-containing and lead-based paints and surface coatings using a high-pressure water jet (e.g. pressure washer)

1.2.26 Type/Class 2A Lead Operations: Defined by the Ministry of Labour document "*Guideline - Lead on Construction Projects"*, dated April 2011, and the Environmental Abatement Council of Canada (EACC) document;

"*Lead Guideline for Construction, Renovation, Maintenance or Repair*", dated October 2014, includes the following operations:

1.2.26.1 Removal of lead-containing or lead-based paints and surface coatings or lead-containing materials using a power tool that has an effective dust collection system equipped with a HEPA filter.

1.2.26.2 Welding, torching or high temperature cutting of lead-containing materials indoors when using an effective fume collector or smoke eater that filters and exhausts lead fume and expels it directly outdoors (away from occupants, entrances, walkways, rest areas, etc.). Fume collector or smoke eater must have effective source control and capture velocity, minimum of 0.5 metres per second (100 feet per minute) at the work surface.

1.2.26.3 Welding, torching or high temperature cutting of lead-containing and lead-based paints and surface coatings or lead-containing materials outdoors.

1.2.26.4 Removal of lead-containing mortar using handheld non-powered tools.

1.2.26.5 Removal of lead-containing and lead-based paints and surface coatings or lead-containing materials by scraping or sanding (including wet sanding) using non-powered hand tools.

1.2.26.6 Demolition of plaster or building components that crumble, pulverize or powder and are covered with lead-containing or lead-based paints or surface coatings.

1.2.26.7 Clean up and removal of a significant amount of lead-containing dust and debris (that can be made easily airborne) using wet methods or HEPA vacuums.

1.2.27 Type/Class 2B Lead Operations: Defined by the Ministry of Labour document "*Guideline - Lead on Construction Projects"*, dated April 2011, and the Environmental Abatement Council of Canada (EACC) document; "*Lead Guideline for Construction, Renovation, Maintenance or Repair*", dated October 2014, includes the following operations:

1.2.27.1 Spray application of lead-containing paints and surface coatings.

1.2.28 Type/Class 3A Lead Operations: Defined by Ministry of Labour document "*Guideline - Lead on Construction Projects"*, dated April 2011, and the Environmental Abatement Council of Canada (EACC) document; "*Lead Guideline for Construction, Renovation, Maintenance or Repair*", dated October 2014, includes the following operations:

1.2.28.1 Removal of lead-containing or lead-based paints and surface coatings or lead-containing materials using a power tool without an effective dust collection system equipped with a HEPA filter.

1.2.28.2 Welding, torching or high temperature cutting of lead-containing materials indoors or in a confined space (e.g. within a ditch or pit).

1.2.28.3 Removal of lead-containing mortar using a powered cutting device.

1.2.28.4 Burning of a material containing lead.

1.2.28.5 Removal, cleaning or repair of a ventilation system or ductwork used for controlling lead exposure

1.2.28.6 Spray application of lead-based paints and surface coatings.

1.2.28.7 In the absence of an exposure assessment;

1.2.28.7.1 demolition or cleanup of a facility where lead-containing products were manufactured and significant dust and debris, which can be made easily airborne, is present.

1.2.28.7.2 cleanup of dust and debris down range of a firing station in an indoor firing range.

1.2.28.7.3 an operation that may expose a worker to lead dust, fume or mist that is not a Type/Class 1, 2, or 3B operation.

1.2.29 Type/Class 3B Lead Operations: Defined by Ministry of Labour document "*Guideline - Lead on Construction Projects"*, dated April 2011, and the Environmental Abatement Council of Canada (EACC) document; "*Lead Guideline for Construction, Renovation, Maintenance or Repair*", dated October 2014, includes the following operations:

1.2.29.1 Abrasive blasting of lead-containing and lead-based paints and surface coatings or lead-containing materials (including wet, slurry and dry abrasive blasting and dry-ice blasting).

1.2.30 Water Filtration System: A multi-stage filtration system for filtering shower and wastewater. Typically constructed with at least two filters, the primary stage retains 20 microns or larger particles and the final stage removes 5 micron or larger particles.

1.2.31 Work: Includes all services, labour and material required to complete the work as specified in the contract.

1.2.32 Work Area(s): Area(s) where work takes place that will, or may disturb lead-containing materials.

1.3 Worker Protection

1.3.1 Prior to commencing work, the Contractor shall instruct workers in all aspects of work procedures and protective measures.

1.3.2 The Contractor shall, provide workers with personally issued marked respiratory equipment acceptable to the Occupational Health and Safety Division of the Ontario Ministry of Labour, suitable for the expected lead dust exposure.

1.3.3 Ensure that suitable respiratory protective equipment is worn by every worker who enters the Asbestos Work Area. A respirator provided by an employer and used by a worker shall be:

1.3.3.1 One of the following types depending on the classification of work and method removal;

1.3.3.1.1 Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filters;

1.3.3.1.2 Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, R-100 or P-100 particulate filters;

1.3.3.1.3 Negative pressure (demand) supplied air respirator equipped with a full-facepiece;

1.3.3.1.4 Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece);

1.3.3.1.5 Pressure demand supplied air respirator equipped with a half or full-facepiece mask.

1.3.3.2 Fitted so that there is an effective seal between the respirator and the worker's face;

1.3.3.3 Assigned to a worker for the worker's exclusive use, if practical;

1.3.3.4 Used and maintained in accordance with the procedures specified by the equipment manufacturer;

1.3.3.5 Cleaned, disinfected and inspected after use on each shift, or more often if necessary;

1.3.3.6 Free of damaged or deteriorated parts replaced prior to being used by a worker;

1.3.3.7 Be stored in a convenient, clean and sanitary location; when not in use;

1.3.3.8 Certified by the US National Institute for Occupational Safety and Health (NIOSH) for exposure to airborne particulates.

1.3.4 The Contractor shall establish written procedures regarding the selection, use and care of respirators.

1.3.5 A copy of the procedures shall be provided to and reviewed with each worker by the Contractor.

1.3.6 A worker shall not 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.

1.3.7 The Contractor shall provide all workers with full body disposable coveralls.

1.3.8 The Contractor shall ensure that full body disposable coveralls are worn by every worker who enters the Lead-Abatement Work Area. The protective clothing provided by an employer and used by a worker shall:

1.3.8.1 Be made of a material which does not readily retain nor permit penetration of lead particulate;

1.3.8.2 Consist of head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent lead particulate from reaching the garments and skin under the protective clothing;

1.3.8.3 Include suitable footwear;

1.3.8.4 Be repaired or replaced if torn.

1.3.8.5 Provide other body protection required under applicable safety regulations.

1.3.9 The Contractor shall ensure that personnel are fully protected at all times when possibility of exposure to lead dust exists.

1.3.10 The Contractor shall provide and post in Clean Change Room the procedures described under Worker Protection.

1.3.10.1 No person shall eat, drink, smoke or chew except in established locations outside the Lead-Abatement Work Area.

1.3.10.2 Personnel shall be fully protected at all times when possibility of disturbance of lead dust exists.

1.4 Visitor Protection

1.4.1 The Contractor shall provide clean protective clothing and equipment and approved respirators to Authorized Visitors.

1.4.2 The Contractor shall ensure that Authorized Visitors have received required training for entry into Lead-Abatement Work Area.

1.5 Air Monitoring

1.5.1 Air monitoring may be performed by the Environmental Consultant at all stages of the abatement.

1.5.2 The Contractor shall cooperate fully with the Environmental Consultant in the collection of air monitoring samples, including the collection of personal worker samples, if required.

1.5.3 The occupational exposure limit for lead is 0.05 mg/m^3, required by the MOL, under O. Reg. 490/09, as amended. Results of air samples of 0.025 mg/m^3, or greater, outside of Abatement Work Area, will be deemed as the action level, at which will require a modification of abatement procedures to reduce airborne lead dust concentrations. Results of air samples of 0.05 mg/m^3 or greater, outside of Lead-Abatement Work Area, will indicate

lead dust contamination of these areas. The contaminated areas shall be isolated and cleaned in the manner applicable for the clean-up of lead-contaminated dust by the Contractor, at no cost to the Owner.

1.5.4 Clearance air monitoring samples shall be collected by the Environmental Consultant after a suitable settling period following application of lock-down agent. Clearance levels must be less than 0.05 mg/m^3 for the Lead-Abatement Work Area to be deemed clean.

1.6 Waste Transport And Disposal

1.6.1 The Contractor shall ensure lead-contaminated materials, removed during abatement are treated, packaged, transported and disposed of as lead waste.

1.6.2 The Contractor shall drop garbage bins at designated locations. Keep bins covered and enclosed while at the site. Bin loading area shall be kept clean at all times.

1.6.3 The Contractor shall pick-up and drop off garbage bins at pre-approved times, and shall not interfere with the Owners operations.

1.6.4 The Contractor shall conform to requirements of Regulations under Environmental Protection Act for Waste Management, transporting and disposal of hazardous waste.

1.6.5 The Contractor shall ensure shipment of containers to dump is taken by a waste hauler licensed to transport lead waste.

1.6.6 The Contractor shall ensure that a bill of lading, showing the type and weight of hazardous waste being transported, is completed for each load.

1.6.7 The Contractor shall check with dump operator to determine type of waste containers acceptable.

1.6.8 The Contractor shall ensure dump operator is fully aware of hazardous material being dumped.

1.6.9 The Contractor shall co-operate with Ministry of the Environment and Climate Change inspectors and immediately carry out instructions for remedial work at dump to maintain environment, at no additional cost to Owner.

2. PRODUCTS

2.1 Materials and Equipment

2.1.1 The Contractor shall ensure that all tools, equipment, materials and supplies brought to work site are in good condition and free of lead, lead debris, and lead-contaminated materials.

2.1.2 The Contractor shall ensure that disposable tools, equipment, materials and supplies are of new materials only.

2.1.3 Airless Sprayer: Spray equipment for water: for application to lead dust contaminated materials. Airless spray units are only acceptable, such as Grace Hydrospray or approved equal.

2.1.4 Caulking: One component non-staining acrylic polymer sealant to conform to GSB Specification 19GP-5M.

2.1.5 Drop Sheets: In polyethylene type and size appropriate for the work being performed.

2.1.6 Electrical Power Cords: Use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas of work.

2.1.7 Flame-Resistant Polyethylene Sheeting: A single polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films, 0.15 mm (6 mils) thickness.

2.1.8 Fine Atomizing Spray Nozzle: Nozzle for airless sprayer capable of delivering not less than 1 gallon per minute of fine particle spray of water.

2.1.9 First Aid Supplies: Comply with governing regulations and recognized recommendations within the construction industry.

2.1.10 Fire Extinguishers: Provide Type "A" fire extinguishers for temporary offices and similar spaces where there is minimal danger of electrical or grease-oil-flammable liquid fires. In other locations provide type "ABC" dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposures in each case.

2.1.11 Foam: Low density polyurethane expanding foam Froth-Pack or equivalent or better.

2.1.12 Garden Sprayer: A hand pump type pressure-can garden sprayer fabricated out of either metal or plastic, equipped with a metal wand at the end of a hose that can deliver a stream or fine spray of liquid of water under pressure.

2.1.13 Ground Fault Panel (All sections require approval from the Owner): Electrical panel, installed by licensed electrician and equipped as follows:

2.1.13.1 Ground fault circuit interrupters of sufficient capacity to power temporary electrical equipment and lights in Lead-Abatement Work Area.

2.1.13.2 Interrupters to have a 5 mA ground fault protection.

2.1.13.3 Necessary accessories including main switch disconnect, ground fault interrupter lights, test switch to ensure unit is working, and reset switch.

2.1.13.4 Openings shall be sealed by the Contractor to prevent moisture or dust penetration.

2.1.14 HEPA Vacuum: Vacuum with necessary fittings, tools and attachments. Discharged air must pass through a HEPA filter.

2.1.15 Lead Dust Waste Containers: The Contractor shall ensure that waste is contained in two separate containers that are dust-tight and impervious to lead dust and any chemicals used during the removal process. The inner container shall be a sealable polyethylene bag. Where there are sharp objects included in the waste material, the outer container shall be a sealable fibre type drum, otherwise the outer container may either be a sealable polyethylene bag. Containers shall be as follows:

2.1.15.1 Lock-down Agent: Sealant for purpose of trapping residual dust. Product shall have flame spread and smoke development ratings both less than 50. Product shall leave no stain when dry. Lock-down agent shall be compatible with replacement insulation or fireproofing where required and capable of withstanding service temperature of substrate.

2.1.15.2 Polyethylene Waste Bag: 0.15 mm (6 mil) thick leak-tight polyethylene bags labelled as required by sub-section 3.5 Waste Disposal.

2.1.15.3 Fibre Drums: 55 US gallon capacity heavy duty leak tight fibre drums with tight sealing locking metal top and metal bottom.

2.1.15.4 Labels: Waste containers shall have a pre-printed cautionary lead dust warning label, acceptable to local dump authorities, clearly visible when ready for removal to disposal site.

2.1.16 Negative Air Unit: Portable air handling system that extracts air directly from the Lead-Abatement Work Area and discharges the air to the exterior of the Lead-Abatement Work Area. Equipped as follows:

2.1.16.1 Prefilter and HEPA filter. Air must pass HEPA filter before discharge.

2.1.16.2 Pressure differential gauge to monitor filter loading.

2.1.16.3 Auto shut off and warning system for HEPA filter failure.

2.1.16.4 Separate hold down clamps to retain HEPA filter in place during change of prefilter.

2.1.17 Polyethylene Sheeting: A single polyethylene film, 0.15 mm (6 mil) minimum thickness unless otherwise specified.

2.1.18 Power Washer: Spray equipment for saturation of lead dust contaminated material with water for cleaning of surfaces in Lead-Abatement Work Area after lead dust removal, capable of delivering an airless stream of water at a pressure of not less than 1200 psi or exceeding 2500 psi.

2.1.19 Protective Coveralls: Disposable full body coveralls complete with hoods manufactured of a material that does not permit penetration of lead particulates.

2.1.20 Rip Proof Polyethylene Sheeting: Woven fibre reinforced fabric bonded both sides with polyethylene sheeting. 0.20 mm (8 mil) fabric made up from 0.13 mm (5 mil) weave and 2 layers 0.04 mm (1.5 mil) poly laminate.

2.1.21 Scaffolding: The type, erection and use of all scaffolding shall comply with all applicable OSHA provisions.

2.1.22 Sealer: Slow-drying sealer shall be a non-staining, clear, water dispersable type that remains tacky on the surface for a minimum of 8 hours for the purpose of trapping any residual airborne dust during the settling period. The product shall have flame spread and smoke development ratings both less than 50 and shall leave no stain when dry. Acceptable products: Borden Polyco 804, Double AD TC-55, equivalent or better. Also referred to as “Lockdown Agent”.

2.1.23 Shower: General shower shall be of the walk-through type to permit use by one person at a time. Receive approval from the Owner before erecting a shower system.

2.1.23.1 Shower Enclosure: Shower enclosure shall be of a minimum 24 gauge steel walls with baked enamel, galvanized steel, aluminum or stainless steel finish, 16 gauge floor with porcelain enamel finish, brass drain and tapping for mixing valve. Shower installation shall be complete with globe valve for tempered water with a showerhead complete with orifice to restrict the flow to 2.5 USGPM.

2.1.23.2 Shower Pan: Provide one-piece waterproof shower pan of minimum size 4' x 8' by 6" deep. Fabricate from seamless fibreglass minimum 1/16" thick reinforced with wood, 18 ga. stainless or galvanized steel with welded seems or, copper or lead with soldered seams.

2.1.23.3 Shower Head and Controls: Provide a factory-made showerhead producing a spray of water that can be adjusted for spray size and intensity. Feed shower separately with water from hot and cold supply lines. Arrange so that control of water temperature, flow rate, and shut off is from inside shower without outside aid.

2.1.23.4 Hose Bib: Provide heavy bronze angle type with wheel handle, vacuum breaker, and 3/4" National Standard male hose outlet.

2.1.23.5 Filters: The Contractor shall provide multi-stage cascaded filter units on drain lines from showers or any other water source carrying lead-contaminated water from the Lead-Abatement Work Area. Provide units with disposable filter elements where the primary filter passes particle 20 microns and smaller and the final filter passes particles 5 microns and

smaller. Connect so that discharged water passes primary filter and output of primary filter passes through secondary filter.

2.1.24 Spray Cement: Spray adhesive in aerosol cans that is specifically formulated to stick tenaciously to sheet polyethylene.

2.1.25 Sump Pump: Provide totally submersible waterproof sump pump with integral float switch and shall have a manual switch. Provide unit sized to pump 2 times the flow capacity of all showers or hoses supplying water to the sump, through the filters specified herein when they are loaded to the extent that replacement is required. Provide unit capable of pumping debris, sand, plaster or other materials washed off during decontamination procedures without damage to mechanism of pump.

2.1.26 Tape: Reinforced cloth or fibreglass reinforced tape in 2" or 3" widths suitable for sealing polyethylene sheeting under both wet conditions, and dry conditions.

2.1.27 Temporary Lighting: Provide general service incandescent lamps or fluorescent lamps of wattage required for adequate illumination as required by the work. Protect lamps with guard cages grounded together to distribution panel or tempered glass enclosures.

2.1.28 Water Heater: ULC rated electric water heater appropriately sized for project to supply hot water for the Decontamination Unit shower. Activate from ground fault panel. Provide with relief valve compatible with water heater operation; pipe relief valve down to drip pan on floor with rigid piping. Drip pans shall consist of a 12" x 12" x 6" deep pan, made of 19 gauge galvanized steel, with handles.

3. EXECUTION

3.1 General Measures and Procedures

3.1.1 Washing facilities consisting of a wash basin, water, soap and towels shall be provided by the Contractor and workers shall use these washing facilities before eating, drinking, smoking or leaving the project.

3.1.2 Gloves shall be provided as necessary and the worker shall wear the gloves.

3.1.3 Use removal methods that minimize dust generation whenever possible.

3.1.4 Suppress any dust generated.

3.1.5 Workers shall not eat, drink, chew gum or smoke in the Lead-Abatement Work Area.

3.1.6 The Contractor shall clean up dust and waste frequently, and at regular intervals, and place the dust and waste in a container that is;

3.1.6.1 Dust tight,

3.1.6.2 Suitable for the type of waste,

3.1.6.3 Identified as containing lead waste,

3.1.6.4 Cleaned with a damp cloth or a vacuum equipped with a HEPA filter, or placed in a clean bag so that a clean exterior surface is achieved immediately prior to removal from the work area, and

3.1.6.5 Removed from the workplace frequently and at regular intervals,

3.1.6.6 Evaluated for lead-content and disposed of in accordance with applicable regulations.

3.1.7 Clean-up after each operation shall be done to prevent lead contamination and exposure to lead.

3.1.8 The use of 6 mil polyethylene bags as a waste container is acceptable provided it is appropriate for the type of waste. Double bagging of waste is recommended.

3.1.9 Drop sheets shall be used below all lead operations which may produce dust, chips, or debris containing lead.

3.1.10 Dry removal of lead-containing or lead-based paints and surface coatings shall be minimized whenever possible.

3.1.11 Wetting of materials shall be conducted whenever possible to control dust. The addition of wetting agents should be considered. Wetting should not be used if it may create a hazard or cause damage.

3.1.12 Wet methods should be incorporated in the operation to reduce dust generation. Examples of wet methods include wetting surfaces, wet mist, wet scraping and wet shovelling.

3.1.13 Dust and waste shall be cleaned up and removed by vacuuming with a HEPA filter equipped vacuum.

3.1.14 Cleaning with compressed air or dry sweeping shall not be performed. Sweeping compounds shall be used where wetting is not possible.

3.1.15 All equipment, tools, respirators and clothing shall be cleaned by damp wiping, or with a vacuum equipped with a HEPA filter, prior to removal from the work area.

3.1.16 Protection of porous or fibrous surfaces is imperative as it is very difficult to remove lead-containing dust from these surfaces. If the material cannot be adequately protected from lead dust or waste it shall be removed and disposed of.

3.1.17 Any water generated from cleaning or removal operations must be appropriately contained, treated or disposed of in accordance with applicable legislation

3.1.18 The Lead-Abatement Work Area shall be inspected at least once daily by the Contractor to ensure that the Lead-Abatement Work Area is clean.

3.2 Measures and Procedures for Type/Class 1 Operations

3.2.1 All general measures and procedures shall be implemented.

3.2.2 Respirators should not be necessary if all general health and safety procedures are followed. However, any worker who requests a respirator shall be provided with a half-mask particulate respirator with N-, R- or P-series particulate filters, and 95, 99 or 100% efficiency, or better.

3.2.3 Coveralls should not be necessary if all general health and safety procedures are followed. However, any worker who requests coveralls shall be provided with coveralls and the worker shall wear the coveralls.

3.3 Measures and Procedures for Type/Class 2 A/B Operations

3.3.1 Washing facilities consisting of a wash basin, clean water, soap (consider the use of lead-specific soaps and hygiene indicators based on the scope of the Operation) and towels shall be provided. Workers shall use these washing facilities upon leaving the work area and before eating, drinking or smoking.

3.3.2 Respirators shall be provided, and the worker shall wear the respirator.

3.3.3 Gloves, coveralls and other Personal Protective Equipment (PPE) shall be provided and the worker shall wear the PPE.

3.3.4 Signage is required, and the area shall be delineated to control access. Signs shall be posted in sufficient numbers to warn of the lead hazard and shall state in large clearly visible letters that, i) there is a lead hazard, and ii) Access to the work area is restricted to persons wearing protective clothing.

3.3.5 Use removal methods that minimize dust generation whenever possible.

3.3.6 Suppress any dust generated.

3.3.7 Workers shall not eat, drink, chew or smoke in the work area.

3.3.8 Dust and waste shall be cleaned up at regular intervals and placed in a container that is;

3.3.8.1 dust tight,

3.3.8.2 suitable for the type of waste,

3.3.8.3 identified as lead waste,

3.3.8.4 cleaned with a damp cloth or a vacuum equipped with a HEPA filter, or placed in a clean bag so that a clean exterior surface is achieved immediately prior to removal from the work area,

3.3.8.5 removed from the workplace frequently and at regular intervals, and

3.3.8.6 evaluated for lead-content and disposed of in accordance with applicable regulations.

3.3.9 The use of 6 mil polyethylene bags as a waste container is acceptable provided it is appropriate to the type of waste. Double bagging of waste is recommended.

3.3.10 Drop sheets shall be used below all lead operations that may produce dust, chips, or debris containing lead.

3.3.11 Air-handling (supply and return) systems servicing the area of the Type/Class2 Operation shall be removed from service or isolated to prevent migration of lead through the air handling system.

3.3.12 Dry removal of lead-containing or lead-based paints and surface coatings shall be minimized whenever possible.

3.3.13 Wetting of materials shall be conducted whenever possible to control dust. The addition of wetting agents should be considered. Wetting should not be used if it may create a hazard or cause damage.

3.3.14 Wet methods shall be incorporated in the operation to reduce dust generation. Examples of wet methods include wetting surfaces, wet mist, wet scraping and wet shovelling.

3.3.15 Cleaning with compressed air or dry sweeping shall not be performed. Sweeping compounds shall be used where wetting is not possible.

3.3.16 All equipment, tools, respirators and clothing shall be cleaned by damp wiping, or using a vacuum equipped with a HEPA filter, prior to removal from the work area.

3.3.17 Protection of porous or fibrous surfaces is imperative as it is very difficult to remove lead-containing dust from these surfaces. If the material cannot be adequately protected from lead dust or waste it shall be removed and disposed of.

3.3.18 Any water generated from cleaning or removal operations must be appropriately contained, treated or disposed of in accordance with applicable legislation.

3.3.19 Where a dust generating operation is carried out, additional local mechanical ventilation shall be provided to remove dust, mist and fumes at the source. Local mechanical ventilation is recommended for welding, burning or high temperature cutting and for the removal of lead-containing and lead-based paints and surface coatings using power tools that are equipped with a dust collection device attached to a HEPA filter. Where local mechanical ventilation is used, the following should be met:

3.3.19.1 Air velocity at the source of dust, mist or fume generation shall be no less than 0.5 m/sec (100 ft./min).

3.3.19.2 Air discharged from the local mechanical ventilation system shall pass through a HEPA filter.

3.4 Measures and Procedures for Type/Class 3 A/B Operations

3.4.1 A competent supervisor must be present at all times during Type/Class3 Operations. Only workers and supervisors with proper training shall perform Type/Class3 Operations.

3.4.2 Washing facilities consisting of a wash basin, clean water, soap (consider the use of lead-specific soaps and hygiene indicators) and towels shall be provided. Workers shall use these washing facilities upon leaving the work area and before eating, drinking or smoking.

3.4.3 Respirators shall be provided, and the worker shall wear the respirator.

3.4.4 Gloves, coveralls and other PPE shall be provided and the worker shall wear the PPE.

3.4.5 Signage is required, and the area shall be delineated to control access. Signs shall be posted in sufficient numbers to warn of the lead hazard and shall state in large clearly visible letters that, i) there is a lead hazard, and ii) access to the work area is restricted to persons wearing protective clothing.

3.4.6 Use removal methods that minimize dust generation whenever possible.

3.4.7 Suppress any dust generated.

3.4.8 Workers shall not eat, drink, chew or smoke in the work area.

3.4.9 Dust and waste shall be cleaned up at regular intervals and placed in a container that is,

3.4.9.1 dust tight,

3.4.9.2 suitable for the type of waste,

3.4.9.3 identified as lead waste,

3.4.9.4 cleaned with a damp cloth or a vacuum equipped with a HEPA filter, or placed in a clean bag so that a clean exterior surface is achieved immediately prior to removal from the work area,

3.4.9.5 removed from the workplace frequently and at regular intervals, and

3.4.9.6 evaluated for lead-content and disposed of in accordance with applicable regulations.

3.4.10 The use of 6 mil polyethylene bags as a waste container is acceptable provided it is appropriate for the type of waste. Double bagging of waste is recommended.

3.4.11 Enclosures shall be used to separate the work area from other construction activities or work areas, and to prevent lead exposure to persons not directly involved in the lead operation. Barriers should only be used where full and partial enclosures are not practicable.

3.4.12 Drop sheets shall be used below all lead operations that may produce dust, chips, or debris containing lead.

3.4.13 For Type/Class3a operations conducted indoors where work areas are not accessible to the public, barriers, partial enclosures, or full enclosures may be used.

3.4.14 For all other all other Type/Class3 operations conducted indoors full enclosures shall be used.

3.4.15 For Type/Class3a and 3b operations conducted outdoors, barriers, partial enclosures, or full enclosures shall be provided.

3.4.16 ***Barriers, Partial Enclosures and Full Enclosures***

3.4.16.1 Ropes or barriers do not prevent the release of contaminated dust or other contaminants into the environment. However, barriers can be used to restrict access to only workers who are adequately protected with proper PPE and prevent entry of individuals not directly involved in the operation. Ropes or barriers shall be placed at a distance far enough from the operation that allows the lead-containing dust to settle. If this is not achievable, warning signs shall be posted at the distance where the lead-containing dust settles to warn that access is restricted to persons wearing PPE. Ropes or barriers shall be located no less than 10 metres from the work area.

3.4.16.2 Partial enclosures may consist of vertical and/or horizontal tarps and drop sheets (e.g. polyethylene sheeting). The tarps shall overlap and be securely fixed together at the seams. A partial enclosure is not a recommended containment system if significant dust is being generated, however is suitable for containing flakes and chips.

3.4.16.3 Full enclosures are tight enclosures (with tarps that are generally impermeable (e.g. polyethylene sheeting) with fully sealed joints and chambered air lock entryways/exits and upper seals). Full enclosures allow minimal or no fugitive emissions to reach the area outside the enclosure. For full enclosures, the following requirements shall be met:

3.4.16.3.1 The enclosure shall be made of windproof materials that are impermeable to dust.

3.4.16.3.2 The enclosure shall be supported by a secure, adequate and safe structure.

3.4.16.3.3 All joints in the enclosure shall be fully sealed.

3.4.16.3.4 Entrances to the enclosure shall be equipped with air locks (curtain walls, flap doors, zipper doors or solid doors).

3.4.16.3.5 The escape of dust, mist, fume, waste, blast media and debris from the enclosure shall be prevented.

3.4.16.3.6 General mechanical ventilation shall be provided by a HEPA filtered unit to remove contaminated air from the enclosure. Clean and safe make-up air that is free from hazardous dust, mist, vapours or fumes shall be provided to replace the exhausted air.

3.4.16.3.7 Filters used on ventilation equipment shall be adequate to ensure that exhausted air quality meets applicable environmental legislation and standards.

3.4.16.3.8 The air velocity within the enclosure shall provide an average minimum cross-draft or down-draft past each worker during abrasive blasting operations as follows.

3.4.16.3.8.1 cross draft capture velocity of 0.5 m/sec (100 ft./min) at the worker breathing zone.

3.4.16.3.8.2 Down draft capture velocity of 0.25 m/sec (50 ft./min) at the worker breathing zone.

3.4.17 The spread of lead dust from the work area shall be prevented by creating and maintaining within the enclosed area a minimum negative air pressure of 0.02 inches of water column (5 pascal), relative to the area outside the enclosed work area and/or 6 air changes per hour. Pressure differential readings must be taken and logged at regular intervals during lead removal.

3.4.18 Air-handling systems (supply and return) servicing the area of the Type/Class3 Operation shall be removed from service or isolated to prevent migration of lead through the air handling system.

3.4.19 Dry removal of lead-containing or lead-based paints and surface coatings shall be minimized whenever possible.

3.4.20 Wetting of materials shall be conducted whenever possible to control dust. The addition of wetting agents should be considered. Wetting should not be used if it may create a hazard or cause damage.

3.4.21 Wet methods shall be incorporated in the operation to reduce dust generation. Examples of wet methods include wetting surfaces, wet mist, wet scraping and wet shovelling.

3.4.22 Cleaning with compressed air or dry sweeping shall not be performed. Sweeping compounds shall be used where wetting is not possible.

3.4.23 All equipment, tools, respirators and clothing shall be cleaned by damp wiping, or using a vacuum equipped with a HEPA filter, prior to removal from the work area.

3.4.24 Protection of porous or fibrous surfaces is imperative as it is very difficult to remove lead-containing dust from these surfaces. If the material cannot be adequately protected from lead dust or waste it shall be removed and disposed of.

3.4.25 Any water generated from cleaning or removal operations must be appropriately contained, treated or disposed of in accordance with applicable legislation.

3.4.26 Where a dust generating operation is carried out, additional local mechanical ventilation shall be provided to remove dust, mist and fumes at the source. Local mechanical ventilation is recommended for welding, burning or high temperature cutting and for the removal of lead-containing and lead-based paints and surface coatings using power tools that are not equipped with a dust collection device attached to a HEPA filter. Where local mechanical ventilation is used, the following should be met:

3.4.26.1 Air velocity at the source of dust, mist or fume generation shall be no less than 0.5 m/sec (100 ft./min).

3.4.26.2 Air discharged from the local mechanical ventilation system shall pass through a HEPA filter.

3.4.27 ***Type/Class3 Decontamination Facility***

3.4.28 Establishing a decontamination facility is required for workers conducting Type/Class3 operations. The decontamination facility shall be located as close as practicable to the work area and shall consist of:

3.4.29 A suitable area for taking off contaminated protective clothing.

3.4.30 A shower that includes;

3.4.30.1 Hot and cold water with individual controls inside the room to regulate water flow and temperature; or

3.4.30.2 Water of a constant temperature that is not less than 40° Celsius or more than 50° Celsius.

3.4.30.3 Clean towels.

3.4.30.4 Soap that is suitable for removing lead, and

3.4.30.5 Hygiene indicators to visually confirm that lead has been removed from workers hands.

3.4.31 A suitable area for changing in to street clothes and for storing clean clothing and equipment

3.5 Measures and Procedures for Cleaning of Lead Dust

3.5.1 Should contamination be discovered, either by visual inspections or by results of air sample analysis, clean-up of effected areas shall be cleaned by the Contractor using the procedures of this Section. All general

measures and procedures and measures for Type 2 Operations shall be implemented.

3.5.1.1 Using vacuums equipped with HEPA filters, the Contractor shall clean all surfaces prior to using detergent solution.

3.5.1.2 The Contractor shall clean and rinse all hard surfaces by any one, or combination, of the following methods: Container, rinse bucket and clean rags; OR spray bottle, rinse bucket and clean rags; OR Mop and two buckets.

3.5.1.3 For porous and other hard-to-clean surfaces, the Contractor shall scrub surfaces with detergent solution and allow soaking for 10 minutes prior to rinsing. In addition to pre-cleaning with vacuums equipped with HEPA filters, hard-to-clean or very dirty surfaces may require additional pre-cleaning with heavy duty or degreasing detergent.

3.5.1.4 Regardless of chosen methodology, the Contractor shall work from top to bottom (i.e. from deck to floor), beginning in the farthest point of entry into the work enclosure.

3.5.1.5 The Contractor shall clean and rinse all mechanical, electrical components and conduits.

3.5.1.6 The Contractor shall clean and rinse any exposed structural components (i.e. deck, exposed beams, columns, etc.).

3.5.1.7 The Contractor shall clean and rinse a small area at a time before doing the next area.

3.5.1.8 When using rags, the Contractor shall use folding technique to expose fresh rag for cleaning. Rinse rag in clean water prior to solution application. Frequently, and at regular intervals, replace soiled rags with clean rags.

3.5.1.9 Frequently, and at regular intervals, the Contractor shall dispose of dirty water and use clean rinse water.

3.5.1.10 The Contractor shall complete final rinsing with clean water.

3.5.1.11 The Contractor shall avoid re-contamination of clean areas.

3.5.2 The Contractor shall clean the deck surface and all surfaces within the Lead-Abatement Work Area.

3.5.3 The Contractor shall dispose of as lead waste, all materials that may be contaminated with lead dust (i.e. rags and/or un-restorable items).

3.6 Preparation Prior to Contamination

3.6.1 The Contractor shall move equipment, tools, supplies and stored materials that can be moved without disturbing lead dust.

3.6.1.1 The Contractor shall erect polyethylene hoarding walls to separate the Work from any Occupied Area.

3.6.2 The Contractor shall pre-clean all surfaces in the Lead-Abatement Work Area, using a HEPA vacuum or damp cloth prior to installing protection.

3.6.3 The Contractor shall remove fixtures, equipment etc. specified to be removed, and that can be removed without disturbing the lead dust.

3.6.4 The Contractor shall seal all below ceiling openings to Lead-Abatement Work Area using polyethylene, tape, caulking, etc., including but not limited to windows, doors, vents, diffusers, etc.

3.6.5 The Contractor shall seal all openings in floor using plugs, tape, caulking, rip-proof polyethylene, etc. Floor openings are to be sealed independently prior to installation of floor polyethylene. Include floors of duct and service shafts.

3.6.6 The Contractor shall maintain emergency and fire exits from Lead-Abatement Work Area, or establish alternative exits satisfactory to Fire Commissioner of Canada and Provincial Fire Marshall.

3.6.7 The Contractor shall provide a fire extinguisher at each emergency exit and in both sides of the decontamination facilities.

3.6.8 The Contractor shall install temporary lighting in all Lead-Abatement Work Areas at levels that will provide for a safe and efficient use of the Lead-Abatement Work Area. Install battery powered emergency lights so as to light exit routes through Lead-Abatement Work Area.

3.6.9 The Contractor shall install a minimum of 1 layer of rip proof polyethylene over floor surfaces. Extend floor protection a minimum of 12" up all vertical surfaces in the Lead-Abatement Work Area. If more than 1 layer is used, each layer of polyethylene is to be laid and sealed independently of each other.

3.6.10 The Contractor shall install 2 layers of polyethylene all walls forming the perimeter of the Lead-Abatement Work Area. Each layer of polyethylene is to be laid and sealed independently of each other. Overlap floor polyethylene with wall polyethylene by a minimum of 12” (305 mm) at each layer.

3.6.11 The Contractor shall isolate at panel and disconnect or ground existing power supply to Lead-Abatement Work Area where necessary. Power supply to remaining areas of building must not be disrupted during work of this section.

3.6.12 The Contractor shall not proceed with work of Contaminated Preparation without obtaining written permission from the Environmental Consultant. The Contractor shall provide a minimum of 24 hours notice to consultant for the need of an inspection.

3.7 Contaminated Preparation

3.7.1 The Contractor shall use full personal protective procedures and equipment, and HEPA vacuums during contaminated preparation.

3.7.2 The Contractor shall shut down HVAC systems affecting the Lead-Abatement Work Area after normal building operating hours only.

3.7.3 The Contractor shall remove and dispose of obstructions to access ducts supplying into and exhausting from the Lead-Abatement Work Area.

3.7.4 The Contractor shall seal ducts supplying into and exhausting from the Lead-Abatement Work Area during one shift.

3.7.4.1 The Contractor shall clean outside and seal duct or equipment with rip-proof polyethylene and other products so as to make air tight.

3.7.4.2 The Contractor shall smoke test seals regularly.

3.8 Lead-Abatement Work Area Dismantling

3.8.1 The Contractor shall remove all polyethylene, tape, polyurethane foam, caulking and enclosures from Lead-Abatement Work Area.

3.8.2 The Contractor shall remove lead contaminated floor polyethylene by carefully rolling away from walls to centre of the Lead-Abatement Work Area.

3.8.3 The Contractor shall remove visible dust or residue found during removal of polyethylene using a HEPA vacuum.

3.8.4 The Contractor shall place Polyethylene, tape, cleaning material, clothing and other contaminated waste in lead waste containers and dispose of as lead waste.

3.8.5 The Contractor shall seal vacuum hoses and fittings, flexible ductwork and all tools used in contaminated work site in 6 mil polyethylene bags prior to removal from Lead-Abatement Work Area.

3.8.6 The Contractor shall decontaminate equipment used in Lead-Abatement Work Area, or double bag for transportation prior to being removed from Lead-Abatement Work Area.

3.8.7 The Contractor shall remove polyethylene protection and hoarding walls where hoarding walls separate occupied areas from Lead-Abatement Work Area.

3.8.8 The Contractor shall wash and mop with clean water all surfaces in the Lead-Abatement Work Area.

3.8.9 The Contractor shall remove all temporary lights, ground fault panels.

3.8.10 The Contractor shall maintain all hoarding walls adjacent to areas where lead dust is present.

3.8.11 The Contractor shall damp mop and clean with HEPA vacuum Occupied Areas previously below platforms, tunnels and decontamination facilities with HEPA vacuum.

3.8.12 Prior to leaving the work area,

3.8.12.1 Workers shall decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing.

3.8.12.2 Remove protective clothing by rolling the clothing outward and downward onto itself so the clean interior of the protective clothing is on the exterior after removal.

3.8.12.3 Workers shall remove all contaminated clothing and equipment except respirator.

3.8.12.4 If the protective clothing is to be reused, it shall be stored in a sealable plastic bag by the worker.

3.8.12.5 If the protective clothing will NOT be reused, the worker shall place it in a lead waste container immediately prior to leaving the work area.

3.8.12.6 Immediately after leaving the work area, all workers shall proceed directly to the established washing facilities to wash hands and face while wearing the respirator.

3.8.12.7 Workers shall wash exposed skin and respirator with soap and water.

3.8.12.8 All workers shall wash, remove and store respirators as per the written procedures that have been established by the employer and as is consistent with the manufacturer's specifications. Respirator filters for re-use shall be removed from respirators prior to washing the respirator or shall be disposed of as lead waste.

End of Section

OTHER HAZARDOUS MATERIALS

SECTION 02 84 01

LIST OF CONTENTS

1. GENERAL

1.1 General and Related Work

1.1.1 All sections of the specifications form a part of the Contract Document and shall be read to determine their effect upon the work of this section.

1.1.2 Related Work Specified Elsewhere

Division 02	Section 02 82 01	Type 1 Asbestos Abatement
Division 02	Section 02 82 02	Type 2 Asbestos Abatement
Division 02	Section 02 82 03	Type 2 Asbestos Abatement (Glove Bag)
Division 02	Section 02 82 04	Type 3 Asbestos Abatement
Division 02	Section 02 83 01	Lead Abatement

Attachment A:

1) *Pre-Renovation Designated Substance & Hazardous Materials Survey Report, ECOH Management Inc., December 1, 2023.*

1.1.3 The Contractor is responsible to verify all measurements for removal, cleaning, and disposal purposes. Measurements and quantities provided herein are for reference only.

1.1.4 It is the intent that abatement performed as per this section will result in the removal and disposal of all hazardous materials as well as any materials that may have been contaminated either during or prior to work of this Section.

1.1.5 Refer to Section 02 82 00, Abatement Scope and Details, for the following information and requirements;

1.1.5.1 Site Conditions,

1.1.5.2 Outline of Work,

1.1.5.3 Schedule,

1.1.5.4 Supervision,

1.1.5.5 Quality Assurance,

1.1.5.6 Regulations,

1.1.5.7 Notification, and

1.1.5.8 Submittals.

1.2 Definitions

1.2.1 Authorized Visitor(s): The Owner or his approved representative and/or persons representing regulatory agencies.

1.2.2 Competent Personnel: a worker who is qualified because of knowledge, training and experience to perform the work; is familiar with the Ontario Occupational Health and Safety Act and with the provisions of the regulations that apply to the work, and; has knowledge of all potential or actual danger to health or safety in the work.

1.2.3 Environmental Abatement Consultant: The Owner or person designated by the Owner to provide inspection and air monitoring of the Contractor's work. The Environmental Abatement Consultant has the same authorities and duties as the Asbestos Abatement Consultant. Those authorities and duties are as follows:

1.2.4 To accept or reject the methods and schedules for removal work;

1.2.5 To coordinate all aspects of hazardous material removal work with the on-site Superintendent provided by the Contractor;

1.2.6 To reject the Superintendent without explanation;

1.2.7 To remove any personnel that, in their opinion, do not meet the qualifications of a competent and trained person capable of the safe removal and handling of hazardous materials or contaminated materials.

1.2.8 To accept or reject work completed by the contractor.

1.2.9 To order work to stop when prescribed health and safety measures and/or health and safety procedures and/or health and safety facilities are not, or are likely not to be, fully implemented.

1.2.10 HEPA Filter: High Efficiency Particulate Aerosol filter that is at least 99.97 percent efficient in collecting a 0.3 micrometre aerosol.

1.2.11 HEPA Vacuum: High Efficiency Particulate Aerosol filtered vacuum equipment acceptable to local provincial Ministry of Labour, and Health and Welfare Canada. Ensure vacuums are equipped with hoses, fittings, and nozzle attachments. Maintain vacuum equipment and system properly.

1.2.12 Project Area(s): Area(s) where work takes place that will or may disturb hazardous materials.

1.3 Worker and Visitor Protection

1.3.1 The Contractor shall provide workers and visitors with protective clothing and equipment where contact with hazardous materials may occur.

1.3.2 The Contractor shall provide workers and visitors with clothing and equipment appropriate for the potential level of exposure.

1.3.3 Before commencing work, the Contractor shall provide satisfactory proof that every worker has had instruction and training in hazardous material exposure, in personal hygiene and work practices, and in use, cleaning, and disposal of respirators and protective clothing.

1.3.4 The Contractor shall provide workers with instruction and training on respirators. This includes:

1.3.5 Limitations of equipment,

1.3.6 Inspection and maintenance of equipment,

1.3.7 Fitting of equipment, and

1.3.8 Disinfecting of equipment.

1.3.9 **Instructions**

1.3.9.1 Before entering hazardous material Project Area(s), the Contractor shall instruct workers and Authorized Visitor(s) in use of respirators, and all aspects of work procedures and protective measures. Provide instruction by competent person as defined by The Occupational Health and Safety Act.

1.3.10 **Respirators**

1.3.10.1 The Contractor shall provide workers with personally issued and marked respirators appropriate for the hazardous material encountered. The Contractor shall provide approved respirators to Authorized Visitor(s). The Contractor shall provide sufficient filters and cartridges, so workers can install new filters and cartridges following disposal of used filters and cartridges before re-entering contaminated areas. Respirators shall be acceptable to Occupational Health Branch of the Ministry of Labour.

1.3.10.2 The Contractor shall provide instruction to users in use of respirators, including qualitative fit testing. No worker or Authorized Visitor(s) shall have facial hair that prevents proper contact between respirator face piece and skin. Alternatively, supplied air positive pressure respirator or supplied air positive pressure hood or helmet may be provided. The Contractor shall maintain respirators in proper functioning and clean condition or remove from site.

1.3.11 **Protective Clothing and Goggles**

1.3.11.1 Workers and Authorized Visitor(s) shall wear personal protective apparel appropriate for the hazardous material encountered and as required by Ministry of Labour construction regulations.

1.3.11.2 Eating, drinking, chewing or smoking shall not be permitted in the Project Area.

1.3.11.3 Workers and Authorized Visitors shall wash hands and face when leaving hazardous material removal Project Area.

1.4 Air Monitoring

1.4.1 Air monitoring, if completed, shall be performed following the National Institute for Occupational Safety and Health Methods, as is applicable for the hazardous material being assessed.

1.4.2 The Contractor shall cooperate fully with the Environmental Abatement Consultant in the collection of air monitoring samples, including requiring workers to wear sampling pumps for a full work shift, if required. Workers shall exercise care not to damage sampling equipment.

1.4.3 If air monitoring shows a hazardous material removal Project Area is contaminated above levels acceptable levels, based upon Occupational Health and Safety exposure limits, the Contractor shall stop work and notify Owner Designee for additional instructions.

1.5 Waste Transport and Disposal

1.5.1 The Contractor shall dispose of hazardous material waste in accordance with requirements of Provincial and Federal authority having jurisdiction.

1.5.2 The Contractor shall ensure hazardous materials are treated, packaged, transported and disposed of as hazardous material.

1.5.3 The Contractor shall conform to requirements of Regulations under Environmental Protection Act for Waste Management, transporting and disposal of hazardous waste.

1.5.4 The Contractor shall ensure shipment of containers to dump is taken by waste hauler licensed to transport hazardous waste.

1.5.5 The Contractor shall ensure that a bill of lading, showing the type and weight of hazardous waste being transported, is completed for each load.

1.5.6 The Contractor shall check with dump operator to determine type of waste containers acceptable.

1.5.7 The Contractor shall ensure dump operator is fully aware of hazardous material being dumped.

1.5.8 The Contractor shall co-operate with Ministry of Environment inspectors and immediately carry out instructions for remedial work at dump to maintain environment, at no additional cost to Owner.

2. PRODUCTS

2.1 Materials and Equipment

2.1.1 Drop Sheet: Minimum 0.15 mm (6 mil) thick polyethylene unreinforced, or minimum 0.15 mm (6 mil) thick woven fibre reinforced fabric bonded both sides with polyethylene of size to minimize joints.

2.1.2 DOP Test: A testing method employing dioctyl phthalate aerosol for purpose of leak-testing negative air units.

2.1.3 HEPA Filter: High Efficiency Particulate Aerosol filter at least 99.97 percent efficient in collecting 0.3 micrometer aerosol.

2.1.4 HEPA Vacuum: Vacuum with all necessary fittings, tools and attachments. All air must be filtered by HEPA filter before discharge.

2.1.5 Negative Air Unit: Portable air handling system which extracts air directly from the Hazardous Material Project Area and discharges the air to the exterior of the Hazardous Material Project Area. Equipped as follows:

2.1.6 Prefilter and HEPA filter. Air must pass HEPA filter before discharge.

2.1.7 Pressure differential gauge to monitor filter loading.

2.1.8 Auto shut off and warning system for HEPA filter failure.

2.1.9 Separate hold down clamps to retain HEPA filter in place during change of pre-filter.

2.1.10 Negative Pressure: Reduced pressure within Project Area(s) established by extracting air directly from Project Area, and discharging it directly to exterior of building. Discharged air first passes through HEPA filter. Extract sufficient air to ensure constant reduced pressure at perimeter of Project Area with respect to surrounding areas.

2.1.10.1 Establishing Negative Pressure: Distribute negative air filter/fan units evenly around the Hazardous Material Project Area. Remove windows, if required, and replace with 1/2" plywood with appropriately sized openings for exhaust. Switch the negative air pressure system to the "ON" mode and operate continuously until final completion of the work, including final cleanup. Exhaust air to the outside of the building using sealed ducting. A spare negative air unit will be fully installed and ready to operate as a backup unit. The negative air pressure system must have the capacity to exchange air volume of the Project Area three times per hour and maintain a minimum of 0.02 inches of water gauge differential. Operate negative pressure system continuously from the time the first polyethylene is installed to seal openings until final completion of the work including

final cleanup and air testing. Replace pre-filters and HEPA filters as required and on a regular basis to maintain even and constant draw across negative air unit. Do not discharge negative air ducting with-in 25 feet of building access points. Replace windows removed for discharge panels upon completion of project, if window removal was required.

2.1.11 Polyethylene Sheeting: 6 mil (0.15 mm) minimum thickness unless otherwise specified, in sheet size to minimize joints.

2.1.11.1 Fibre-Reinforced (Rip-Proof) Polyethylene Sheeting: 8 mil (0.20mm) fabric made up from one layer of 5 mil (0.13 mm) weave and two layers of 1.5 mil (0.04 mm) poly laminate or approved equal. In sheet size to minimize on-site seams and overlaps.

2.1.11.2 Flame-Resistant Polyethylene Sheeting: A single polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films, 6 mil (0.15 mm) thickness.

2.1.12 Protective Coveralls: Disposable full body coveralls complete with hoods manufactured of a material that does not permit penetration of asbestos fibres or other hazardous materials.

3. EXECUTION

3.1 General Precautions

3.1.1 Demolition construction work of building materials found not to contain, or not suspected of containing any hazardous materials shall be completed using (at a minimum) general worker health and safety precautions which includes, in part, appropriate dust suppression methods and proper respiratory protection.

3.1.2 The Contractor shall prevent spread of dust from Project Area using measures appropriate to work to be completed.

3.1.3 The Contractor shall perform work in manner to reduce dust creation to lowest levels practicable. Work is subject to visual inspection and air monitoring. Any contamination of surrounding areas indicated by visual inspection or air monitoring shall require complete enclosure and clean-up of affected areas

3.1.4 Washing facilities consisting of a wash basin, water, soap and towels shall be provided by the Contractor and workers shall use these washing facilities before eating, drinking, smoking or leaving the project.

3.1.5 Gloves shall be provided as necessary and the worker shall wear the gloves.

3.1.6 Use removal methods that minimize dust generation whenever possible.

3.1.7 Suppress any dust generated.

3.1.8 Workers shall not eat, drink, chew gum or smoke in the Project Area.

3.1.9 The Contractor shall clean up dust and waste frequently, and at regular intervals, and place the dust and waste in a container that is;

3.1.9.1 Dust tight,

3.1.9.2 Suitable for the type of waste,

3.1.9.3 Identified as containing waste,

3.1.9.4 Cleaned with a damp cloth or a vacuum equipped with a HEPA filter, or placed in a clean bag so that a clean exterior surface is achieved immediately prior to removal from the Project Area, and

3.1.9.5 Removed from the workplace frequently and at regular intervals,

3.1.9.6 Disposed of in accordance with applicable regulations.

3.1.10 Clean-up after each operation shall be done to prevent spread of waste.

3.1.11 The use of 6 mil polyethylene bags as a waste container is acceptable provided it is appropriate for the type of waste. Double bagging of waste is recommended.

3.1.12 Drop sheets shall be used below all operations which may produce dust, chips, or debris.

3.1.13 Dry removal of materials shall be minimized whenever possible.

3.1.14 Wetting of materials shall be conducted whenever possible to control dust. The addition of wetting agents should be considered. Wetting should not be used if it may create a hazard or cause damage.

3.1.15 Wet methods should be incorporated in the operation to reduce dust generation. Examples of wet methods include wetting surfaces, wet mist, wet scraping and wet shovelling.

3.1.16 Dust and waste shall be cleaned up and removed by vacuuming with a HEPA filter equipped vacuum.

3.1.17 Cleaning with compressed air or dry sweeping shall not be performed. Sweeping compounds shall be used where wetting is not possible.

3.1.18 All equipment, tools, respirators and clothing shall be cleaned by damp wiping, or with a vacuum equipped with a HEPA filter, prior to removal from the Project Area.

3.1.19 Protection of porous or fibrous surfaces is imperative as it is very difficult to remove dust from these surfaces. If the material cannot be adequately protected from dust it shall be removed and disposed of.

3.1.20 Any water generated from cleaning or removal operations must be appropriately contained, treated or disposed of in accordance with applicable legislation

3.1.21 The Project Area shall be inspected at least once daily by the Contractor to ensure that the Project Area is clean

3.2 Arsenic

3.2.1 Arsenic would not be expected in the Project Area and was not noted during previous investigations.

3.2.2 Arsenic compounds, however, may be present in paints and adhesives.

3.2.3 During demolition work, the management of arsenic compounds, if present in paint finishes, can be adequately addressed utilizing standard best practices for dust control and general health and safety precautions.

3.3 Benzene

3.3.1 Benzene would not be expected in the Project Area and was not observed during previous investigations.

3.4 Coke Oven Emissions

3.4.1 Coke Oven Emissions would not be expected in the Project Area and was not observed during previous investigations.

3.5 Ethylene Oxide

3.5.1 Ethylene oxide would not be expected in the Project Area and was not observed during previous investigations.

3.6 Isocyanates

3.6.1 Free isocyanate compounds would not be expected in the Project Area and were not noted during previous investigations.

3.6.2 Historically, these compounds are known to have been present in paint finishes.

3.6.3 During demolition work, the management of these compounds, if present in paint finishes, can be adequately addressed utilizing standard best practices for dust control and general health and safety precautions.

3.7 Mercury

3.7.1 Mercury is present in minor quantities within the Subject Demolition Area in the following forms:

3.7.1.1 Vapour within fluorescent light tubes,

3.7.1.2 A liquid in wall mounted thermostats,

3.7.1.3 A possible constituent of paints and adhesives.

3.7.2 The Contractor shall remove items that contain mercury in a manner to keep them sealed and intact at all times.

3.7.3 The Contractor shall avoid direct skin contact with mercury and avoid inhalation of mercury vapour.

3.7.4 The Contractor shall collect all mercury-containing items (fluorescent light tubes, thermostats, etc.) from all buildings in a central location. All mercury-containing items shall be submitted to a qualified recycling facility for mercury reclamation.

3.7.5 The Contractor shall store and transport mercury-containing items in a manner to avoid incidental breakage.

3.7.6 In the event of incidental breakage, the Contractor shall isolate the area using barricades and notify the Owner Designee. The Owner Designee will advise on remediation procedures.

3.7.7 During demolition work, the management of these compounds, if present in paint finishes, should be adequately addressed using safety precautions utilized during the removal or demolition of painted surfaces.

3.8 Silica

3.8.1 Free crystalline silica, in the form of common construction sand, is present in all concrete and masonry products within the Subject Area.

3.8.2 Cutting, grinding or demolition of materials containing silica should be completed only with appropriate dust suppression methods, proper respiratory protection and general worker safety precautions.

3.9 Vinyl Chloride

3.9.1 Vinyl chloride monomer would not be expected in the area and was not noted during previous investigations.

3.9.2 Vinyl chloride monomer, however, is typically a component of Poly Vinyl Chloride (PVC) piping and conduits. If present on site, this form of vinyl chloride would not be expected to be a health & safety concern during work.

3.10 Ozone Depleting Substances (ODS)

3.10.1 Equipment that may contain Ozone Depleting Substances (ODS) were not noted within the Project Area during previous investigations.

End of Section

PART I GENERAL

Summary: Provide and install free-standing, modular 5001 RoofBarrier 501 Guardrail System, including tube railings, uprights, weighted bases, fittings and delivery to site.
Refer to Roof Plan for location and sizes.

Reference: OHSA Act R.R.0. 1990, Regulation 851 – Industrial Establishments, Division B, Section 9.8.8, and all applicable state, provincial, local, and regional codes.

Finish:
1. Tube for handrails, mid-rails, and uprights is to be galvanized G90 finish to the requirements of A-787.
2. Fittings shall be fluorocarbon finished or hot dipped galvanized to meet A-787 or BS EN ISO 1461:2009.

Design Requirements:
1. Railing shall consist of top rails, mid rails, uprights, weighted bases and connections.
2. All railing tubing shall be 1.66” 11 gauge G90 galvanized steel tube manufactured as per A-787, C1010 modified grade, 50,000 yield, 55,000 tensile.
3. Railing assembly shall be capable of resisting an evenly distributed vertical load of 1.5kN/m applied at the top of the guard (As per OBC).
4. Compliant with OBC 4.1.5.14.(1)(b): a concentrated load of 1.0 kN applied at any point so as to produce the most critical effect, for access ways to equipment platforms, contiguous stairs and similar areas where the gathering of many people is improbable.

Submittals:
1. Shop drawing: Indicate profiles, sizes, connections, size, and type of fasteners and accessories.
2. Have licensed professional engineer verify proposed installation and stamp.

Field Measurements:
1. Verify field measurements prior to assembly and/or ordering.

PART II PRODUCTS

Manufacturer: Skyline Group, Series: 5001 RoofBarrier 501 Guardrail System. Toll-free contact: (877) 417-6336

Components:
1. Tube: A-787 1.66” 11 gauge G90 galvanized steel tube.
2. Rails and Posts: A-787 1.66” 11 gauge G90 galvanized steel tube.
3. Clamp fittings: Elbows, Crossovers, Wall flanges, Tees, Couplings, fluorocarbon finish or hot dipped galvanized.
4. Weighted Bases: Steel base plates are 5/8” thick and supplied with powder-coated finish, upright receivers and a ¾” thick rubber protection mat on underside of the component.

5. Fasteners: All Fasteners shall be 304 or 305 stainless steel.

Assembly:
1. Fit and shop-assemble components in largest practical sizes for delivery to site.
2. Upright tops shall be plugged with weather and light resistant material where required.
3. Assemble components with joints tightly fitted and secured with set screws tightened to 20 ft.lbs. of torque.
4. Accurately form components to suit installation.

PART III EXECUTION

Installation:
1. For all connections with clamp fittings, each set screw is to be tightened to 20 ft.lbs. of torque.
2. Placement of uprights and weighted base plates to meet manufacturer specifications as stated in the RoofBarrier Installation Instructions.
3. Terminate the run as stated in the RoofBarrier Installation Instructions.

Schedules:
1. Freestanding counterweighted guardrail system with 43-1/8” nominal height to be used as a guardrail where the public is exposed to any falling hazards that resists an evenly distributed vertical load of 1.5kN/m applied at the top of the guard (As per OBC).

PART 1 - GENERAL

1.1 Description of Work

.1 Including the following but not limited to: sheathing, furring, rough framing, grounds, blocking, rough hardware, wood preserving, concealed wood anchoring within stud wall assemblies for all metal door and glazing screen frames, concealed wood anchoring for all wall and/or ceiling mounted fitments, features and equipment items identified on the drawings, etc.

.2 Temporary carpentry, including fencing, hoarding, etc. as required throughout the course of construction to comply with all items in Division 1.

1.2 Related Work Specified Elsewhere

.1	Finish Carpentry	Section 06200
.2	Architectural Woodwork/Millwork	Section 06400

1.3 Source Quality

.1 Identify lumber by grade stamp of an agency certified Control by Canadian Lumber Standard Administration Board.

.2 Identify pressure treated wood by stamp of approval and Licensed applicator of Kopper's "Wolmanized" system.

PART 2 - PRODUCTS

2.1 Lumber

.1 Except as indicated or specified otherwise, lumber materials shall be softwood, not greater than 19% moisture content at time of installation, in accordance with the following standards:
(a) CSA 0141
(b) NLGA Standard Grading Rules for Canadian Lumber, effective 1979.

.2 Machine stress-rated lumber is acceptable for all purposes.

.3 Framing and board lumber; in accordance with Table 9.3.2A of O.B.C. 1990 except as indicated or specified otherwise.

.4 Plywood coping and sheathing: exterior grades thickness as shown.

.5 Preserved wood: pressure treated softwood, to CSA 080, using Wolman CCA preservative.

.6 Plywood: CSA 0151M - Softwood.

2.2 Fastenings and Hardware

.1 Nails, spikes and staples.

(a) Use common spiral nails and spiral spikes except where indicated otherwise.
(b) Use hot galvanized finish steel for exterior work, pressure-preservative treated lumber except where indicated otherwise.

.2 Bolt, nut, washer, screw and pin type fasteners: with hot-dip galvanized finish for exterior work, interior highly humid areas and for pressure-preservative treated lumber; elsewhere with primer paint finish where installed on sight-exposed surfaces.

.3 Use surface fastenings of following types, except where specific type is indicated.

(a) To hollow masonry, plaster and panel surfaces use toggle bolt.
(b) To solid masonry and concrete use expansion shield with lag screw or lead plug with wood screw.
(c) To structural steel use bolts through drilled hole or welded stud-bolts or power driven self-drilling screws.

PART 3 - EXECUTION

3.1 Furring and Blocking

.1 Install furring and/or solid wood blocking as required to support and/or to solidly anchor finishes, fitments, features, white boards and all wall and ceiling-mounted equipment items throughout. Use solid wood blocking within concealed wall, ceiling and/or bulkhead assemblies as required.

.2 Align and plumb face of furring and blocking to tolerance of 1:600.

.3 Ensure provision of continuous 2” wide x depth to suit wood blocking around all door frames in steel stud wall assemblies. Blocking depth to be full depth of steel studs surrounding door/glazing screen framing.

3.2 Rough Bucks

.1 Install wood bucks and nailers as indicated and/ or where nailers required.

.2 Except where indicated otherwise use material at least 38mm thick secured with 9mm bolts located within 300mm from ends of members and uniformly spaced at not over 1200mm between.

.3 Countersink bolts where necessary to provide clearance for other work.

3.3 Coping, Curbs and Sheathing

.1 Install backing, curbs and other wood supports for roofing and sheet metal work, and roof mounted equipment, as indicated.

.2 Secure with galvanized bolts where indicated, galvanized screws elsewhere. Locate fastenings within 300mm from ends and uniformly spaced between. Space bolts at 1200mm maximum and nails at 600mm centers maximum except where indicated otherwise.

.3 Install wood nailers for roof hopper, dressed, tapered and recessed slightly below surface of roof insulation.

END OF SECTION 06100

PART 1 - GENERAL

1.1 General

Division One, General Requirements, is part of this section and shall apply as if repeated here.

1.2 Description of Work

Provide all labour, materials, and equipment required or called for in this specification, and as shown on drawings or which is necessary, to complete the work without any extra cost. This work may require any or all, but not be limited to any of the following:

.1 Firestop and smoke seal at:
- i) Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
- ii) Top of fire-resistance rated masonry and gypsum board partitions.
- iii) Intersection of fire-resistance rated masonry and gypsum board partitions.
- iv) Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
- v) Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
- vi) Openings and sleeves installed for future use through fire separations.
- vii) Around mechanical and electrical assemblies penetrating fire separations.
- viii) Rigid ducts: greater than 129 cm^2: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

1.3 Related Work

.1 Fire stopping and smoke seals within mechanical assemblies (ie. Inside ducts, dampers) and electrical assemblies (ie. Inside cable trays) are specified in Division 15 and 16 respectively.

1.4 References

.1 CAN4-S115-M85, Standard Method of Fire Tests of Firestop Systems.

1.5 Samples

.1 Submit samples in accordance with General Conditions.

PART 2 – PRODUCTS

2.1 Materials

.1 Fire stopping and smoke seal systems: in accordance with CAN4-S115.
- i) Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke, and gases in compliance with requirements of CAN4-S115 and not to exceed opening sizes for which they are intended and conforming to special requirements specified in 3.5.
- ii) Firestop system rating: 2hr & 1hr.
- iii) Fire Rated Joints for Concrete Steel Fluted Decks to Concrete Walls Assemblies using TREMstop Acrylic. This detail is to be used for **all** rated walls throughout scope of project.

.2 Service penetration assemblies: certified by ULC in accordance with CAN4-S115 and listed in ULC Guide NO. 40 U19.

.3 Service penetration firestop components: certified by UlC in accordance with CAN4-S115 M85.

.4 Fire-resistance rating of installed fire stopping assembly not less than the fire-resistance rating of surrounding floor and wall assembly.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.10 Sealants for vertical joints: non-sagging.

.11 Acceptable material: Tremco, "TREMstop Acrylic".

PART 3 – EXECUTION

3.1 Preparation

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2 Installation

.1 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to a neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.3 Inspection

.1 Notify consultant when ready for inspection and prior to concealing or enclosing fire-stopping materials and service penetration assemblies.

3.4 Clean Up

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION 07270

PART 1 - GENERAL

1.1 Description of Work

The general scope of work shall include, but not be limited to the following:

.1 All gypsum wall board, cement board, steel studwork, steel furring and framing etc. throughout the building interior and exterior.

.2 Supply and installation of all sound and fire insulation materials at interior building assemblies.

1.2 Related Work

.1	Mechanical	Section 15000
.2	Acoustical Ceilings	Section 09130
.3	Painting & Decorating	Section 09900

1.3 Product Handling

.1 Store product in protected dry areas. Store gypsum board laying flat in piles with edges protected.

.2 Ensure that metal members are not bent, dented, or otherwise deformed.

.3 Deliver products supplied under the work of this Section only to those who are responsible for installation, to the place they direct, and to meet installation schedules.

1.4 Environmental Conditions

.1 Install work only in areas closed and protected against weather, and maintained between 10 degrees C and 21 degrees C. In cold weather ensure that heat is introduced in sufficient time, before work commences, to bring surrounding materials up to these temperatures; and maintained until materials installed by this Section have cured.

.2 Provide adequate ventilation to carry off excess moisture during curing of joint compound and textured finishes.

PART 2 - PRODUCTS

2.1 Materials

.1 All materials to be supplied by Canadian Gypsum Company, Domtar or approved alternates.

.2 Steel stud framing: to ASTM C645 formed from minimum 0.5mm (25 ga.) thickness hot-dipped galvanized steel sheet, meeting ASTM A525 and A568, for screw attachment of gypsum board. Knockout service holes at 450mm minimum o.c. Stud size to be as noted on the drawings.

Steel gauge of studs to be as noted above only as a minimum, and shall be increased in gauge as required to suit job requirements. Select stud gauge to related wall

heights utilizing one single stud for height of wall. Select stud gauge for bulkheads respective to length of bulkhead and any anchoring loads to be accommodated by the studs from glazing screens, doors and similar items.

.3 Furring Channel: ASTM C645, 1.5mm (16 ga.) 32 x 22 mm (1 1/4" x 7/8") galvanized metal.

.4 Corner bead: galvanized metal 32 mm (1 1/4") flange.

.5 Edge trim: "J" or "L" profile galvanized metal, minimum 22 mm (7/8") flange.

.6 Runner channels: meeting ASTM A525 and A568; 1.2 mm (18 ga.), 38 mm x 19 mm (1 1/2" x 3/4") galvanized metal.

.7 Hanger wire: galvanized 4 mm (8 ga.).

.8 Tie Wire: galvanized 1.2 mm (18 ga.)
Fasteners Type S Bugle head or as otherwise required, in lengths to suit application.

.9 **General-Use Gypsum Wall Board (GWB):**
Gypsum board on Interior Walls Sufraces above 8'-0" (2440 mm) above finished floor:
Product to be 15.9 mm (5/8") thick standard paper-faced gypsum board Type 'X' fire rated; 1200 mm (4') width sheets in lengths to suit tapered edges and square cut meeting CSA A82-27-M.

Gypsum Board on Interior Ceilings and Bulkheads: use 5/8" thick gwb generally throughout with Type 'X' fire-rating (unless noted otherwise on drawings); where drawings specifically note 1/2" thick board on horizontal ceiling surfaces, ensure use of sag-resistant 'ceiling board' throughout.

.10 **Abuse-Resistant Gypsum Wall Board (GWB):**
GWB on Interior Wall Surfaces below 8'-0" (2440 mm) above finished floor:
Product to be 5/8" thick Georgia-Pacific 'Dens Armor Plus Abuse Resistant Interior Panels' with moisture-resistant core faced in coated fibre-glass matts. Product inherently meets type X fire-rating requirements. Board widths to be 4'-0" x longest practical lengths to suit.

.11 **Gypsum Wall Board (GWB) Backing Board behind Tiled Wall Treatments:**

Large Format Tile on Steet Stud Assemblies:
At wall and bulkhead surfaces specified to receive large format tiles (tiles with any dimension exceeding 3") on steel stud assemblies, backing board behind tile is to be 1/2" cement board as per item .12 below. Ensure that cement board ties-in neatly with surrounding gypsum board wall and bulkhead finishes throughout.

Small Format Tile:
At wall and bulkhead surfaces specified to receive mosaic or small format tile (tiles with both dimensions less than 3"), backing board is to be 5/8" gwb on steel stud wall assemblies and ½" gwb on steel stud bulkhead assemblies. At small format tile on masonry wall assemblies, backing board is to be 3/8" gwb laminated to masonry substrate.

.12 **Cement Board:** 1/2" thickness throughout unless noted otherwise on drawings; wherever cement board is used as a finish, supply and install fiberglass mesh and cementitious plaster skim coat(s) as required to provide a smooth cnsistent surface, suitable for painting and resistant to moisture and vapour from showers, cooking equipment and/or any similar fixtures and equipment.

.13 Joint tape: perforated paper; 50 mm (2") width.

.14 Joint filler compound: to ASTM C474.67, ready-to-use; all purposed, for base coats, special topping grade for final coat.

.15 Vapour Barrier 0.25 mm (6 mil) polyethylene sheet.

.16 VOC content of all adhesives and sealants used shall be as per limits specified in Section 01359.

.17 **Sound and/or Fire-Resistance Batt Insulation:**
Fire-resistance insulation is to be supplied thicknesses no less than that required to achieve noted fire-resistance ratings according to related CAN/ULC assembly types.

All sound insulation is to be supplied in thicknesses fully filling the depth of related wall assembly.

Sound and Fire-Resitsance Batt Insulation is to be Rockwool AFB throughou, supplied and installed in full accordance with the manufacturer's recommendations for the intended application.

PART 3 - EXECUTION

3.1 Examination

.1 The installing sub-contractor shall examine all ceilings and wall surfaces to which his work is attached; report to the Contractor, in writing, any defects of work prepared by other trades and unsatisfactory site conditions.

.2 Before work of this Section commences ensure that services have been installed, tested, and approved by relevant jurisdictional authorities, that conduit, pipes, cables, and outlet are plugged, capped, or covered; and that fastenings and supports installed by others are in place. Do not permit work of others to touch the back of wallboard.

3.2 Installation

.1 Framing and furring shown on Drawings is indicative but do not regard it as exact or complete. Construct work to provide adequate strength to withstand stresses imposed by use and application conditions without distortion. Maintain dimensions indicated on Drawings, and execute work in accordance with regulations governing fire rated assemblies and separations.

Ensure that all gwb panels/panel types are installed and finished in full accordance with panel manufacturer's recommendations, notwithstanding notations to the contrary herein. Use all manufacturer recommended fasteners, joint tapes, joint compounds, application products and installation techniques suited to the intended application.

.2 Erect supporting and finish materials to dimensions indicated on Drawings; plumb, level, straight, and square to adjoining elements. Install work within 3 mm (1/8") of dimensioned location unless otherwise approved, flat to a tolerance of 1:1000 (1/8" in 10.0") overall and 1.5 mm (1/16") maximum in any 300 mm (1.0").

.3 Do not support the work of this Section from, nor make attachment to: ducts, pipes, conduit, or the support framing of the work of other sections.

.4 Do not apply gypsum board in close proximity to hot pipes or heating ducts.

.5 Install materials with the minimum of joints. Tightly butt joints, without force, and neatly align them.

.6 Provide clearances required at mechanical and electrical services, such as grilles, diffusers, access panel, and lighting fixtures only after verification of requirements in each case.

.7 Provide freedom for deflection under beams and structural slabs.

.8 Do not use or install metal framing, trim, or accessories which have bent or otherwise deformed.

3.3 Installation: Steel studs and Wall Furring

.1 Install steel stud and wall furring as specified and/or as otherwise required for fire rated separations or protection.

.2 Align partition tracks plumb and level at ceiling or bulkheads as shown on the drawings, secure at 600 mm oc (2'-0") maximum.

.3 Place studs in tracks vertically at 400 mm (16") oc and not more than 50 mm (2") from abutting walls, and at each side of openings. Cross brace steel studs or add horizontal stiffeners as required to provide rigid installation to manufacturer's instructions.

.4 Attach studs to bottom and ceiling track using screws. No crimping allowed.

.5 Coordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.6 Coordinated erection of studs with installation of doors and
special supports or anchorage for work specified in other Sections.

.7 Erect studs for fascia in similar manner.

.8 Install wall furring for gypsum board wall finished at 400 mm (16") oc; install furring for other material as indicated nest channels 200 mm (8") at splices.

.9 Furr duct shafts, beams, columns, pipes and exposed serviced where indicated. Provide access doors at clean outs and fire dampers.

3.4 Installation: Gypsum Bd. Ceiling Framing

.1 Erect hangers, runner and furring channels for suspended gypsum board ceiling as specified or as otherwise required to provide fire rated ceilings separation or protection.

.2 Anchor hangers to structure.

.3 Space hangers for runner channels to suite structure, to support ceiling load, at a maximum distance of 1,200 mm o.c., and at no greater distance than 150 mm (6") from ends of runner channel. Bend rod hangers securely in place with saddle ties.

.4 Install runner channels at 1200 mm (4'-0") o.c., generally, and at no greater distance than 150 mm (6") from terminations of supported cross furring members or adjacent walls. Provide 25 mm (1") clearance between runners and abutting walls and partitions.

.5 Splice runner channels by lapping at least 300 mm (12") with interlocking flanges, and wired at each end with two loops. Splice only where unavoidable. Do not bunch or line up spliced.

.6 Install cross furring at 600 mm (24") oc, no closer than 25 mm (1") and at no greater distance than 150 mm (6"), from walls, openings, breaks in continuity of ceiling, and changes
of direction. Space furring in all cases to suite incorporated services, and so as to avoid contact with perimeter walls, span furring channels no greater than 1200 mm (4'-0"); use metal studs for greater spans as approved by Architect.

.7 Secure cross furring to supports with double loops of tie wire or approved equivalent attachment. Splice by nesting and tying together within 200 mm (8") overlap.

.8 Frame perimeter of openings for access panels, light fixtures, diffusers, grilles, etc. with furring channels to maintain integrity of framing.

.9 Furr for gypsum board faced vertical bulkheads within or at termination of ceilings.

.10 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

.11 Erect entire hanger and suspension system to adequately support the ceiling assembly, including services incorporated, with a maximum deflection of 1/360 in the span of each component member, and free from horizontal movement. Install work level to tolerance of 1:1200 (1/8" in 12'-6").

3.5 Installation: Gypsum Board Panels

.1 Install gypsum board wall and ceiling finishes in gypsum panel type and thicknesses indicated and/or as otherwise required to provide required fire-rated separations, ratings or protection.

.2 Apply wallboard with long dimension perpendicular to supports. Back all joints with framing member.

.3 Install wallboard in maximum lengths and widths to minimize
joints, and never in lengths of under 1800 mm (6'-0").
Stagger end joints where they are unavoidable. Locate joints in soffits where least prominently discerned.

.4 Form neat joints at mill ends and at field cut edges of wallboard panels. Cut paper on face with a knife. Smooth by sanding and rubbing edges together.

.5 Fasten wallboard to metal support members by sheet metal screws no closer than 9 mm (3/8") to, and no farther than 12.5 mm (1/2') from, centre of joints, and at 300 mm (12") maximum oc at edges and on intermediate supports. Where two layers of wallboard are used, screw outer layer through inner to metal framing.

.6 Finish all exposed edges of wall board panels, or where gypsum board butts against a surface having no trim concealing its juncture, with appropriate metal trim, Erect plumb or level with minimum joints. Where trim abuts block or brick walls, the joint shall be carefully caulked to overcome irregularities in the masonry wall.

.7 At external corners install corner beads secure through wallboard, to framing at 150 mm (6") oc on alternate flanges.

.8 Ensure that all gwb reveals are installed level and true througout and are compounded in place, flush with surrounding gwb faces. Ensure that joints between adjacent reveals are seemed imperceptibly.

3.6 Taping and and Filling

.1 Fill joints between boards, at edge trim and corner beads, all screw holes and depressions on wallboard surfaces exposed to view to provide smooth seamless surfaces and square neat corners. Use jointing compounds and reinforcing tapes in conformance with manufacturer's specifications. Ensure that wall board is tight against framing members, fasteners are properly depressed, and adhesives have sufficiently cured.

.2 Fill at joints by three-coat method:
(a) Embed reinforcing tape in a cover of joint filler.
(b) Apply level coat of joint filler when cover coat has dried.
(c) Apply skim coat of topping cement when level coat has dried.

.3 At beveled joints: apply cover coat 178 mm (7") wide, level
coat 254 mm (10") wide, and skim coat 300 mm (12") wide.

.4 At end joints, and butt joints formed at cut edges of wallboard: apply cover coat 356 mm (14") wide level coat 508 mm (20") wide, and skim coat 600 mm (24") wide. Camber treatment over end joints to 0080 mm (1/32") thick.

.5 At Internal Corners: first fill gaps between boards with joint filler. Imbed creased reinforcing tape in a thin coat of joint filler applied 52 mm (2") wide at each side of corner. Apply cover coat as specified for beveled joints. Apply skim coat (as specified for beveled joints) to just one side of joint, and when dry apply skim coat to other side.

.6 At External Corners: fill to nose of corner bead with joint filler
and topping cement as specified for beveled joints.

.7 At edge trim: as specified for beveled joints.

.8 At screws and heads: fill holes and depressions with a two coat application of joint filler so as to be invisible after painting is complete.

.9 At control joints: as specified for beveled joints both sides. Do not fill control joint.

.10 Feather edges of compounds into surfaces of wallboards. After skim coat has dried for at least 24 hours sand lightly to leave smooth for decoration. Do not sand paper face of wallboard.

.11 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for painting.

.12 Cement Board Finishing: wherever cement board is used as a ceiling finish, supply and install fiberglass mesh and cementitious plaster skim coat(s) as required to provide a smooth consistent surface, suitable for painting and resistant to moisture and vapour from showers, cooking equipment and/or any other fixtures, equipment items etc.

3.7 Patching and Cleaning

.1 Remove droppings and excess joint compound from work before it sets.

.2 Vacuum clean working areas at the end of each day to reduce traffic of gypsum dust through other areas.

.3 Make good to cut-outs for services and other work. Fill in defective joints, holes and other depression with joint compound; ensure that surfaces are smooth, evenly textured and within specified tolerances to receive finish treatments.

.4 Clean off beads, casings and other metal trim, and leave all surfaces ready for specified finishes.

3.8 Protection

.1 Provide adequate protection of materials and work of this section from damage by weather and other causes. Protect other work from damage resulting from work of this section.

.2 Any damage caused to work of this section shall be repaired by this section at this sections expense to the satisfaction of the Architect.

END OF SECTION 09111

PART 1 - GENERAL

1.1 General

Division One, General Requirements, is part of this section and shall apply as if repeated here.

1.2 Description of Work

Provide all labour, materials, and equipment required or called for in this specification, or which is necessary, to complete the work without any extra cost. This work may require any or all, but not be limited to the supply and installation of:

.1 New lay-in acoustical ceiling panels and metal suspension grid systems for SAT ceiling assemblies as indicated on the Drawings and Schedules.

.2 Removal and modification of existing suspended acoustic ceiling panels and suspension systems as required by the work outlined in the drawings. This may also include the re-installation of existing salvaged tiles (possibly involving cutting) as well as the modification and alteration of existing suspension grids as required throughout.

1.3 Related

.1	Metal Stud and Gypsum Board	Section 09111
.2	Painting and Decorating	Section 09990
.3	Mechanical Fixtures	Section 15000
.4	Electrical Fixtures	Section 16000

1.4 Requirements of Regulatory Agencies

.1 Install ceilings that serve as fire protective membranes exactly as specified in Underwriter's Laboratories text design specifications. Verify, before installation of ceiling, that work specified in other Sections, as a part of the entire assembly, is installed to meet validating specification for a ceiling-floor or a ceiling roof assembly.

.2 Materials supplied shall carry marks identifying them as U.L.C. approved for the particular use and assembly.

1.5 Submittals

.1 Samples: Submit samples of each specified acoustical board, suspension components, and exposed grid material.

.2 Affidavits: Submit to Architect two (2) copies of affidavits in accordance with Section 01300 to verify that ceiling meets fire protective requirements.

.3 Extra Stock: Provide two sealed cartons of each specified acoustical ceilings for Owner's use. Deliver to Owner as directed.

1.6 Product Handling

.1 Deliver all products in fully sealed packages.

.2 Store all materials in a protected dry area.

.3 Ensure that pre-finished metal members are not bent, dented, or otherwise deformed or blemished.

.4 Deliver products supplied under the work of this Section to those who are responsible for installation, to the place they direct, and to meet installation schedule.

1.7 Environmental Conditions

.1 Install work only in areas closed and protected against weather, and maintained at no less than 10 degrees C. (50 degrees F.)

.2 Do not install work in any area unless satisfied that work in place has dried out, and that no further installation of damp materials is contemplated.

PART 2 - PRODUCTS

2.1 Materials

.1 Materials shall be supplied with all means of fastening as recommended by the manufacturer for the particular type of installation, and to include all clips, etc., to make the tile and grid system conform to the requirements of the U.L.C. tested assembly where a fire rated ceiling is required.

.2 Acoustical tile panels and suspension systems in locations as illustrated on Reflected Ceiling Plans and Architectural Drawings are to be as noted below.

SAT (Standard Lay-In Tile):

Tiles: 24" X 48" X 3/4" Armstrong "School Zone Fine Fissured" #1714 square lay-in tiles in white factory finish

Grid: Armstrong "Prelude ML 15/16" exposed tee system" in white factory finish

.3 Accessories: Miscellaneous clips, splicers, connectors, screws, and other standard accessories shall be steel, zinc coated or cadmium plated, strength and design compatible with suspension methods and system specified.

.4 Hangers: Galvanized annealed steel wire: 2.5mm diameter (#12 ga.) to support a maximum weight of 68 kg/hanger (150 lbs.)

.5 Inserts and Hanger Connections: Steel; galvanized after forming; suitable for structure and ceiling conditions, and loading; and approved by Architect before work commences.

PART 3 - EXECUTION

3.1 Cooperation

.1 The contractor shall cooperate with all other trades concerned to ensure a satisfactory installation. This contractor shall furnish the electrical trade all necessary information so that their lights and fixtures will conform to the centres and joining of the tiles and panels.

3.2 Scaffolding

.1 The contractor shall provide all necessary scaffolding required for the proper execution of the wall and ceiling finishes. Scaffolding shall be erected to interfere as little as possible with the work of the other trades and shall be removed immediately on completion of the work of this section.

3.3 Examination

.1 Ensure that environmental conditions and work preceding this Section are satisfactory and will permit compliance with the quality and dimension required of this work.

.2 Verify that work performed under other Sections as a part of an Underwriter Specification for a fire rated protective assembly has been done in accordance with that Specification.

3.4 Installation

.1 Install grid system ceilings as specified by the manufacturer of the system. Ensure that methods of installation used are acceptable to the manufacturer of each system component and in conformance with requirements of U.L.C. rated assemblies where required.

.2 Coordinate work of this Section with that of other Sections. Ensure that adequate preparation is made for attachment of hangers and fasteners. Do not use through the-roof hangers. Provide for carrying and integration of flush-mounted and recessed services components only after consultation and verification of methods and locations with those performing the work of Sections 15000 and 16000.

.3 Space hangers for supporting grid generally at 1200mm (48") nominal centres each way, to suit structure and ceiling system. Secure wire hangers to framing by bending sharply upward and wrapping securely with three turns. Install hangers free of kinks, provide extra hangers for each corner of lighting fixtures, and reinforce other ceiling equipment with hangers. Secure hangers to structure by a permanent method as approved by Architect.

.4 Install-the entire hanger and suspension grid to adequately support the ceiling assembly, including services incorporated, with a maximum deflection of 1/360 of the span of each component member, and free from horizontal movement. Provide intermediate support channels as and when required between structural building components securely wired thereto. Install hangers at no more than 5 degrees off vertical.

.5 Frame and trim all openings as required for recessed lighting fixtures, diffusers, grilles and openings.

.6 Lay out work in accordance with Drawings to provide even spacing in each area, with grid lines symmetrical about room axes, columns and service dimensions on opposite sides of areas. Work shall include suitable moldings as required where ceilings abut walls or other vertical surfaces.

.7 Maintain true surface planes, and component and joint lines throughout each area.

.8 Butt joints between components tightly together.

.9 Only install new tiles free from any visible irregularities on the surface face, edges or corners. When utilizing salvaged existing tiles (only in locations permitted on Architectural drawings) select the cleanest and most blemish-free tile from reclaim stock for re-use.

.10 Brace system to maintain alignment of grid.

.11 Adapt installation to provide for access to ceiling where required for services.

.12 Mark access panels in an unobtrusive manner.

.13 Work shall include expansion joints in ceiling where required or indicated.

3.5 Tolerances

.1 Install ceilings within a variation of +/- 5 mm (3/16") of dimensioned height above floor unless approved otherwise by Architect, and level within a maximum tolerance of 1 mm in 1000 mm (1/8" in 10'-0").

3.6 Cleaning

.1 Clean soiled or discoloured surfaces of exposed work on completion of work.

.2 Replace components which are visibly damaged, marred, or uncleanable.

.3 Final cleaning is specified in Section 01700.

3.7 Repair

.1 Repair any fire protection removed or damaged by work in this Section in accordance with Section 07812.

END OF SECTION 09130

PART 1 - GENERAL

1.1 General

Division One, General Requirements, is part of this section and shall apply as if repeated here.

1.2 Description of Work

Provide all labour, materials, and equipment required or called for in this specification, or which is necessary, to complete the work without any extra cost. This work may require any or all, but not be limited to the supply and installation of the following:

.1 Resilient flooring materials (in types and formats as specified herein and as shown on the drawings)

.2 Rubber wall base (at all walls and/or the base of all millwork items as indicated on the Drawings)

.3 Resilient flooring transition strips (between resilient floors and dissimilar flooring finishes)

.4 Preparation of all existing floors and applicable substrates as required to ensure first-rate installation, adhesion and performance of new resilient flooring products specified herein. This work may include (without strict limitation to) removal of existing flooring and wall base; scraping and removal of existing sub-floor irregularities down to a smooth substrate; dustless diamond grinding of existing concrete floors as required; isolated patching and repair of existing substrates to provide smooth and consistent finish for newly installed resilient flooring materials and related items specified herein.

1.3 Related Work

.1	Demolition	Section 02100
.2	Cast-in-Place Concrete	Section 03300
.3	Steel Stud & Gypsum Board	Section 09111
.4	Porcelain and Ceramic Tile Flooring	Section 09315
.5	Carpet	Section 09680
.6	Millwork	Section 06400
.7	Floor Access Covers	Mechanical Division

1.4 Maintenance Data

.1 Provide data for maintenance of resilient tile flooring in accordance with Section 01730.

1.5 Maintenance Materials

.1 Deliver 2 square meters of each colour, pattern and type of flooring material required for this project, for maintenance use, excluding sheet goods. Package and clearly identify each type. Deliver to Owner as directed.

.2 Maintenance materials to be same production run as installed materials.

1.6 Environmental

.1 Maintain minimum 20° air temperature at flooring installation area for 3 days before, during and for 48 hours after installation.

.2 Acclimate all resilient flooring and wall

1.7 Samples .1 Submit a 300mm x 300mm (12" x 12") sample of each colour and material indicated, including insets/accents as applicable. All samples are to be approved by the Architect prior to product ordering.

PART 2 - PRODUCTS

2.1 Materials .1 **Vinyl Composition Tiles:**

12" X 12" x 1/8" (3.2 mm) thick 'Azrock VCT' vinyl tile as manufactured by Johnsonite/Tarkett in colour from full range. Allow for a total of 3 colours.

Quantities, locations and patterned installation to be as per Architectural drawings.

Ensure use of manufacturer recommended adhesives (suited to the intended application) and conformance to all manufacturer-recommended installation techniques of product throughout.

.2 **RUBBER BASE (RB-#):**

All rubber base to be 4.25" high Johnsonite 'Traditional Rubber Base with toe' in colours and locations noted on drawings and related Schedules. Product to be supplied in roll goods throughout and installed in longest practical lengths with seams only at inside corners.

Product colours to be: from full range.

Base to be installed with Johnsonite #960 Adhesive on porous substrates and Johnsonite #945 Contact Base Adhesive on non-porous surfaces.

Flooring trade to note requirement for rubber base on millwork items where shown on Architectural drawings.

.3 **Resilient Flooring Adhesives:**

a) VCT Adhesives: to be as recommended by VCT manufacturer for the specified flooring material and intended application on applicable substrate (above, at, or below grade**).** ***Ensure use of water-resistant adhesives for all on-grade applications.***

Acceptable adhesives include:
Armstrong S-700 (for standard applications) or Armstrong S-525 (for high moisture applications including both substrate moisture content and ambient relative humidity levels); alternate materials from Mapei, Roberts or approved manufacturers will be considered.

b) LVT Adhesives: to be as recommended by product manufacturer for the specific flooring material and intended application on applicable substrate (above, at, or below grade**).** ***Ensure use of water-resistant adhesives for all on-grade applications***.

Acceptable adhesives include:
Johnsonite Rollsmart Adhesive (capable of mitigating up to 95% RH)

.4 **Transition Strips:**

Transition strips shall include all 'reducers', 'adaptors' 'slimline transitions' and/or 'wheeled traffic transitions' as manufactured by Johnsonite (unless noted otherwise).

Transition strips are to be supplied and installed at all flooring transitions throughout where dissimilar flooring materials meet [unless noted otherwise]. Flooring trade to determine the required profile of the transition strips for the intended application, supplying and installing suitable transitions strips to:

- mediate/transition between new flooring of different thicknesses
- mediate/transition between a new flooring finish and an adjacent existing flooring finish which is not co-planar (i.e. with a different finish level)
- protectively cap seams between differing flooring materials/types of the same or differing thicknesses

Note: No transition strip required at juncture of LVT and carpet, as specified LVT matches carpet thickness.

Transition Strip Colours:
Architect to select colours from Johnsonite's full 'Essentials' colour range including metallics (2018 colour range).

.5 **Sub-Floor Preparation Materials:**
Flooring trade is responsible to prepare existing concrete floors as required for newly specified materials, ensuring that final installation of resilient flooring is free of calendaring and any evidence of substrate irregularities. This may include the installation of subfloor treatment products including (without strict limitation to): subfloor primers, patching and skimcoat products, slope & deep fill products; dry-pack mortars, self-leveling (poured-on) underlayments etc. [as and where required throughout]. All sub-floor preparation materials are to be selected suited to the intended application, substrate conditions, and manufacturer installation requirements for newly specified products outlined herein. All preparation materials utilized are to provide a lasting bond to the subfloor and are to support long-term use of the specified finished flooring products. The flooring trade is to responsible to coordinate subfloor preparation and installation requirements

with flooring manufacturers, allowing for and providing all related materials and techniques herein.

All sub-floor preparation products are to be:

- fully bonded to substrate
- finished flush, level and smooth with surrounding subfloors
- fully compatible with both substrate material and the new newly specified floor finishes

Acceptable manufacturers for sub-floor preparation products include Mapei and Ardex.

PART 3 – EXECUTION

3.1 Sub-floor Conditions

.1 Ensure concrete sub-floors are clean and dry, exhibiting negative alkalinity and no signs of efflorescence, carbonization or dusting.

Perform sub-floor moisture test using test methods recommended by flooring manufacturer to determine moisture content in substrates. Ensure that they conform to manufacturer's standards prior to installation, and that correct manufacturer-recommended adhesives are used related to the moisture content of both sub-floors and relative humidity (ambient air) at the time of installation.

3.2 Sub-floor Preparation

.1 Remove sub-floor ridges and bumps. Remove residue from any previous materials and/or finishes. Grind down to even surface where necessary. As required, provide dustless diamond grinding (via commercial dustless diamond grinder) to ensure flatness and smoothness of substrate free of irregularities.

.2 Clean floors and substrates to remove all dust and irregularities which might adversely affect the work. Ensure use of suitable cleansing agents for areas of oil or other contaminants on the sub-floor surface. Rinse all cleansing agents from the floor to with clean water to ensure that no residue remains.

.3 Fill all low spots, dishing, cracks, joints, holes and other inset irregularities in the sub-floor, choosing a patching, skimming, levelling or filler agent as required related to each subfloor irregularity. Utilize primers where necessary to ensure proper bond. Trowel and float filler agents as required to leave a smooth, hard surface once cured. Sand or grind cured fillers where required. Ensure that all filling materials provide a smooth, consistent and flat finish which is permanently bonded to the subfloor.

3.3 Environmental Acclimation

.1 All resilient flooring products (including both sheet and tile products) are required to acclimate to ambient indoor temperatures within related installation spaces (at temperatures between 65ºF and 75ºF for a min. 72 hours prior to installation). Ensure that all resilient flooring materials are installed in full accordance with the manufacturer's environmental conditions throughout.

3.4 Resilient Tile Installation

.1 Apply adhesive uniformly using recommended trowel type in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place. All tile must be installed prior to adhesives 'setting-up' and curing in order to promote optimal and lasting bond.

.2 All tile installation patterns, colours and locations are to be as per Architectural drawings and Colour and Finish Schedule.

.3 ***Verify installation orientation of all resilient flooring products with Architect prior to installation.***, particularly for resilient flooring products which are 'directional' (i.e. have a distinct visual 'grain' running in a single direction).

Unless noted otherwise, square-format resilient floor tile is to be installed in each room with all tiles (and visual 'grain' thereon) running in a single direction throughout. Quarter-turned (tessellated) tile installations will ***not*** be accepted. Installation orientation is to be as indicated on architectural drawings and/or as directed by the Architect.

.4 Unless noted otherwise, install tile flooring in half offset brickwork pattern with all lines aligned and parallel to building lines wherever possible. All joints between tiles to be tight and free of gaps, ensuring same is true at patterned installations throughout.

.5 Double-cut any patterned installations involving angles or curves using plywood scribing templates to suit.

.6 Cut and fit neatly around fixed or excessively heavy objects.

.7 Install flooring in removable floor access covers where applicable) maintaining floor pattern.

.8 Terminate flooring at centerline of door (where possible) in openings where adjacent floor finish or colour is dissimilar.

.9 Roll all installed products with commercial flooring roller as recommended by flooring product manufacturer to remove air bubbles below flooring and to ensure that all product lays flat and true, free of any lifting edges and irregularities throughout.

.10 Following cleaning, provide initial waxing and sealing of VCT floors (in full accordance with VCT manufacturer's recommendations) prior to hand-over to client. Wax to be 'Diversey High Mileage Floor Finish/ Sealer in One', Low Odor 18.9l.

3.4 Base Installation

.1 Set base in adhesive tightly against wall and floor surfaces. Use lengths as long as practical and not less than 500mm (20") long.

.2 Install straight and level to variation of 1:100.

.3 All base products are to be installed in full accordance with manufacturer's recommendations, including scribing details at all interior and exterior corners. Fit base goods neatly to all doorframes. All short returns of base goods (and at any locations where base product may not sit firmly against wall surface), base to be secured in place with construction adhesive or contact cement adhesive, sufficient to ensure full adhesion.

3.5 Protection of Finished Work

.1 Prohibit traffic on floor for 48 hours after installation.

.2 Where floors are to be subject to traffic before final inspection, provide suitable protection following installation of initial wax and seal by flooring trade.

END OF SECTION 09660

PART 1 - GENERAL

1.1 General

Division One, General Requirements, is part of this section and shall apply as if repeated here.

1.2 Description of Work

Provide all labour, materials, and equipment required or called for in this specification, or which is necessary to complete the work without any extra cost. This work *may* require, without strict limitation to the following (at the building interior and/or exterior):

.1 Priming and painting of interior masonry, gypsum board, cement plaster, plaster and other surfaces as indicated on Drawings and Schedules.

.2 Finish priming and painting of new steel doors and frames, and other non-prefinished metal components including priming and finish painting of all miscellaneous steel items contained within the Architectural and related Engineering drawings.

.3 Painting of miscellaneous non-prefinished steel and metal items (bench supports, countertop supports, lintels etc.)

.4 Complete preparation of existing painted surfaces (specified for re-paint) including all related sanding, scraping, and removal of loose existing paint, testing of existing paint (for determination of compatible paint formulations), and priming of all existing surfaces (following Preparation) prior to re-painting as specified.

1.3 Related Work by Others

.1	Shop priming structural steel	Section 05120
.2	Shop painting miscellaneous metals	Section 05500
.3	Steel Doors & Frames	Section 08100
.4	Sealants	Section 07900

1.4 Requirements of Regulatory Agencies

.1 All finishes shall meet the flame spread and smoke development requirements of the Ontario Building Code for the specific location and application for all parts of the Work.

1.5 Environmental Requirements

.1 Apply finishing materials only when air and surface temperatures have reached the minimum level recommended by the manufacturer's specification for each product, and have been maintained at this temperature for a minimum of 24 hours.

.2 Do not apply exterior finish in direct sunlight that raises surface temperatures above that for proper application and drying, nor in rainy, foggy or windy weather.

.3 Do not apply finishes when relative humidity is over 50%, when condensation has formed or is likely to form, nor immediately following rain, frost or dew.

.4 Do not apply paint where moisture content, in gypsum board, pipe insulation or wood is above paint manufacturer's recommended maximum allowances. Confirm results of moisture test with Architect before proceeding.

.5 Do not apply paint finish in areas where dust is being generated.

1.6 Colours and Samples

.1 All colours shall be as scheduled by the Architect on the Colour and Finish Schedule or as specified herein.

.2 Paint samples shall be prepared as directed by the Architect in accordance with Section 01340 and 1.11 of Section 09900. All site work on site must be completed to match approved sample. All product mixing and work on-site must be preceded with Architect's approved samples for paint & stain, lacquer and varnish, etc.

Acceptable paint and stain samples include 8” x 11" (minimum) sample size. Only “draw down” samples of actual paints will be accepted for paint colours. Minimum requirements are 2 draw down samples per paint colour per different paint product and per different paint finish. Stain samples to be applied to wood sample of wood species specified for use in the project.

1.7 Cooperation with Others

.1 This contractor shall examine all drawings and specifications of all trades throughout the building for information affecting the work of this trade.

1.8 Plant and Scaffolding

.1 The contractor shall provide all plant and scaffolding necessary for proper and efficient performance of the work.

1.9 Field Quality Control

.1 Arrange for periodic visits to site by paint manufacturers' representatives while work is in progress. On each visit he shall verify that specified materials and methods are used, and that procedures agreed upon at the initial site meeting are followed.

1.10 Product Delivery, Storage and Handling

.1 Deliver to site each container sealed and labeled with manufacturer's name, catalogue number or brand name, colour, and formulation type, reducing instructions, and reference standard specification number if applicable

.2 Store materials on site, and in an area specifically set aside for purpose, that is locked, ventilated, maintained at a temperature of over 4 degrees C (40 degrees F) and protected from direct rays of sun.

.3 Ensure that health and fire regulations are complied with in storage area. Provide carbon dioxide fire extinguishers of 9 kg (20 lbs.) minimum capacity in each storage area while materials are contained within.

.4 On each container, for materials requiring a fire hazard classification, attach an Underwriter's label verifying that the material is listed under their label service, and giving the hazard classification.

1.11 Protection

.1 Cover or mask surfaces adjacent to those receiving treatment and finishing to protect work of others from damage and soil. Mask instruction and specification plates attached to equipment being painted.

.2 Take particular care in storage and mixing areas that floors are protected by tarpaulins and metal pans.

.3 Place cloths and other disposable finishing materials, that are a fire hazard, in closed metal containers containing water, and remove from building every night.

.4 Coordinate with the appropriate trades for the removal from finished surfaces, storage and reinstallation after finish work is completed of finish hardware, switch and receptacle plates, escutcheons, luminaries frames, and similar items.

.5 Post "No Smoking" signs and ensure that spark-proof electrical equipment is used in areas where flammable painting materials are being applied.

.6 Post "Wet Paint" signs throughout freshly finished areas and remove when finishes are dry.

1.12 Colour and Product Fidelity and Finish

.1 Draw Down samples of each paint colour and paint sheen for each different paint product must be approved by the Architect prior to installation. The Contractor will retain 1 full set of the approved samples on site and is responsible to verify the application of the proper colours and products throughout the project. The Architect reserves the right to enforce full conformance of the finished work to the approved samples and specified products as shown on drawings, Schedules, Addenda's, and all Contract Documents. Any colours or products which the Architect deems unsuitable due to lack of colour or sheen fidelity, improper application, poor workmanship or any conditions not in strict accordance with the Contract Documents will be rectified by the Painting Contractor to the full satisfaction of the Architect in accordance with the Contract Documents at no cost increase.

PART 2 - PRODUCTS

2.1 Paint Materials

.1 Painting materials such as primers, paints, rust-inhibiting agents, stains, fillers, varnishes, lacquers, etc., to be supplied by Benjamin Moore, Sherwin Williams or ICI/Dulux only. All paint to be highest professional/commercial grade products available from each manufacturer as prescribed in PART 3 below, relative to the intended application. Only OPCA/CPCA/CGSBQ approved equivalents within the noted manufacturers will be accepted.

Painting contractors must inform the Architect in writing which product line he intends to use and is to receive approval prior to mixing. Selection of final product line is completely at the Architect's discretion and the Architect reserves the right to select any of the specified product lines at no cost increase.

.2 All materials to be the highest professional/commercial grade available from the manufacturer for each finish type, to meet or exceed CGSB Specifications, as outlined in PART 3 herein.

.3 Materials for application of each finish type shall be products from a single manufacturer.

.4 Materials such as putty, linseed oil, shellac, turpentine, etc., shall be pure, or of the highest quality produced or recommended by the paint manufacturer, and bear an identifying label on the container.

.5 Gypsum Board patching compound: Resurfo by Reardon or alternate.

PART 3 – EXECUTION & INSTALLATION

3.1 Paint Colours

.1 All paint/pigment colours and locations to be in full and strict accordance with Architect's drawings, Room Finish Schedule and Colour Finish Schedule. Any areas or items requiring paint finishes which appear unclear or which are insufficiently documented, are to be reported to the Architect for direction prior to paint mixing and installation. Any site work relative to such items undertaken by the Contractor or trades without the consultation of the Architect is the sole responsibility of the Contractor and is subject to further rectification of the work for unacceptable materials, colours, or finishes, as per the Architect's direction, at no cost increase.

.2 Except where noted otherwise within the Contract Documents, and excluding those surfaces featuring painted wall graphics, the Architect reserves the right to select any number of paint/pigment colours for each room, up to one individual colour per wall surface/wall plane (or ceiling surface/ceiling plane), at no cost increase. This applies only to wall and ceiling surfaces and excludes trims and other architectural features thereon. For all other architectural items associated with the walls, floors, ceilings, etc. in each room, the Architect reserves the right to select another paint colour differing from that of the adjacent surfaces at no cost increase. All paint colours to be noted on Colour/Finish Schedule (issued post-Tender).

3.2 Examination

.1 Verify that specified environmental conditions are ensured before commencing work.

.2 Ensure that surfaces to receive finishing materials are satisfactory for specified materials and will not adversely affect execution, permanence, or quality of work.

.3 Maintain on site at all times until work is completed a moisture meter, hygrometer and thermometer to verify surface and environmental conditions. Test all surfaces for moisture content with an electronic moisture meter, and concrete, masonry, exterior insulation and finish systems, plus plaster surfaces for acid alkali balance with appropriate equipment and procedures.

3.3 Mixing

.1 Unless specified otherwise paints shall be ready-mixed. All catalyzed products to be mixed on site to as required to provide a uniform and optimal finish quality.

3.4 Workmanship

.1 All work must be executed by skilled, experienced mechanics under the direction of a competent foreman. All paint and enamel shall be evenly spread and no coat shall be applied until the previous coat is perfectly dry.

.2 All products are to be applied in full accordance with the paint manufacturer's recommendations, including surface preparations, recommended application tools, techniques, intermediate drying times, etc. All products are to be applied in full accordance with the manufacturer's maximum recommended dried film thicknesses (dft) throughout.

.3 There shall not be any drips or runs of materials. The woodwork shall be well-rubbed down before the first coat and between all coats. All work shall be to the satisfaction of the Architect.

.4 Brush on all painting materials covered by this division, except where noted in 3.4.8 below. If this contractor wishes to spray certain surfaces, obtain prior approval from the Architect. Apply painting materials evenly and smoothly.

.5 Sand and dust between each coat to remove defects visible from distance up to 1.0m (3' -0").

.6 Finish bottoms, tops, edges and sides of all doors, including returns to cutouts where applicable.

.7 In the opinion of the Architect, the number of coats of paint specified should produce a superior finish. However, if more coats than the number specified are required to meet the approval of the Architect, they shall be supplied and applied at no extra charge. Painting contractor may be required to verify dry film thickness (dft) of any products applied under this Section, at no cost increase.

3.5 Preparation

.1 All surfaces or materials to receive paint finish are to be prepped in full accordance with the finish manufacturer's specifications relative to the material substrate, using the finish manufacturer's recommended products. It will be assumed by the Architect that any improperly adhering paint finishes are the result of inadequate preparation or improper application, and are subject to full rectification at no cost increase.

.2 Touch-up shop painted primer on steel with approved primer. Tint filler to match stains for stained woodwork.

.3 Prepare galvanized steel and zinc coated surfaces with one coat of copper sulfate solution in water (1:16 proportion).

.4 Prepare exposed concrete, plaster and masonry to make free of dust, dirt, grease, loose mortar on face, etc. Apply filler to concrete block of sufficient density to eliminate pinholing.

.5 Interior gypsum board to be prepared by cutting out minor imperfections, such as scratches, cracks, abrasions in surface, and filled with patching compound; sand smooth when dry. Seal before prime coat application.

.6 Prepare wood finishes (designated for stain and/or clear topcoat finish) by applying matching (or stainable) wood filler to suit, at nail holes, gaps, cracks and imperfections, blending filled spots with adjacent surfaces. Sand all filler smooth and flush with adjacent surface, applying in multiple coats as required. Ensure that all wood is adequately sanded and free of contaminants which may adversely affect quality and consistency of subsequent stain and/or topcoat finishes.

.7 PREPARATION of PREVIOUSLY COATED SURFACES:
Painting Contractor to investigate all previously coated surfaces to determine necessary requirements to ensure proper adhesion and formulation compatibility of newly specified paint finishes throughout.

Existing painted surfaces (specified to be re-painted) are to be tested with methyl-hydrate to determine if they are alkyd or water-based materials to determine compatible formulation of new paint materials.

All existing coatings are to be properly cleaned, scraped and prepared for recoat to ensure full and lasting adhesion of new paint finish. Preparation shall include any form of mechanical abrasion required (sanding, scraping, sandblasting, shot-blasting etc.) to remove peeling and/or loose paint finishes to ensure a proper and lasting bond of new paint finish.

Existing clear topcoated surfaces (varnish, polyurethane, oil-based or waterbased clearcoats etc.) are to be properly scraped, sanded and de-glossed as required to remove any topcoats which are not fully adhered to their substrate.

Supply and install new high-adhesion bonding primers, stain-blocking primers and/or sealant primers as required prior to repainting. Bonding primers should be selected to ensure adhesion and perfomance of the final paint finish. Non-waterbased primers are acceptable to ensure adhesion throughout.

3.7 Exterior Coatings ***The items noted in this section below are provided for reference as/if required.***

.1 Miscellaneous Steel Lintels and Non-prefinished Steel Items:
- 1 coat Sherwin Williams “Kem Bond Hi-Solids” Universal Metal Primer (alkyd); VOC compliant
- 2 coats Sherwin Williams “Industrial Enamel Urethane” topcoat (alkyd), B54W151 Series, gloss finish; VOC compliant [spray applied finish at steel doors]

.2 Miscellaneous Ferrous Metals:
- 1 coat Sherwin Williams “Kem Bond Hi-Solids” Universal Metal Primer (alkyd); VOC compliant
- 2 coats Sherwin Williams “Industrial Enamel Urethane” topcoat (alkyd), B54W151 Series, gloss finish; VOC compliant

.3 Miscellaneous Galvanized Items:
- 1 coat Sherwin Williams “Galvite HS” acrylic primer, B50 WZ30 Series, spray applied
- 2 coats Sherwin Williams “Industrial Enamel Urethane” topcoat (alkyd), B54W151 Series, gloss finish; VOC compliant

3.8 Interior Coatings

It is the intention that various (existing) interior [previoulsy painted] items may be re-painted as part of this scope of work.

Whether or not expressly noted below, it is required that all items to be repainted are to be prepped in accordance with Section 3.5 (Preparation), using additional products (as required) including suitable bonding primers and/or sealing primers (such as Sherwin Williams ‘Extreme Bond – Bonding Primer’, Sherwin Williams ‘PrimeRX Peel Bonding Primer’, Zinsser ‘Bullseye Shellac Bonding Primer’ and/or similar products). Primers to be selected specific to individual application requirements based upon site requirements.

.1 Concrete Block - Paint Finish:
- 1 coat Sherwin Williams “Prep Rite” Blockfiller, B25 Series
- 2 coats Sherwin Williams abrasion resistant “Duration Interior Latex” A98 Series *or* Dulux “Diamond Interior 100% Acrylic”, satin finish

.2 Gypsum Wall Board Walls – Paint Finish
- 1 coat Sherwin Williams “Prep Rite 200" Primer, B28W200 Series
- 2 coats Sherwin Williams abrasion resistant “Duration Interior Latex” A98 Series *or* Dulux “Diamond Interior 100% Acrylic”, satin finish

.3 Gypsum Wall Board Ceilings/Bulkheads - Paint Finish:
- 1 coat Sherwin Williams “Prep Rite 200” Primer, B28W200 Series
- 2 coats Sherwin Williams “Promar 200 Zero VOC” Interior Latex” Interior Acrylic, eggshell finish

.4 Steel Door and Frames and All Miscellaneous Non-prefinished Steel Items (u.n.o.) – Paint Finish:
- 1 coat Sherwin Williams “Kem Bond Hi-Solids” Universal Metal Primer (alkyd); VOC compliant
- 2 coats Sherwin Williams “Industrial Enamel Urethane” topcoat (alkyd), B54W151 Series, gloss finish; VOC compliant

.5 Galvanized and Zinc coated Metals – Paint Finish:
- 1 coat Sherwin Williams “Galvite HS” acrylic primer, B50 WZ30 Series, spray applied
- 2 coats Sherwin Williams “Industrial Enamel Urethane” topcoat (alkyd), B54W151 Series, gloss finish; VOC compliant

.6 Exposed Underside of Metal Deck, Open Web Steel Joists, Steel Roof Structutre, Exposed Metal Ducts, Conduit, etc. – Paint Finish:
- 2 coats Sherwin Williams “Waterborne Acrylic Dryfall”, B42 Series, eggshell finish, spray applied

.7 Repainted Hollow Metal Doors, Door Frames and Glazing Screen frames (as applicable):
- 1 coat appropriate bonding primer
- 2 coats Sherwin Williams “Industrial Enamel Urethane” topcoat (alkyd), B54W151 Series, gloss finish; VOC compliant

3.10 Touch-Up & Cleaning

.1 Touch up and finish visible defects in the work. Refinish entire wall, ceiling or finished surface where substrate and/or finish is significantly damaged or not deemed acceptable by the Archtitect.

.2 Remove all overspray paint or similar finish from prefinished or unpainted items throughout. Clean and remove any paint overspray of one colour on a painted surface of dissimilar colour or finish. Repaint and restore finishes as required to blemish-free state.

.3 Leave storage and mixing areas clean and in same condition as adjacent spaces in project.

END OF SECTION 09900

ECOH
Environmental Consulting
Occupational Health

PRE-RENOVATION DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY

GLENDALE SECONDARY SCHOOL
145 RAINBOW DRIVE
HAMILTON, ONTARIO

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ECOH Project No.: 28228

December 1, 2023

EXECUTIVE SUMMARY

ECOH Management Inc. (ECOH) was retained by the Hamilton Wentworth District School Board (HWDSB) to conduct a Pre-Renovation Designated Substance and Hazardous Materials Survey in specified areas at Glendale Secondary School, located at 145 Rainbow Drive in Hamilton, Ontario, hereafter referred to as the "Project Area". ECOH understands that various materials of the facility are scheduled to be disturbed or replaced as part of the Boiler and AHU replacement project as detailed in Project Drawings provided by Exp Services Inc. (EXP).

This survey report fulfils requirements set forth within the Ministry of Labour codes and the Ontario Occupational Health and Safety Act to inform workers of the presence of Designated Substances and other hazardous materials prior to renovation or demolition.

Stuti Sathvara were on site on November 24, 2023.This executive summary provides a brief overview of the key survey findings and associated recommendations. Detailed information regarding the findings and recommendations are discussed in the body of the report.

KEY FINDINGS & RECOMMENDATIONS

Asbestos

Asbestos-containing materials were identified within the Project Area as follows:

- Parging cement fittings on straight run pipe was confirmed to be **asbestos-containing (55 –70% Chrysotile).**
- Parging cement on Air handling unit was sampled and confirmed to be **asbestos-containing (55% Chrysotile).**
- Plaster on ceiling and beams was confirmed to be **asbestos-containing (0.5-5% Chrysotile)**.
- Transite panels were previously confirmed to be **asbestos-containing**.
- 9” x 9” Vinyl floor tile (brown with black streaks) was sampled and confirmed to be **asbestos-containing (8% Chrysotile)**
- Flexible duct connectors are **presumed to be asbestos-containing**. This material was not sampled as to avoid damage to material associated with active HVAC system.

As asbestos-containing materials (ACM) are present within the Project Area, ECOH recommends that all workers have asbestos awareness and respirator training before commencing work. Asbestos awareness training will provide on-site workers with the understanding of asbestos-related health and safety issues; the ability to recognize ACM and any situation that may present a potential asbestos exposure, and the ability to respond appropriately to an inadvertent disturbance of ACM in the work area.

Prior to renovation work, asbestos-containing materials should be removed from the Project Area. Removal or disturbance of asbestos-containing materials must be conducted using asbestos safety procedures detailed within Ontario Regulation 278/05, regulation respecting *Asbestos on*

Construction Projects and in Building and Repair Operations – made under the Occupational Health and Safety Act.

The following are classifications of relevant asbestos operations. Classification of work is based on the **total area** in which work is done consecutively in a room or enclosed area, even if the work is divided into smaller jobs:

Regarding the removal or disturbance of non-friable **asbestos-containing** materials (transite panels, vinyl floor tiles, flexible duct connectors), if required:

- Type 1 Asbestos Safety Precautions should be utilized for the disturbance or removal of the aforementioned **asbestos-containing** materials, provided that materials are wetted to control the spread of dust or fibres and work is completed using non-powered hand-held tools.
- Type 2 Asbestos Safety Precautions should be utilized for the disturbance removal of the aforementioned **asbestos-containing** materials, or if the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.
- Type 3 Asbestos Safety Precautions should be utilized for the disturbance removal of the aforementioned **asbestos-containing** materials, if the work is done by means of power tools that are not attached to dust-collecting devices equipped with HEPA filters.

Regarding the removal or disturbance of friable **asbestos-containing** materials (plaster, parging cement on fittings, parging cement on AHU) if required;

- Type 2 Asbestos Safety Precautions should be utilized for the disturbance or removal of one square meter or less of friable **asbestos-containing** materials, if work is completed using non-powered hand tools.
- Type 2 Glove Bag Asbestos Safety Precautions should be utilized for the disturbance or removal of friable **asbestos-containing materials**.
- Type 3 Asbestos Safety Precautions should be utilized for the disturbance or removal of more than one square meter of friable **asbestos-containing** materials.

Removal or disturbance of materials confirmed to be non-asbestos do not require Asbestos Safety Precautions but should employ other appropriate health and safety precautions, which may include dust suppression methods.

During work of the project, if additional materials are revealed beyond what are described in this report, or as described in the existing inventory of asbestos-containing materials (i.e., materials not identified or materials that are not homogenous to those identified or materials that become revealed during the work), additional testing for asbestos-content should be completed immediately and prior to disturbance of the material. Alternatively, materials can be assumed to contain asbestos, if not sampled and analyzed, and the appropriate level of asbestos safety precautions must be implemented.

Lead

Although no regulations exist in Ontario, guidelines indicate that paints and surface coatings that contain 0.5% lead concentration by dry weight (i.e. concentrations of lead at or above 0.5%, or 5000 parts per million (ppm), which is comparable to 1 milligram per square centimetre (mg/cm^2) when using an XRF analyzer) is considered to be a "lead-based paint or surface coating". Paints or surface coatings that contain concentrations of lead greater than 0.1% by dry weight (1000 ppm), and less than 0.5% by dry weight (5000 ppm), is considered to be a "lead-containing paint or surface coating". Paints or surface coatings that contain concentrations of lead at, or below, 0.1% by dry weight (1000 ppm) is considered to be a "low-level lead paint or surface coating".

The presence of lead in paint and in mortar was assessed by the collection and submission of bulk material samples to a professional laboratory for analysis by flame atomic absorption spectroscopy.

Three (3) of the sampled materials (paints) were determined to be lead-containing or lead-based:

- Yellow paint on gas pipe – **30,000 ppm**
- Blue paint on floor – **1400 ppm**
- Grey paint on ducts and AHU – **6400 ppm**

No other major sources of lead or lead-containing products were observed during the survey; however, lead may be present in:

- Internal batteries associated with emergency lighting system,
- Wiring connectors and electric cable sheathing,
- Piping and solder joints on piping, and
- Cast iron pipe joint packing.

Any work involving the disturbance of building materials confirmed or assumed to contain lead (e.g. wiring connectors, ceramic tiles or electric cable sheathing), should be conducted following recommendations detailed within the Ministry of Labour document Guideline - Lead on Construction Projects, dated April 2011, and the Environmental Abatement Council of Canada (EACC) Lead Guideline, dated October 2014.

Work shall be classified as follows, as per the EACC Lead Guideline:

- Removal of lead-containing or lead-based paints and surface coatings with a chemical gel/stripper or paste is a Class 1 lead operation.
- Removal of lead-containing or lead-based paints and surface coatings with a heat gun is a Class 1 lead operation.
- Removal of materials coated with lead-containing or lead-based paints and surface coatings, using non-powered hand tools, where the material remains chiefly intact and is not crumbled, pulverized or powdered is a Class 1 lead operation.
- Removal of lead-containing coatings or materials using a power tool that has an effective dust collection system equipped with a HEPA filter is a Class 2a lead operation.

- Removal of lead-containing or lead-based paints or materials by scraping or sanding using non-powered hand tools is a Class 2a lead operation.
- Manual demolition of lead-painted plaster walls (or similar building components that will crumble, pulverize, or powder) when striking with a sledgehammer or similar tool is a Class 2a lead operation.
- Removal of lead-containing coatings or materials using power tools without an effective dust collection system equipped with a HEPA filter is a Class 3a lead operation,
- Abrasive blasting of lead-containing coatings or materials is a Class 3b lead operation.

Renovation, demolition or general construction work involving the removal of materials containing only trace concentrations of lead (i.e. lead concentrations below 0.1% by dry weight, or 1000ppm) can be completed without lead specific safety precautions provided that:

a) Work does not include 'fume generating activities' (heat producing) such as welding, torching, burning, high temperature cutting, etc.,
b) Work does not include dust-generating activities such as grinding, cutting or chemical stripping,
c) Dust levels are maintained below 3 mg/m^3, and

General health and safety construction procedures are implemented, which would include dust suppression methods, proper respiratory protection (minimum of a ½-face respirator) and protective clothing, as is appropriate for the work being completed.

Mould

Mould was not observed in project area during the survey.

Mercury

Mercury may be present in minor quantities within the Project Area in the forms below. Items suspected to contain mercury were noted to be in good condition.

- As a vapour within fluorescent tubes lights or compact fluorescent lamp (CFL) bulbs,
- As a possible constituent of thermostats, and
- As a possible constituent of paints and adhesives.

The presence of mercury within assembled units (e.g., fluorescent light bulbs and thermostat bulbs) should not be considered a hazard provided that the assembled units remain sealed and intact. Avoid direct skin contact with mercury and avoid inhalation of mercury vapour. Dispose of mercury following applicable legislative requirements.

Polychlorinated Biphenyls (PCBs)

The presence of Polychlorinated Biphenyl (PCBs) in caulking was assessed by the collection and submission of bulk material to a professional laboratory for analysis. PCB Regulations, SOR/2008-273, stipulates that any solid material that contains 50 parts per million (ppm) PCBs shall be treated as a PCB-containing material. None of the sampled materials were determined to contain PCB concentrations exceeding 50 ppm. Laboratory analysis results for PCB sampling completed during this assessment are presented in Appendix 3.

Silica

Free Crystalline Silica in the form of common construction sand is present in all concrete and masonry products within the Project Area. Any work involving the disturbance of materials that may contain silica should be conducted following recommendations detailed in the Ministry of Labour document "*Guideline - Silica on Construction Projects*", dated April 2011.

Other Designated Substances and Hazardous Materials

Arsenic, Acrylonitrile, Benzene, Coke Oven Emissions, Ethylene Oxide, Isocyanates, Ozone Depleting Substances, and Vinyl Chloride Monomer were not noted in significant quantities or forms, if at all, during this survey.

Complete commentary on each of the designated substances in the project area can be found in the body of this report. The executive summary is not intended to substitute for the complete report, nor does it discuss some of the specific issues documented in the report.

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APPENDICES

1. INTRODUCTION AND REGULATORY REQUIREMENTS

1.1 Introduction and Scope

ECOH Management Inc. (ECOH) was retained by the Hamilton Wentworth District School Board (HWDSB) to conduct a Pre-Renovation Designated Substance and Hazardous Materials Survey in specified areas at Glendale Secondary School, located at 145 Rainbow Drive in Hamilton, Ontario, hereafter referred to as the "Project Area". ECOH understands that various materials of the facility are scheduled to be disturbed or replaced as part of the Boiler and AHU replacement Project as detailed in Project Drawings provided by EXP Services Inc. (EXP).

This survey report fulfils requirements set forth within the Ministry of Labour codes and the Ontario Occupational Health and Safety Act to inform workers of the presence of Designated Substances and other hazardous materials prior to renovation or demolition.

Stuti Sathvara visited the site on November 24, 2023. The survey included an investigation for the presence of designated substances, namely:

- Asbestos
- Lead
- Mould
- Mercury
- Polychlorinated Biphenyls (PCB)s
- Silica

And, in addition, investigation for:

- Acrylonitrile
- Arsenic
- Benzene
- Coke Oven Emissions
- Ozone Depleting Substances (ODS)s
- Ethylene Oxide
- Isocyanates
- Vinyl Chloride Monomer
- UFFI

1.2 Building Description

Glendale Secondary School is a two-story building with a basement. The building was originally constructed in 1960 with additional construction in 1963.

1.3 Regulatory Requirements

A Designated Substances and Hazardous Materials Report were completed to fulfil the Owner's requirements under Section 30 of the Ontario Occupational Health and Safety Act. Prior to tendering project work in a building, the building owner must provide this report to contractors tendering on the work.

Ministry of Labour Regulation 278/05, *Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations*, controls the disturbance of asbestos materials on construction projects. Ministry of Environment Regulation, R.R.O. 347, controls the disposal of asbestos waste. The Ministry of Labour has also issued guidelines for the control of Lead and

Silica on construction projects, these entitled, *Guideline - Lead on Construction Projects* and *Guideline - Silica on Construction Projects*.

There are no specific Ministry of Labour regulations for control of the remaining Designated Substances on construction projects. However, the Ministry of Labour actively enforces the general duty clause of the Occupational Health and Safety Act which protects workers and provides guidance on exposure monitoring, permissible exposure levels, medical monitoring, etc., for all Designated Substances in an occupational setting.

2. SURVEY METHODOLOGY

2.1 General Approach

Where available, facility records were reviewed to identify the known asbestos-containing materials present within the facility prior to conducting the survey. During the survey, the surveyor looked for the most common applications of building materials made with Designated Substances based on historical applications. The investigation performed was generally non-intrusive in nature (i.e. no test-cuts, the investigation did not include demolition of building systems to verify concealed conditions).

Existing facility records should be updated with additional information provided in this report.

2.2 Asbestos Survey Methodology

2.2.1 Asbestos Sampling Strategy and Analytical Methods

Where sampling was required, bulk samples of potential asbestos containing materials collected for analysis during the designated substances and hazardous materials survey were collected as per the requirements of Ontario Regulation 278/05; multiple samples (ranging from 1 to 7 depending on quantity and type of material) are required to confirm the absence of asbestos. Only one positive result (i.e., confirming the presence of asbestos) is required to classify a material as asbestos-containing. Therefore, ECOH's sampling strategy involves the collection of sufficient numbers of samples to meet regulatory requirements, followed by instructions to the laboratory to cease analysis when one sample within a series has already proven positive for asbestos.

Sampling required a small volume of material to be removed either from a damaged section of suspect material or cut from intact material and then repaired by sealing with tape to prevent fibre release. The collected samples were placed in plastic bags and sealed during shipment to an independent laboratory. A formal chain of custody procedure was maintained between ECOH and the sub-contract laboratory during sample transport. Samples were then analysed following the analytical procedure prescribed by the Regulation 278/05 U.S. Environmental Protection Agency Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials. June 1993. Although not required by provincial regulation, all

laboratories used by ECOH are accredited under the U.S. National Voluntary Laboratory Accreditation Program (NVLAP) to ensure consistent, accurate and defendable results.

The Chain of Custody and the Certificate of Analysis, which details analytical results referenced in the findings section, for all asbestos bulk sampling is presented within Appendix II.

2.2.2 Asbestos Survey Omissions from Scope

When conducting an asbestos survey, it is standard practice to assume that certain building materials potentially contain asbestos. Depending on the material, this assumption is undertaken for one or more of the following reasons:

- The material is inaccessible (i.e., underground piping, between piping systems, etc.).
- There is an inherent danger in sampling the material (i.e., high voltage wires).
- Sampling will compromise the integrity of the building structure or envelope (i.e., window / door caulking).

Therefore, for the purpose of this survey, ECOH has assumed that the following materials, if present, are asbestos containing:

- High voltage wiring
- Underground services or piping
- Gaskets

In addition, no identification was made of asbestos products used in manufacturing processes or operations (i.e., manufacturing equipment, laboratories, etc.).

2.3 Lead Methodology

The presence of lead in materials was assessed by the collection of bulk samples of potential lead-based materials identified during the survey. Samples were analysed by Flame Atomic Absorption Spectroscopy, EPA SW-846 3050B/6010C/7420 method. Lead-based materials are considered to have concentrations of lead equal to or greater than 0.5%, or 5000 ppm by dry weight, whereas lead-containing materials have concentrations of lead equal to or greater than 0.1%, or 1000 ppm by dry weight.

The Chain of Custody and the Certificate of Analysis, which details analytical results referenced in the findings section, for all lead bulk sampling is presented within Appendix II.

2.4 Mould Assessment

Mould assessment of the Project Area was conducted in accordance with industry-accepted protocols. Protocols include:

- Canadian Construction Association, Standard Construction Document CCA 82, 2004; "*Mould Guidelines for the Canadian Construction Industry*".
- ASTM D7338 – 10; Standard Guide for Assessment of Fungal Growth in Buildings.
- New York City Department of Health and Mental Hygiene: Bureau of Environmental &
- Occupational Disease Epidemiology; "Guidelines on Assessment and Remediation of Fungi in Indoor Environments", 2008.
- Institute of Inspection Cleaning and Restoration (IICRC): S520, December 2003; "*Standard and Reference Guide for Professional Mould Remediation*".

Although there are no regulatory requirements or guidelines in Ontario for such an assessment, the preceding protocols have become accepted as the industry standard by most experts, consultants, and the Ontario Ministry of Labour.

2.5 Survey of Other Hazardous Materials

Materials or equipment suspected of containing ODS, UFFI and other Designated Substances are identified by appearance, age, and knowledge of historic applications.

3. FINDINGS AND DISCUSSION

3.1 Asbestos

The following outlines the extent to which asbestos-containing materials (ACM) were identified in the Project Area. The discussion is organized under the headings of materials that are generally suspected of containing asbestos. Please refer to Table 1 for sample details and laboratory analysis results. As per *Ontario Regulation 278/05*, only materials containing 0.5% or more asbestos by dry weight are considered to be asbestos-containing.

Table 1: Summary of Analysis of Asbestos Bulk Samples			
Sample Number	**Sample Location**	**Sample Description**	**Results**
28228-ASB-01A	Vestibule (Loc. 1045)	Brick mortar on wall	None Detected
28228-ASB-01B	Vestibule (Loc. 1045)	Brick mortar on wall	None Detected
28228-ASB-01C	Vestibule (Loc. 1045)	Brick mortar on wall	None Detected
28228-ASB-02A	Storage Room 1050B (Loc.4047)	9” x 9” Vinyl floor tile – Brown with black streaks	**8% Chrysotile**
		Black mastic	None Detected
28228-ASB-02B	Storage Room 1050B (Loc.4047)	9” x 9” Vinyl floor tile – Brown with black streaks	**Not Analyzed (Stop positive)**
		Black mastic	None Detected
28228-ASB-02C	Storage Room 1050B (Loc.4047)	9” x 9” Vinyl floor tile – Brown with black streaks	**Not Analyzed (Stop positive)**
		Black mastic	None Detected
28228-ASB-03A	Mechanical Room (Loc. 2090A)	Parging cement on air handling unit	**55% Chrysotile**
28228-ASB-03B	Mechanical Room (Loc. 2090A)	Parging cement on air handling unit	**Not Analyzed (Stop positive)**
28228-ASB-03C	Mechanical Room (Loc. 2090A)	Parging cement on air handling unit	**Not Analyzed (Stop positive)**
28228-ASB-04A	Mechanical Room (Loc. 1027)	Block Fill	None Detected
		Concrete block mortar on walls	None Detected
28228-ASB-04B	Mechanical Room (Loc. 2091)	Concrete block mortar on walls	None Detected
28228-ASB-04C	Office 1058A (Loc. 4063)	Concrete block mortar on walls	None Detected
28228-ASB-05A	Roof 504	Dark red caulking on metal support	None Detected
28228-ASB-05B	Roof 504	Dark red caulking on metal support	None Detected
28228-ASB-05C	Roof 504	Dark red caulking on metal support	None Detected
28228-ASB-06A	Roof 503	Off-white caulking on metal support	None Detected
28228-ASB-06A	Roof 503	Off-white caulking on metal support	None Detected
28228-ASB-06A	Roof 503	Off-white caulking on metal support	None Detected
28228-ASB-07A	Roof 402	Light grey caulking on vent	None Detected
28228-ASB-07B	Roof 402	Light grey caulking on vent	None Detected
28228-ASB-07C	Roof 402	Light grey caulking on vent	None Detected

Table 1: Summary of Analysis of Asbestos Bulk Samples			
Sample Number	**Sample Location**	**Sample Description**	**Results**
28228-ASB-08A	Roof 503	Light brown/silver caulking on metal support	None Detected
28228-ASB-08B	Roof 503	Light brown/silver caulking on metal support	None Detected
28228-ASB-08C	Roof 503	Light brown/silver caulking on metal support	None Detected
28228-ASB-09A	Roof 402	White caulking on vent	None Detected
28228-ASB-09B	Roof 402	White caulking on vent	None Detected
28228-ASB-09C	Roof 402	White caulking on vent	None Detected
28228-ASB-10A	Office 1054A (Loc. 4058)	Drywall joint compound on ceiling	None Detected
28228-ASB-10B	Office 1054A (Loc. 4058)	Drywall joint compound on ceiling	None Detected
28228-ASB-10C	Office 1054A (Loc. 4058)	Drywall joint compound on ceiling	None Detected
28228-ASB-11A	Storage Room 1057 (Loc. 4064)	Sweat wrap insulation on ducts – Wrap	None Detected
		Sweat wrap insulation on ducts - Tar	None Detected
		Sweat wrap insulation on ducts - Insulation	None Detected
28228-ASB-11B	Storage Room 1057 (Loc. 4064)	Sweat wrap insulation on ducts – Wrap	None Detected
		Sweat wrap insulation on ducts - Tar	None Detected
		Sweat wrap insulation on ducts - Insulation	None Detected
28228-ASB-11C	Storage Room 1057 (Loc. 4064)	Sweat wrap insulation on ducts – Wrap	None Detected
		Sweat wrap insulation on ducts - Tar	None Detected
		Sweat wrap insulation on ducts - Insulation	None Detected
28228-ASB-12	Roof 402	Roofing material – Tar paper	None Detected
		Roofing material – Foam	None Detected
		Roofing material – Tar	None Detected
		Roofing material – Tar felt	None Detected

Table 1: Summary of Analysis of Asbestos Bulk Samples			
Sample Number	**Sample Location**	**Sample Description**	**Results**
28228-ASB-13	Roof 501	Roofing material – Tar	None Detected
		Roofing material – Tar Felt	None Detected
		Roofing material - Fiberboard	None Detected
		Roofing material – Tar paper	None Detected
		Roofing material – Tar dot	None Detected
		Roofing material – Foam	None Detected
28228-ASB-14	Roof 701	Roofing material – Tar	None Detected
		Roofing material – Tar felt	None Detected
		Roofing material – Fiberboard	None Detected
		Roofing material – Tar paper	None Detected
		Roofing material – Foam	None Detected
28228-ASB-15	Roof 503	Roofing material – Shingle	None Detected
		Roofing material – Tar	None Detected
		Roofing material – Fiberboard	None Detected
		Roofing material – Tar dot	None Detected
		Roofing material - Foam	None Detected
		Roofing material – Tar paper	None Detected
28228-ASB-16	Roof 601	Roofing material – Shingle	None Detected
		Roofing material – Tar	None Detected
		Roofing material – Tar felt	None Detected
		Roofing material - Fiberboard	None Detected
		Roofing material - Foam	None Detected
	- shading indicates sample result positive for asbestos (if applicable)		

3.1.1 Thermal Mechanical Insulation (Friable)

Non-asbestos and **asbestos-containing** mechanical insulations are present in the Project Area. The following presents a brief description of the mechanical insulations and the systems to which they are applied.

3.1.1.1 Piping systems

Pipe fittings/systems are present throughout the Project Area and are either not insulated, insulated with non-asbestos materials (i.e. fiberglass), or insulated with **asbestos-containing materials.**

- Parging cement on pipe fittings were observed within Mechanical room 2090A and Mechanical Room 2091. This material was previously sampled, reflected in the "Glendale Secondary School Asbestos Inventory" dated April 2023, prepared by the Regulated Substance Team, and determined to be **asbestos-containing (50-75% Chrysotile)**. This material may be disturbed during upcoming renovations.

Piping with **asbestos-containing** materials may be present throughout the Project Area in concealed areas such as above solid ceilings, within wall cavities, below floor slab, and other inaccessible areas. If suspect piping materials are encountered during demolition, stop work in the area and contact ECOH to assess.

3.1.1.2 Duct Systems

Duct systems observed throughout the Project Area were either not insulated, or were insulated with non-asbestos materials (i.e. fiberglass, sweat wrap).

- Sweat wrap insulation on ducts was observed in various locations of the Project Area. Three (3) representative samples (Sample ID: 28228-ASB-11A-C) of this material were collected from Storage Room 1057 (Loc. 4064) and determined by laboratory analysis to be non-asbestos. This material is expected to be disturbed during upcoming renovations.

- Flexible duct connectors were observed within the Project Area. This material is **presumed to be asbestos-containing.** This material was not sampled as to avoid damage to material associated with active HVAC system. This material is expected to be disturbed during upcoming renovations.

Additional ductwork with asbestos containing materials (insulation, mastic, etc.) may be present throughout the Project Area in concealed areas such as above ceilings, within wall cavities, and other inaccessible areas.

3.1.1.3 Mechanical Equipment

Mechanical equipment observed throughout the Project Area were either not insulated or were insulated with **asbestos-containing** materials.

- Parging cement was observed on air handling unit (AHU) within Mechanical Room 2090A of the Project Area. Three (3) representative samples (Sample ID: 28228-ASB-03A-C) of this material were collected from Mechanical Room 2090A and determined by laboratory analysis to be **asbestos-containing (55% Chrysotile).** This material is expected to be disturbed during upcoming renovations.

- Boilers were observed within Mechanical Room 1027 (Loc. 4026) of the Project Area. Due to manufacture date for all boilers (1985), friable asbestos-containing materials are not suspected to be present as a component of internal insulation.

3.1.2 Spray Fireproofing (Friable)

Sprayed fireproofing was not observed in the Project Area during this survey.

3.1.3 Texture Coat (Friable)

Texture coat was not observed in the Project Area during this survey.

3.1.4 Vermiculite Insulation (Friable)

Vermiculite insulation was not observed during this survey, however intrusive testing was not completed, and vermiculite insulation may be present in concealed areas such as wall cavities and above solid ceilings.

3.1.5 Plaster (Potentially Friable)

Plaster was observed on beam enclosures and ceiling within the Project Area during the survey. This material was previously sampled, reflected in the "Glendale Secondary School Asbestos Inventory" dated April 2023, prepared by the Regulated Substance Team, and determined to be **asbestos-containing (0.5-5% Chrysotile)**. This material is expected to be disturbed during upcoming renovations.

3.1.6 Drywall Joint Compound (DJC) (Non-Friable)

Drywall Joint Compound was observed within the Project Area. Three (3) representative samples (Sample ID: 28228-ASB-10A-C) of this material were collected from Office 1054A (Loc. 4058) and determined by laboratory analysis to be non-asbestos. This material is expected to be disturbed during upcoming renovations.

3.1.7 Mortar (Non-Friable)

Two (2) visually distinct types of mortar were observed within the Project Area:

- Concrete block mortar was observed within the Project Area. Three (3) representative samples (Sample ID: 28228-ASB-04A-C) of this material were collected from various locations within the project Area and determined by laboratory analysis to be non-asbestos. This material is expected to be disturbed during upcoming renovations.

- Brick mortar was observed within the Project Area. Three (3) representative samples (Sample ID: 28228-ASB-01A-C) of this material were collected from Vestibule 1045 of the Project Area and determined by laboratory analysis to be non-asbestos. This material is expected to be disturbed during upcoming renovations.

3.1.8 Acoustic Ceiling Tiles (Non-Friable)

Various types of acoustic ceiling tiles were observed within the Project Area. These materials were previously sampled, reflected in the "Glendale Secondary School Asbestos Inventory" dated April 2023, prepared by the Regulated Substance Team, and determined to be non-asbestos. This material is expected to be disturbed during upcoming renovations.

3.1.9 Asbestos Cement (Non-Friable)

Transite panels were observed within Corridor 1048 (Loc. 4049) of the Project Area. This material was previously sampled, reflected in the "Glendale Secondary School Asbestos Inventory" dated April 2023, prepared by the Regulated Substance Team, and determined to be **asbestos-containing.** This material is expected to be disturbed during upcoming renovations.

3.1.10 Vinyl Floor Tile (VFT) (Non-Friable)

Vinyl floor tiles were observed within the Project Area during this survey.

- 9" x 9" Vinyl floor tile (brown with black streaks) was observed within Storage Room 1050B (Loc. 4047). Three (3) representative samples (Sample ID: 28228-ASB-02A-C) of this material were collected from Storage Room 1050B (Loc. 4047) within the project Area and determined by laboratory analysis to be **asbestos-containing (8% Chrysotile)**. This material is expected to be disturbed during upcoming renovations.

3.1.11 Roofing Materials

Roofing materials are present within the Project Area.

- Roofing materials scheduled for disturbance are present on Roof Sections 402, 501, 701, 503, 601 within the Project Area. Representative samples of these material (28228-ASB-12-16) were collected from the Project Area and determined by laboratory analysis to be non-asbestos. These materials are expected to be disturbed during upcoming renovations.

3.1.12 Other Materials (Non-Friable)

<u>Caulking</u>

Five (5) distinct types of caulking were observed in the Project Area during this survey.

- Dark red caulking on metal support was observed in the Project Area. Three (3) representative samples (Sample ID: 28228-ASB-05A-C) of this material were collected from the project Area and determined by laboratory analysis to be non-asbestos. This material is expected to be disturbed during upcoming renovations.
- Off-white caulking on metal support was observed in the Project Area. Three (3) representative samples (Sample ID: 28228-ASB-06A-C) of this material were collected

from the project Area and determined by laboratory analysis to be non-asbestos. This material is expected to be disturbed during upcoming renovations.

- Light grey caulking on vent was observed in the Project Area. Three (3) representative samples (Sample ID: 28228-ASB-07A-C) of this material were collected from the project Area and determined by laboratory analysis to be non-asbestos. This material is expected to be disturbed during upcoming renovations.
- Light brown/silver caulking on metal support was observed in the Project Area. Three (3) representative samples (Sample ID: 28228-ASB-08A-C) of this material were collected from the project Area and determined by laboratory analysis to be non-asbestos. This material is expected to be disturbed during upcoming renovations.
- White caulking on vent was observed in the Project Area. Three (3) representative samples (Sample ID: 28228-ASB-09A-C) of this material were collected from the project Area and determined by laboratory analysis to be non-asbestos. This material is expected to be disturbed during upcoming renovations.

3.2 Lead

Although no regulations exist in Ontario to define a lead-based paint or lead-containing material, guidelines indicate that paint containing 0.5% lead concentration by dry weight (i.e. concentrations of lead at or above 0.5%, or 5000 parts per million (ppm)) is considered to be a lead-based paint or lead-containing material.

Paints or surface coatings that contain concentrations of lead greater than 0.1% by dry weight (1000 ppm), and less than 0.5% by dry weight (5000 ppm), is considered to be a “lead-containing paint or surface coating”.

Paints or surface coatings that contain concentrations of lead at, or below, 0.1% by dry weight (1000 ppm) is considered to be a “low-level lead paint or surface coating”.

The presence of lead in paint and mortar was assessed by the collection and submission of bulk material samples to a professional laboratory for analysis by flame atomic absorption spectroscopy.

Please refer to Table 2 for sample details and laboratory analysis results for paints scheduled for potential disturbance. Certificates of Analysis and Chains of Custody are presented in Appendix II.

Table 2: Summary of Analysis for Lead Samples

Sample number	Location	Description	Analytical Results	Result
28228-Pb-01	Roof 504	Yellow paint on gas pipe	**30000 ppm**	**Lead-Based**

Table 2: Summary of Analysis for Lead Samples				
28228-Pb-02	Mechanical Room 1027 (4026)	Concrete block mortar	<40mg/Kg	Low-Level Lead
28228-Pb-03	Vestibule 1045	Brick mortar	<40mg/Kg	Low-Level Lead
28228-Pb-04	Mechanical Room 1027 (Loc. 4026)	Light blue paint on boiler	<480 ppm	Low-Level Lead
28228-Pb-05	Mechanical Room 1027 (Loc. 4026)	Blue paint on floor	**1400 ppm**	**Lead-Containing**
28228-Pb-06	Mechanical Room 2091	Grey paint on ducts and AHU	**6400 ppm**	**Lead-Based**
28228-Pb-07	Mechanical Room 2091	Light yellow paint on walls	540 ppm	Low-Level Lead
28228-Pb-08	Storage Room 1056B (Loc. 4062)	Light pink paint on walls	480 ppm	Low-Level Lead
28228-Pb-09	Mechanical Room 1027 (4026)	Black paint on concrete pads	<80 ppm	Low-Level Lead
	- shading indicates sample result positive for lead (if applicable)			

Three (3) of the sampled materials (paints) were determined to be lead-containing:

- Yellow paint on gas pipe – **30,000 ppm**
- Grey paint on ducts and AHU – **6400 ppm**
- Blue paint on floor **– 1400 ppm**

Additional paints including white paint on ceiling, off-white paint on ducts and ceiling were observed within the Project Area. These materials were previously sampled and reflected in the "Glendale Secondary School Asbestos Inventory" dated April 2023, prepared by the Regulated Substance Team, and determined to be low-level lead. These materials are expected to be disturbed during upcoming renovations.

No other major sources of lead or lead-containing products were observed during this survey. However, lead may be present in:

- Internal batteries associated with emergency lighting system,
- Wiring connectors and electric cable sheathing,
- Piping and solder joints on piping, and
- Cast iron pipe joint packing.

3.3 Mould

Mould was not observed in the Project Area during this survey.

3.4 Mercury

Mercury may be present in minor quantities within the Project Area in the forms below. Items suspected to contain mercury were noted to be in good condition.

- As a vapour within fluorescent tubes lights or compact fluorescent lamp (CFL) bulbs,
- As a possible constituent of thermostats, and
- As a possible constituent of paints and adhesives.

3.5 Silica

Free crystalline silica, in the form of common construction sand, is present in all concrete and masonry products within the Project Area.

3.6 Polychlorinated Biphenyls (PCBs)

The presence of Polychlorinated Biphenyls (PCBs) in materials present in Project Area was assessed by collection and submission of bulk material samples to a professional laboratory analysis. PCB Regulations, SOR/2008-273, stipulates that any solid material that contains 50 parts per million (ppm) PCBs shall be treated as a PCB-containing material.

- One (1) sample of brown/silver caulking on metal was collected from Roof 503 and determined by laboratory to be non-PCB containing. This material is likely to be disturbed during upcoming renovations.
- One (1) sample of white caulking on vent was collected from Roof 402 and determined by laboratory to be non-PCB containing. This material is likely to be disturbed during upcoming renovations.
- One (1) sample of dark-red caulking on metal support was collected from Roof 504 and determined by laboratory to be non-PCB containing. This material is likely to be disturbed during upcoming renovations.
- One (1) sample of off-white caulking on metal support and AHU unit was collected from Roof 503 and determined by laboratory to be non-PCB containing. This material is likely to be disturbed during upcoming renovations.
- One (1) sample of light grey caulking on vent unit was collected from 402 and determined by laboratory to be non-PCB containing. This material is likely to be disturbed during upcoming renovations.

Laboratory analysis determined that all sampled materials are non-PCB-containing materials (i.e. <50 ppm).

3.7 Other Environmental Considerations

The environmental audit also included an investigation for the following compounds, none of which were found to be present:

- Acrylonitrile
- Arsenic
- Benzene
- Coke Oven Emissions
- Ethylene Oxides
- Isocyanates
- Vinyl Chloride Monomer
- Ozone Depleting Substances

Please note: paint, adhesives and plastics present throughout the project area may contain trace amounts of Acrylonitrile, Arsenic, Benzene, Ethylene Oxides, Isocyanates, Lead, Mercury, and Vinyl Chloride Monomer. However, none of these materials were observed in a hazardous or unsafe condition. Dust suppression and personal protection procedures should be implemented during the demolition of materials that may contain any of the above-mentioned substances.

4. RECOMMENDATIONS

The following recommendations meet requirements of the Occupational Health and Safety Act. Asbestos recommendations meet the requirements of the Designated Substance – Regulation respecting *Asbestos on Construction Projects and in Buildings and Repair Operations*, Ontario Regulation 278/05. Based upon the results of ECOH's investigations, ECOH offers the following recommendations:

4.1 Asbestos

As asbestos-containing materials (ACM) are present within the Project Area, ECOH recommends that all workers have asbestos awareness and respirator training before commencing work. Asbestos awareness training will provide on-site workers with the understanding of asbestos-related health and safety issues; the ability to recognize ACM and any situation that may present a potential asbestos exposure, and the ability to respond appropriately to an inadvertent disturbance of ACM in the work area.

Prior to renovation work, asbestos-containing materials should be removed from the Project Area. Removal or disturbance of asbestos-containing materials must be conducted using asbestos safety procedures detailed within Ontario Regulation 278/05, regulation respecting *Asbestos on Construction Projects and in Building and Repair Operations* – made under the Occupational Health and Safety Act.

Regarding the removal or disturbance of non-friable **asbestos-containing** materials (Transite panels, vinyl floor tiles, flexible duct connectors), if required:

- Type 1 Asbestos Safety Precautions should be utilized for the disturbance or removal of the aforementioned **asbestos-containing** materials, provided that materials are wetted to control the spread of dust or fibres and work is completed using non-powered hand-held tools.
- Type 2 Asbestos Safety Precautions should be utilized for the disturbance removal of the aforementioned **asbestos-containing** materials, or if the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.
- Type 3 Asbestos Safety Precautions should be utilized for the disturbance removal of the aforementioned **asbestos-containing** materials, if the work is done by means of power tools that are not attached to dust-collecting devices equipped with HEPA filters.

Regarding the removal or disturbance of friable **asbestos-containing** materials (plaster, parging cement on fittings, parging cement on AHU) if required;

- Type 2 Asbestos Safety Precautions should be utilized for the disturbance or removal of one square meter or less of friable **asbestos-containing** materials, if work is completed using non-powered hand tools.
- Type 2 Glove Bag Asbestos Safety Precautions should be utilized for the disturbance or removal of friable **asbestos-containing materials**.
- Type 3 Asbestos Safety Precautions should be utilized for the disturbance or removal of more than one square meter of friable **asbestos-containing** materials.

Any demolition, renovation or maintenance activities involving materials found NOT to contain asbestos, should implement general health and safety precautions including, in part, the use of dust suppression techniques and appropriate respiratory protection.

During work, if additional materials are revealed beyond what are described in the existing asbestos survey report or in this report (i.e., materials not identified, materials that are not homogenous to those identified, or materials that become revealed during the work), additional testing for asbestos-content should be completed immediately and prior to disturbance of the material. Alternatively, these materials can be assumed to contain asbestos, and the appropriate level of asbestos safety precautions must be implemented.

Results presented within this report should be used to update facility asbestos inventory data.

4.2 Lead

Any work involving the disturbance of building materials confirmed or assumed to contain lead (e.g. paints etc.), should be conducted following recommendations detailed within the Ministry of Labour document Guideline - Lead on Construction Projects, dated April 2011, and the Environmental Abatement Council of Canada (EACC) Lead Guideline, dated October 2014.

Work shall be classified as follows, as per the EACC Lead Guideline:

- Removal of lead-containing or lead-based paints and surface coatings with a chemical gel/stripper or paste is a Class 1 lead operation.
- Removal of lead-containing or lead-based paints and surface coatings with a heat gun is a Class 1 lead operation.
- Removal of materials coated with lead-containing or lead-based paints and surface coatings, using non-powered hand tools, where the material remains chiefly intact and is not crumbled, pulverized or powdered is a Class 1 lead operation.
- Removal of lead-containing coatings or materials using a power tool that has an effective dust collection system equipped with a HEPA filter is a Class 2a lead operation,
- Removal of lead-containing or lead-based paints or materials by scraping or sanding using non-powered hand tools is a Class 2a lead operation,
- Manual demolition of lead-painted plaster walls (or similar building components that will crumble, pulverize, or powder) when striking with a sledgehammer or similar tool is a Class 2a lead operation,
- Removal of lead-containing coatings or materials using power tools without an effective dust collection system equipped with a HEPA filter is a Class 3a lead operation,
- Abrasive blasting of lead-containing coatings or materials is a Class 3b lead operation.

Renovation, demolition or general construction work involving the removal of materials containing only trace concentrations of lead (i.e. lead concentrations below 0.1% by dry weight, or 1000 ppm) can be completed without lead specific safety precautions provided that:

a) Work does not include 'fume generating activities' (heat producing) such as welding, torching, burning, high temperature cutting, etc.,
b) Work does not include dust-generating activities such as grinding, cutting or chemical stripping,
c) Dust levels are maintained below 3 mg/m^3, and

General health and safety construction procedures are implemented, which would include dust suppression methods, proper respiratory protection (minimum of a ½-face respirator) and protective clothing, as is appropriate for the work being completed.

4.3 Mould

All recommended removal of mould-affected materials (i.e. mould-affected counter tops, wood panelling and wallpaper, wood baseboards etc.) shall be completed following the Canadian Construction Association (CCA) 2004 Mould Guidelines for the Canadian Construction Industry, or Environmental Abatement Council of Canada (EACC) document; “Mould Abatement Guidelines”, Edition 3, 2015.

4.4 Mercury

The presence of mercury within assembled units (e.g., fluorescent light bulbs and thermostat bulbs) should not be considered a hazard provided that the assembled units remain sealed and

intact. Avoid direct skin contact with mercury and avoid inhalation of mercury vapour. Dispose of mercury following applicable legislative requirements.

4.5 Polychlorinated Biphenyls (PCB)

Confirmed or assumed material to contain polychlorinated biphenyls (PCBs) must be disposed of following the requirements of the Ontario Environmental Protection Act, Ontario Regulation 362: PCB Waste Management and Ontario Regulation 347: General-Waste Management (as amended by O. Reg. 558/00).

4.6 Silica

Any work involving the disturbance of materials that may contain silica should be conducted following recommendations detailed in the Ministry of Labour document "*Guideline - Silica on Construction Projects*", dated April 2011.

5. STATEMENT OF LIMITATIONS

Due to the nature of building construction, and on-going building activities, some limitations exist to the thoroughness of a building assessment. The field observations, measurements and analysis are considered sufficient in detail and scope to form a reasonable basis for the findings and conclusions presented in this report. The observations, results and conclusions drawn by ECOH Management Inc. (ECOH) are limited to the specific scope of work for which ECOH was retained and are based solely on information generated as a result of the specific scope of work authorized by the Hamilton Wentworth District School Board. Only those items that are capable of being observed and are reasonably obvious to ECOH personnel or have been identified to ECOH by other parties, can be reported. ECOH has exercised a degree of thoroughness and competence that is consistent with the profession during the execution of this assessment. ECOH considers the opinions and information as they are presented in this report to be factual at the time of the assessment. The conclusions are limited to the specific locations of where testing and/or observations were completed during the course of the assessment.

It is important to note that work was completed with the utmost care and our extensive expertise in carrying out assessments. ECOH believes that the information collected during the assessment concerning the Work Area is reliable. No other warranties are implied or expressed. ECOH, to the best of its knowledge, believes this report to be accurate, however, ECOH cannot guarantee the completeness or accuracy of information supplied to ECOH by third parties. It should also be noted that any investigation regarding the presence of hazardous materials in the work area is based on interpretation of conditions determined at specific sampling locations, and conditions may vary between sampling locations. ECOH is an Environmental Consulting Company and as such any results or conclusions presented in this report should not be construed as legal advice. The material in this report reflects ECOH's professional interpretation of information available at the time of report preparation. Any use

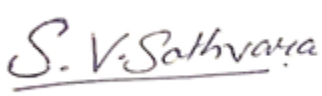
which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. ECOH accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Should additional information become available that suggests other environmental issues of concern beyond that described in this report, ECOH retains the right to review this information and modify conclusions and recommendations presented in this report accordingly.

Should you have any questions, please do not hesitate to contact us at (905) 795-2800.

ECOH
Environmental Consulting
Occupational Health

Prepared by:



Stuti Sathvara, B.Sc. (Env)
Environmental Scientist

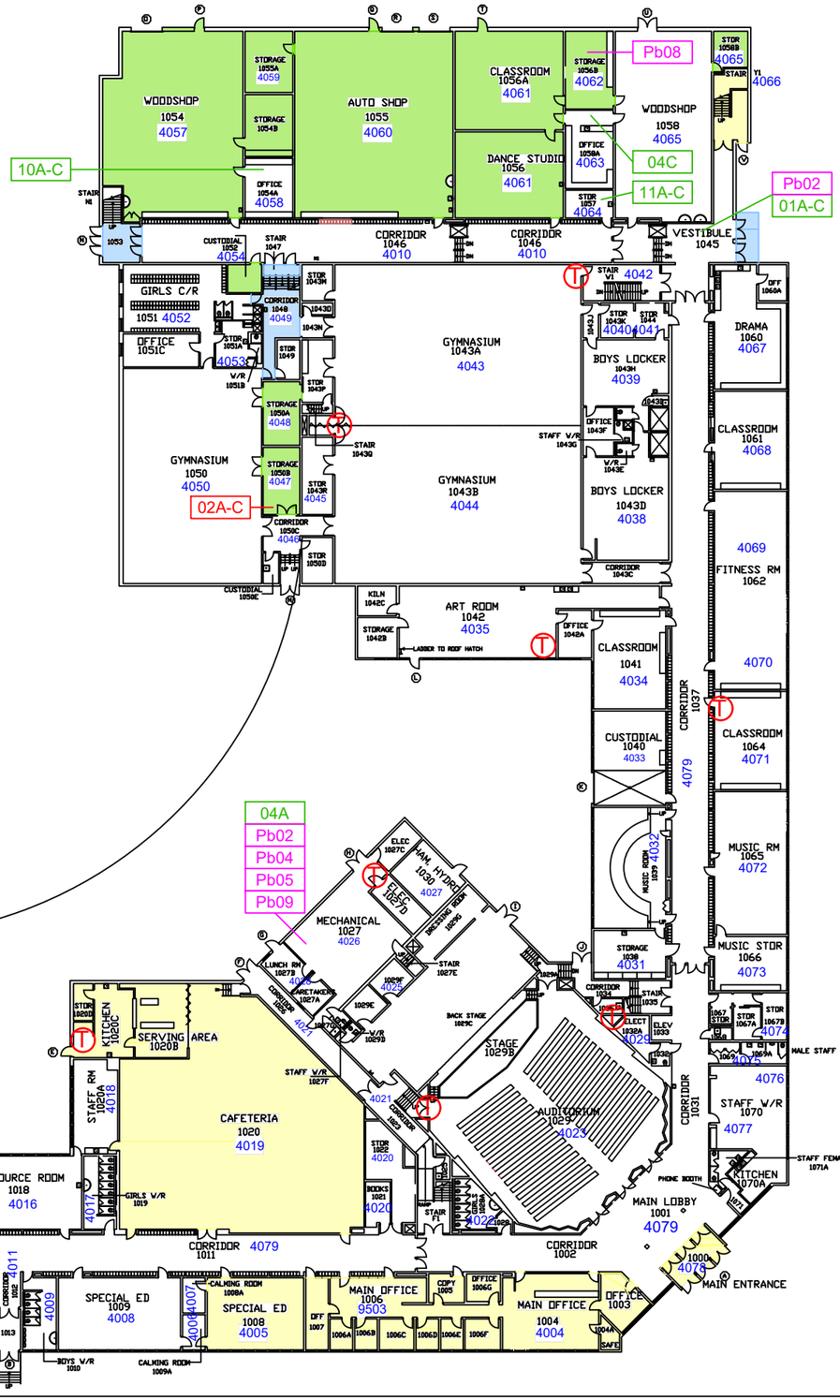
Reviewed by:

Elliot Dametto, B.Sc.
Project Manager

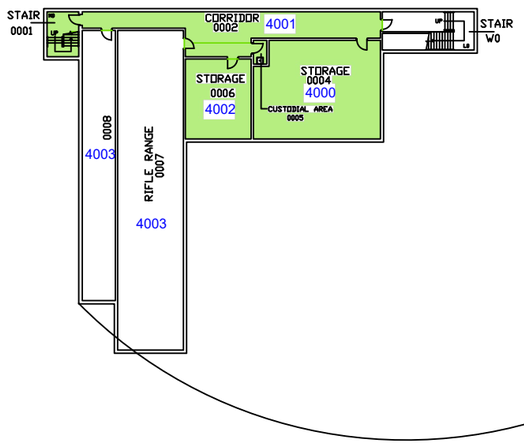
APPENDIX I

Project Drawings

FIRST FLOOR



BASEMENT



Legend

01a	Positive Asbestos Bulk Sample Location (28228-ASB-xx)
01a	Negative Asbestos Bulk Sample Location (28228-ASB-xx)
Pb01	Lead Bulk Sample Location (28228-Pb-xx)
	Asbsestos-Containing Rough Plaster on Walls and Ceiling
	Asbestos-Containing Transite Panels
	Asbestos-Containing Drywall Joint Compound
T	Tunnel Access Restricted to Confined Space Protocol & Type 2 Asbestos Prcedures

All information relating to room size and location is approximate and for visual aid only. ECOH does not guarantee the drawing to be complete, absolute, accurate or current. The drawing should not be used by any party in lieu of obtaining architectural drawings.

Figure 1

Basement & First Floor Plan

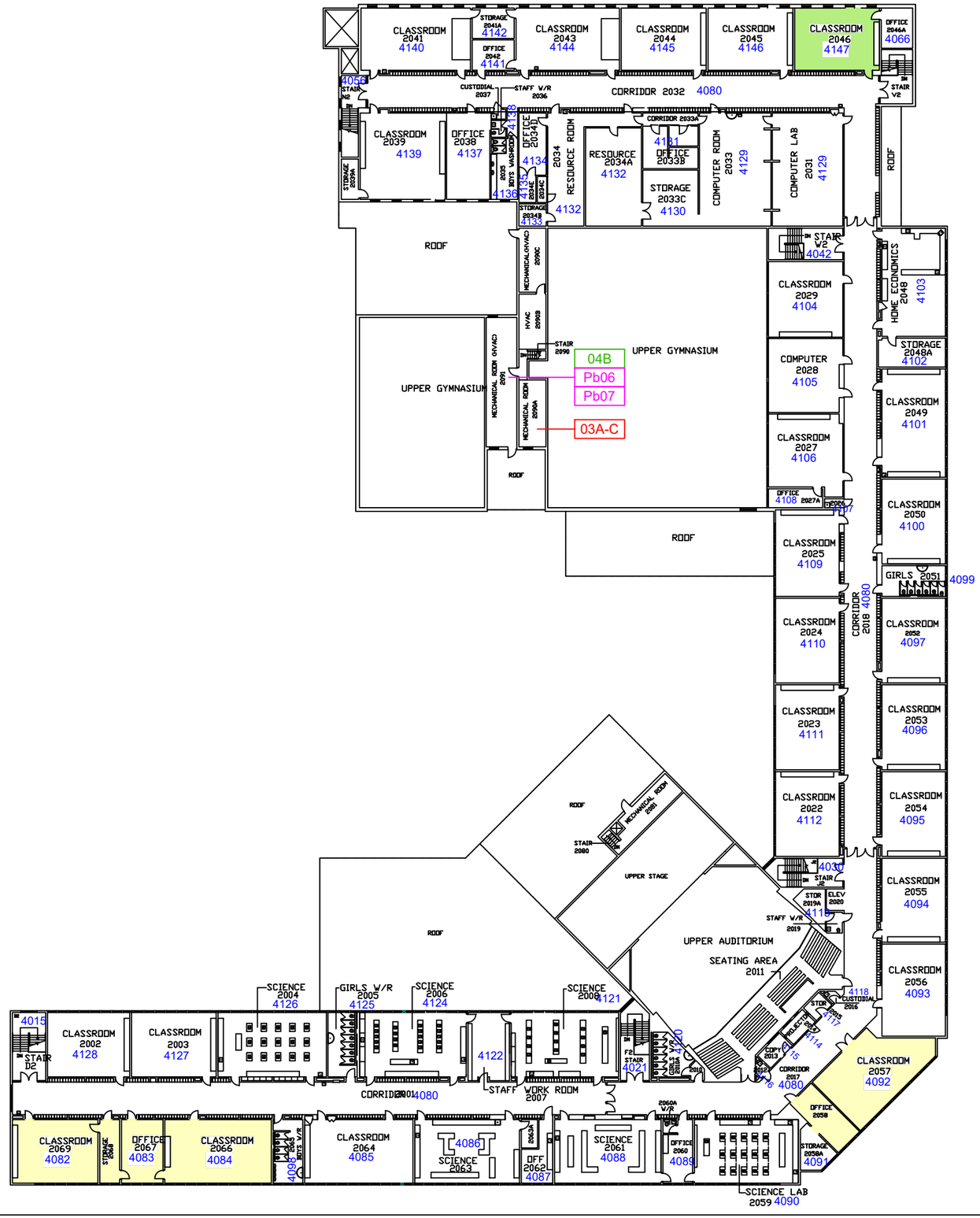
BUILDING NAME:
Glendale Secondary School

LOCATION:
145 Rainbow Drive,
Hamilton, Ontario

PROJECT:
Pre-Renovation Designated Substances Survey

CLIENT: Hamilton-Wentworth Disctrict School Board			
PROJECT NUMBER: 28228	DATE: Dec. 2023	DRW BY: EM	
CAD FILE: FIGS P28228 HWDSB Glendale SS DSS	SCALE: Not to Scale	CHK BY: SS	

P:\28200 - 28299\28228 - HWDSB, Glendale SS, Boiler and AHU Replacement - DSS\CAD\CAD File



P:\28200 - 28299\28228 - HWDSB, Glendale SS, Boiler and AHU Replacement - DSS\CAD\CAD File

Legend

01a	Positive Asbestos Bulk Sample Location (28228-ASB-xx)
01a	Negative Asbestos Bulk Sample Location (28228-ASB-xx)
Pb01	Lead Bulk Sample Location (28228-Pb-xx)
	Asbsestos-Containing Rough Plaster on Walls and Ceiling
	Asbestos-Containing Transite Panels
	Asbestos-Containing Drywall Joint Compound
T	Tunnel Access Restricted to Confined Space Protocol & Type 2 Asbestos Prcedures

All information relating to room size and location is approximate and for visual aid only. ECOH does not guarantee the drawing to be complete, absolute, accurate or current. The drawing should not be used by any party in lieu of obtaining architectural drawings.

Figure 2

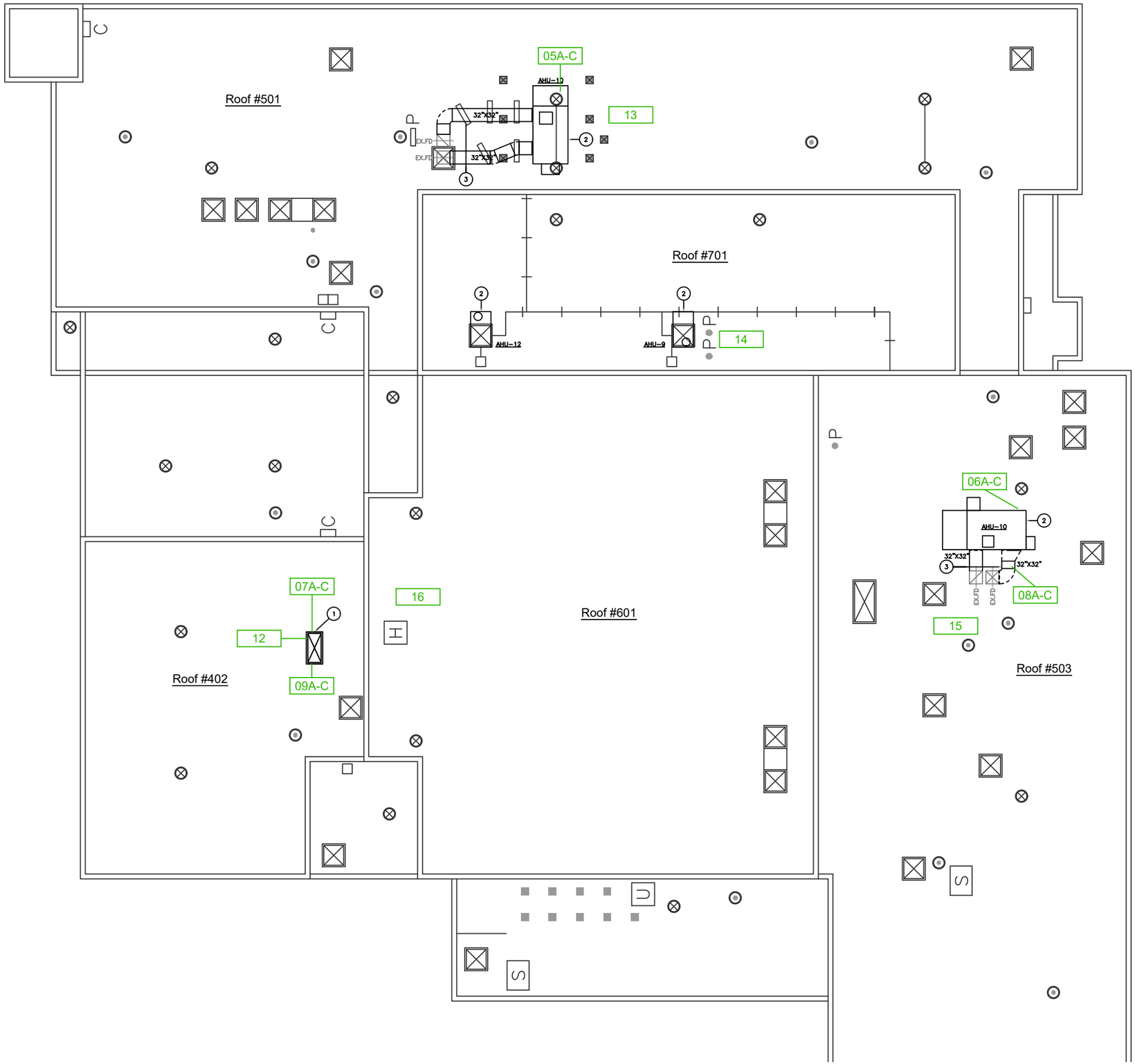
Second Floor Plan

BUILDING NAME:
Glendale Secondary School

LOCATION:
145 Rainbow Drive,
Hamilton, Ontario

PROJECT:
Pre-Renovation Designated Substances Survey

CLIENT: Hamilton-Wentworth Disctrict School Board			
PROJECT NUMBER: 28228	DATE: Dec. 2023	DRW BY: EM	
CAD FILE: FIGS P28228 HWDSB Glendale SS DSS	SCALE: Not to Scale	CHK BY: SS	



Legend

- 01a — Positive Asbestos Bulk Sample Location (28228-ASB-xx)
- 01a — Negative Asbestos Bulk Sample Location (28228-ASB-xx)
- Pb01 — Lead Bulk Sample Location (28228-Pb-xx)
- Asbsestos-Containing Rough Plaster on Walls and Ceiling
- Asbestos-Containing Transite Panels
- Asbestos-Containing Drywall Joint Compound
- Ⓣ — Tunnel Access Restricted to Confined Space Protocol & Type 2 Asbestos Prcedures

All information relating to room size and location is approximate and for visual aid only. ECOH does not guarantee the drawing to be complete, absolute, accurate or current. The drawing should not be used by any party in lieu of obtaining architectural drawings.

Figure 3

Roof Plan

BUILDING NAME:
Glendale Secondary School

LOCATION:
145 Rainbow Drive,
Hamilton, Ontario

PROJECT:
Pre-Renovation Designated Substances Survey

CLIENT: Hamilton-Wentworth Disctrict School Board			
PROJECT NUMBER: 28228	DATE: Dec. 2023	DRW BY: EM
CAD FILE: FIGS P28228 HWDSB Glendale SS DSS	SCALE: Not to Scale	CHK BY: SS

P:\28200 - 28299\28228 - HWDSB, Glendale SS, Boiler and AHU Replacement - DSS\CAD\CAD File

APPENDIX II

Results of Bulk Sample Analysis

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Tel/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order:	552318509
Customer ID:	55ECOH45
Customer PO:	28228
Project ID:	

Attention:	Stuti Sathvara	**Phone:**	(905) 795-2800
	ECOH Management, Inc.	**Fax:**	(905) 795-2870
	75 Courtneypark Drive West	**Received Date:**	11/27/2023 12:56 PM
	Unit 1	**Analysis Date:**	11/30/2023
	Mississauga, ON L5W 0E3	**Collected Date:**	11/24/2023
Project:	28228 / Glendale SS - Boiler and AHU Replacement DSS		

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
28228-ASB- 01 A *552318509-0001*	Brick Mortar - Vestibule (Loc. 1045)	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 01 B *552318509-0002*	Brick Mortar - Vestibule (Loc. 1045)	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 01 C *552318509-0003*	Brick Mortar - Vestibule (Loc. 1045)	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 02 A-Floor Tile *552318509-0004*	9" x 9" Vinyl Floor Tiles - Brown with Black Streaks - Storage Room (Loc. 1050B)	Tan Non-Fibrous Homogeneous		92% Non-fibrous (Other)	8% Chrysotile
28228-ASB- 02 A-Mastic *552318509-0004A*	9" x 9" Vinyl Floor Tiles - Brown with Black Streaks - Storage Room (Loc. 1050B)	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 02 B-Floor Tile *552318509-0005*	9" x 9" Vinyl Floor Tiles - Brown with Black Streaks - Storage Room (Loc. 1050B)				Positive Stop (Not Analyzed)
28228-ASB- 02 B-Mastic *552318509-0005A*	9" x 9" Vinyl Floor Tiles - Brown with Black Streaks - Storage Room (Loc. 1050B)	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 02 C-Floor Tile *552318509-0006*	9" x 9" Vinyl Floor Tiles - Brown with Black Streaks - Storage Room (Loc. 1050B)				Positive Stop (Not Analyzed)
28228-ASB- 02 C-Mastic *552318509-0006A*	9" x 9" Vinyl Floor Tiles - Brown with Black Streaks - Storage Room (Loc. 1050B)	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 03 A *552318509-0007*	Parging cement on Air Handling Unit - Mechanicalo Room (Loc. 2090A)	White Fibrous Homogeneous		45% Non-fibrous (Other)	55% Chrysotile
28228-ASB- 03 B *552318509-0008*	Parging cement on Air Handling Unit - Mechanicalo Room (Loc. 2090A)				Positive Stop (Not Analyzed)

Initial report from: 11/30/2023 13:32:34

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2756 Slough Street Mississauga, ON L4T 1G3
Tel/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order:	552318509
Customer ID:	55ECOH45
Customer PO:	28228
Project ID:	

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
28228-ASB- 03 C *552318509-0009*	Parging cement on Air Handling Unit - Mechanicalo Room (Loc. 2090A)				Positive Stop (Not Analyzed)
28228-ASB- 04 A-Block Fill *552318509-0010*	Concrete Block mortar on walls - Mechanical Room (Loc. 1027)	Beige Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 04 A-Mortar *552318509-0010A*	Concrete Block mortar on walls - Mechanical Room (Loc. 1027)	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 04 B *552318509-0011*	Concrete Block mortar on walls - Mechanical Room (Loc. 2091)	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 04 C *552318509-0012*	Concrete Block mortar on walls - Office (Loc. 1058A)	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 05 A *552318509-0013*	Dark red caulking on metal support - Roof 504	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 05 B *552318509-0014*	Dark red caulking on metal support - Roof 504	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 05 C *552318509-0015*	Dark red caulking on metal support - Roof 504	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 06 A *552318509-0016*	Offwhite caulking on metal support - Roof 503	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 06 B *552318509-0017*	Offwhite caulking on metal support - Roof 503	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 06 C *552318509-0018*	Offwhite caulking on metal support - Roof 503	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 07 A *552318509-0019*	Light grey caulking on vent - Roof 402	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 07 B *552318509-0020*	Light grey caulking on vent - Roof 402	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 07 C *552318509-0021*	Light grey caulking on vent - Roof 402	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 08 A *552318509-0022*	Light brown/silver caulking on metal support - Roof 503	Brown/Silver Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 08 B *552318509-0023*	Light brown/silver caulking on metal support - Roof 503	Brown/Silver Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 08 C *552318509-0024*	Light brown/silver caulking on metal support - Roof 503	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 09 A *552318509-0025*	White caulking on vent - Roof 402	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

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http://www.EMSL.com / torontolab@emsl.com

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Customer ID:	55ECOH45
Customer PO:	28228
Project ID:	

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
28228-ASB- 09 B *552318509-0026*	White caulking on vent - Roof 402	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 09 C *552318509-0027*	White caulking on vent - Roof 402	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 10 A *552318509-0028*	Drywall joint compound on ceiling - Office (Loc. 1054A)	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 10 B *552318509-0029*	Drywall joint compound on ceiling - Office (Loc. 1054A)	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 10 C *552318509-0030*	Drywall joint compound on ceiling - Office (Loc. 1054A)	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 11 A-Wrap *552318509-0031*	Sweat wrap insulation on ducts - Storage Room (Loc. 1057)	Brown Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
28228-ASB- 11 A-Tar *552318509-0031A*	Sweat wrap insulation on ducts - Storage Room (Loc. 1057)	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 11 A-Insulation *552318509-0031B*	Sweat wrap insulation on ducts - Storage Room (Loc. 1057)	Yellow Fibrous Homogeneous	90% Min. Wool	10% Non-fibrous (Other)	None Detected
28228-ASB- 11 B-Wrap *552318509-0032*	Sweat wrap insulation on ducts - Storage Room (Loc. 1057)	Brown Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
28228-ASB- 11 B-Tar *552318509-0032A*	Sweat wrap insulation on ducts - Storage Room (Loc. 1057)	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 11 B-Insulation *552318509-0032B*	Sweat wrap insulation on ducts - Storage Room (Loc. 1057)	Yellow Fibrous Homogeneous	90% Min. Wool	10% Non-fibrous (Other)	None Detected
28228-ASB- 11 C-Wrap *552318509-0033*	Sweat wrap insulation on ducts - Storage Room (Loc. 1057)	Brown Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
28228-ASB- 11 C-Tar *552318509-0033A*	Sweat wrap insulation on ducts - Storage Room (Loc. 1057)	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 11 C-Insulation *552318509-0033B*	Sweat wrap insulation on ducts - Storage Room (Loc. 1057)	Brown Fibrous Homogeneous	90% Min. Wool	10% Non-fibrous (Other)	None Detected
28228-ASB- 12-Tar *552318509-0034*	Roofing material - Roof 402	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 12-Tar Felt *552318509-0034A*	Roofing material - Roof 402	Black Fibrous Homogeneous	25% Cellulose	75% Non-fibrous (Other)	None Detected
28228-ASB- 12-Fiberboard *552318509-0034B*	Roofing material - Roof 402	Brown Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected

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EMSL Canada Order: 552318509
Customer ID: 55ECOH45
Customer PO: 28228
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
28228-ASB- 12-Tar Paper *552318509-0034C*	Roofing material - Roof 402	Brown/Black Fibrous Homogeneous	65% Cellulose	35% Non-fibrous (Other)	None Detected
28228-ASB- 12-Foam *552318509-0034D*	Roofing material - Roof 402	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 13-Tar *552318509-0035*	Roofing material - Roof 501	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 13-Tar Felt *552318509-0035A*	Roofing material - Roof 501	Black Fibrous Homogeneous	25% Cellulose	75% Non-fibrous (Other)	None Detected
28228-ASB- 13-Fiberboard *552318509-0035B*	Roofing material - Roof 501	Brown Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
28228-ASB- 13-Tar Paper *552318509-0035C*	Roofing material - Roof 501	Brown/Black Fibrous Homogeneous	60% Cellulose	40% Non-fibrous (Other)	None Detected
28228-ASB- 13-Tar Dot *552318509-0035D*	Roofing material - Roof 501	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 13-Foam *552318509-0035E*	Roofing material - Roof 501	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 14-Tar *552318509-0036*	Roofing Material - Roof 701	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 14-Tar Felt *552318509-0036A*	Roofing Material - Roof 701	Black Fibrous Homogeneous	25% Cellulose	75% Non-fibrous (Other)	None Detected
28228-ASB- 14-Fiberboard *552318509-0036B*	Roofing Material - Roof 701	Brown Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
28228-ASB- 14-Tar Paper *552318509-0036C*	Roofing Material - Roof 701	Brown/Black Fibrous Homogeneous	60% Cellulose	40% Non-fibrous (Other)	None Detected
28228-ASB- 14-Foam *552318509-0036D*	Roofing Material - Roof 701	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 15-Shingle *552318509-0037*	Roofing Material - Roof 503	Gray/Black Fibrous Homogeneous	15% Cellulose	85% Non-fibrous (Other)	None Detected
28228-ASB- 15-Tar *552318509-0037A*	Roofing Material - Roof 503	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 15-Fiberboard *552318509-0037B*	Roofing Material - Roof 503	Brown Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
28228-ASB- 15-Tar Dot *552318509-0037C*	Roofing Material - Roof 503	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 11/30/2023 13:32:34

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Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
28228-ASB- 15-Foam *552318509-0037D*	Roofing Material - Roof 503	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 15-Tar Paper *552318509-0037E*	Roofing Material - Roof 503	Black Fibrous Homogeneous	25% Glass	75% Non-fibrous (Other)	None Detected
28228-ASB- 16-Shingle *552318509-0038*	Roofing Material - Roof 601	Gray/Black Fibrous Homogeneous	15% Cellulose	85% Non-fibrous (Other)	None Detected
28228-ASB- 16-Tar *552318509-0038A*	Roofing Material - Roof 601	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28228-ASB- 16-Tar Felt *552318509-0038B*	Roofing Material - Roof 601	Black Fibrous Homogeneous	15% Glass	85% Non-fibrous (Other)	None Detected
28228-ASB- 16-Fiberboard *552318509-0038C*	Roofing Material - Roof 601	Brown Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
28228-ASB- 16-Foam *552318509-0038D*	Roofing Material - Roof 601	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Analyst(s)

Kira Ramphal (54)
Hassan Moeez (12)

Matthew Davis or other approved signatory
or Other Approved Signatory

Initial report from: 11/30/2023 13:32:34

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EMSL Canada Or	552318508
CustomerID:	55ECOH45
CustomerPO:	28228
ProjectID:	

Attn: **Stuti Sathvara**
ECOH Management, Inc.
75 Courtneypark Drive West
Unit 1
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Phone:	(905) 795-2800
Fax:	(905) 795-2870
Received:	11/27/2023 12:56 PM
Collected:	11/24/2023

Project: **28228 / Glendale SS - Boiler and AHU Replacement DSS**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client SampleDescription	*Collected*	*Analyzed*	*Weight*	*RDL*	*Lead Concentration*
28228-Pb- 01	11/24/2023	11/27/2023	0.2453 g	820 ppm	30000 ppm
552318508-0001	Site: Yellow paint on gas pipe - Roof 504				
28228-Pb- 04	11/24/2023	11/27/2023	0.0421 g	480 ppm	<480 ppm
552318508-0004	Site: Light blue paint on boiler - Mechanical Room (Loc. 1027)				
28228-Pb- 05	11/24/2023	11/27/2023	0.2502 g	80 ppm	1400 ppm
552318508-0005	Site: Blue paint on floor - Mechanical Room 9Loc. 1027)				
28228-Pb- 06	11/24/2023	11/27/2023	0.2481 g	400 ppm	6400 ppm
552318508-0006	Site: Grey paint on duct and AHU - Mechanical Room (Loc. 2091)				
28228-Pb- 07	11/24/2023	11/27/2023	0.2473 g	81 ppm	540 ppm
552318508-0007	Site: Light yellow paint on walls - Mechanical Room 9Loc. 2091)				
28228-Pb- 08	11/24/2023	11/27/2023	0.2444 g	82 ppm	480 ppm
552318508-0008	Site: Light pink paint on walls - Storage Room (Loc. 1056B)				
28228-Pb- 09	11/24/2023	11/27/2023	0.2588 g	80 ppm	<80 ppm
552318508-0009	Site: Black paint on concrete pad - mechanical Room (Loc. 1029)				

The reporting limit is based upon the sample weight received

Rowena Fanto, Lead Supervisor
or other approved signatory

Initial report from 11/30/2023 09:03:52

EMSL Canada Inc.
2756 Slough Street, Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or	552318508
CustomerID:	55ECOH45
CustomerPO:	28228
ProjectID:	

Attn: **Stuti Sathvara**
ECOH Management, Inc.
75 Courtneypark Drive West
Unit 1
Mississauga, ON L5W 0E3

Phone:	(905) 795-2800
Fax:	(905) 795-2870
Received:	11/27/2023 12:56 PM
Collected:	11/24/2023

Project: **28228 / Glendale SS - Boiler and AHU Replacement DSS**

Test Report: Lead by Flame AAS (SW 846 3050B/7000B)*

Client SampleDescription	*Collected*	*Analyzed*	*Weight (g)*	*RDL*	*Lead Concentration*
28228-Pb- 02	11/24/2023	11/27/2023	0.5007 g	40 mg/Kg	<40 mg/Kg
552318508-0002	Site: Concrete Block mortar - Mechanical Room (Loc. 1027)				
28228-Pb- 03	11/24/2023	11/27/2023	0.5004 g	40 mg/Kg	<40 mg/Kg
552318508-0003	Site: Brick Mortar - Vestibule (Loc. 1045)				

Rowena Fanto, Lead Supervisor
or other approved signatory

* Analysis following Lead in Soil/Solids by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 40 mg/kg based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON

Initial report from 11/30/2023 09:02:55

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: ECOH MANAGEMENT INC.
75 COURTNEYPARK DRIVE WEST UNIT 1
MISSISSAUGA , ON L5W 0E3
(905) 795-2800
ATTENTION TO: Stuti Sathvara
PROJECT: 28228 - HWDSB - Glendale SS
AGAT WORK ORDER: 23T097734
TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor
DATE REPORTED: Dec 01, 2023
PAGES (INCLUDING COVER): 5
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.*
- *For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.*

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 23T097734

PROJECT: 28228 - HWDSB - Glendale SS

CLIENT NAME: ECOH MANAGEMENT INC.

ATTENTION TO: Stuti Sathvara

SAMPLING SITE:

SAMPLED BY:Stuti Sathvara

Total PCBs (caulking)

DATE RECEIVED: 2023-11-27

DATE REPORTED: 2023-12-01

SAMPLE DESCRIPTION:				Brown/Silver caulking on metal support - Roof	White caulking on vent - Roof 402	Dark red caulking on metal support - Roof 504	Off-white caulking on metal support and AHU	Light grey caulking on vent - Roof 402
SAMPLE TYPE:				Solid	Solid	Solid	Solid	Solid
DATE SAMPLED:				2023-11-24	2023-11-24	2023-11-24	2023-11-24	2023-11-24
Parameter	Unit	G / S	RDL	5496956	5496964	5496965	5496966	5496967
Polychlorinated Biphenyls	µg/g		1	<1	<1	<1	<1	<1
Surrogate	Unit	Acceptable Limits						
Decachlorobiphenyl	%	60-130		72	72	80	116	120

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5496956-5496967 Results are based on the weight of the sample as received.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: ECOH MANAGEMENT INC.
PROJECT: 28228 - HWDSB - Glendale SS
SAMPLING SITE:

AGAT WORK ORDER: 23T097734
ATTENTION TO: Stuti Sathvara
SAMPLED BY:Stuti Sathvara

Trace Organics Analysis

RPT Date: Dec 01, 2023			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total PCBs (caulking)															
Polychlorinated Biphenyls	5496965		< 1	< 1	NA	< 1	105%	60%	140%	96%	60%	140%	NA	60%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Method Summary

CLIENT NAME: ECOH MANAGEMENT INC.

AGAT WORK ORDER: 23T097734

PROJECT: 28228 - HWDSB - Glendale SS

ATTENTION TO: Stuti Sathvara

SAMPLING SITE:

SAMPLED BY:Stuti Sathvara

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Polychlorinated Biphenyls	ORG-91-5113	EPA SW-846 3541 & 8082A	GC/ECD
Decachlorobiphenyl	ORG-91-5113	EPA SW-846 3541 & 8082A	GC/ECD

AGAT Laboratories
5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only
Work Order #: 23T097734
Cooler Quantity: 1 bag
Arrival Temperatures: 21.3 | 20.9 | 22.1
Custody Seal Intact: ☐ Yes ☐ No ☒ N/A
Notes: No Ice

Report Information:
Company: ECOH Management Inc.
Contact: Stuti Sathvara
Address: 75 Courtneypark Drive West
Mississauga, ON
Phone: 647-293-9939 Fax:
Reports to be sent to:
1. Email: ssathvara@ecoh.ca
2. Email: edametto@ecoh.ca

Regulatory Requirements:
(Please check all applicable boxes)

☐ Regulation 153/04
Table (Indicate One) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (Check One) ☐ Coarse ☐ Fine

☐ Excess Soils R406
Table (Indicate One)
☐ Regulation 558
☐ CCME

☐ Sewer Use ☐ Sanitary ☐ Storm
(Region)
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
(Indicate One)

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Turnaround Time (TAT) Required:
Regular TAT ☐ 5 to 7 Business Days
Rush TAT (Rush Surcharges Apply)
☑ 3 Business Days ☐ 2 Business Days ☑ Next Business Day
OR Date Required (Rush Surcharges May Apply):
Please provide prior notification for rush TAT
*TAT is exclusive of weekends and statutory holidays
For 'Same Day' analysis, please contact your AGAT CPM

Project Information:
Project: 28228 - HWDSB - Glendale SS
Site Location: Glendale SS - 145 Rainbow Drive, Hamilon, ON
Sampled By: Stuti Sathvara
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:
Bill To Same: Yes ☐ No ☐
Company: ECOH Managment Inc.
Contact: Accounts Payable
Address: 75 Courtneypark Drive W, Mississauga ON
Email: accounting@ecoh.ca

Sample Matrix Legend
B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y/N	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs	O. Reg 153: Analyze F4G if required ☐ Yes ☐ No	O. Reg 153: PAHs	O. Reg 153: PCBs	O. Reg 153: VOC	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Excess Soils SPLP Rainwater Leach ☐ Metals ☐ VOCs ☐ SVOCs	O. Reg 406: Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Salt - EC/SAR	Potentially Hazardous or High Concentration (Y/N)
Brown/Silver caulking on metal support - Roof	2023/11/24	AM PM										☑						
White caulking on vent - Roof 402	2023/11/24	AM PM										☑						
Dark red caulking on metal support - Roof 504	2023/11/24	AM PM										☑						
Off-white caulking on metal support and AHU	2023/11/24	AM PM										☑						
Light grey caulking on vent - Roof 402	2023/11/24	AM PM																
		AM PM																
		AM PM																
		AM PM																
		AM PM																
		AM PM																
		AM PM																

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Stuti Sathvara	2023/11/27		Nov 27/23		3:38 PM

Page ____ of ____
No:

APPENDIX III

Site Photographs

ECOH
Environmental Consulting
Occupational Health

SITE PHOTOGRAPHS

Client Name:	Site Location:	Project No.
Hamilton Wentworth District School Board	Glendale Secondary School 145 Rainbow Drive, Hamilton, Ontario	28228

Photo No. 1.

Date: November 24, 2023

Location:
Various Locations

Description:

Plaster on beam enclosures and ceilings.

This material was previously confirmed to be asbestos-containing (0.5-5% Chrysotile).

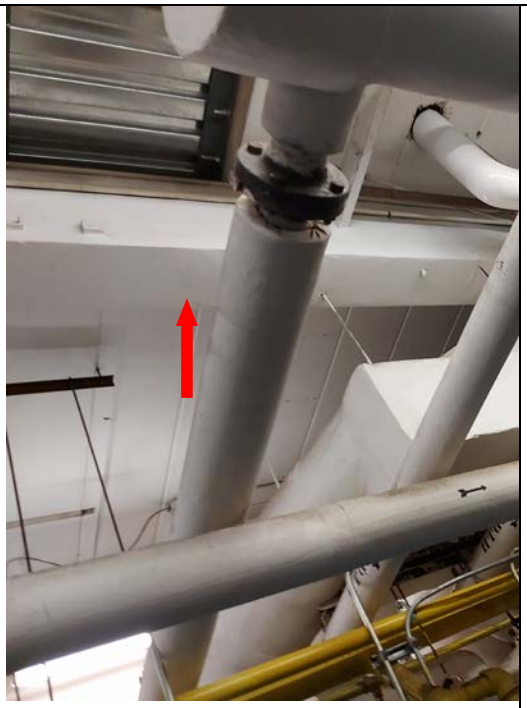

Photo No. 2.

Date: November 24, 2023

Location:
Storage room 1050B (Loc. 4047)

Description:

9” x 9” Vinyl floor tile (brown with black streaks)

This material was sampled and determined by laboratory analysis to be asbestos-containing (8% Chrysotile).

Client Name:	Site Location:	Project No.
Hamilton Wentworth District School Board	Glendale Secondary School 145 Rainbow Drive, Hamilton, Ontario	28228

Photo No. 3.

Date: November 24, 2023

Location:
Various Locations

Description:

Flexible duct connectors

This material is presumed to be asbestos-containing.

Photo No. 4.

Date: November 24, 2023

Location:
Various Locations

Description:

Parging cement on fittings

This material was confirmed to be asbestos-containing (55-70% Chrysotile)

Client Name:	Site Location:	Project No.
Hamilton Wentworth District School Board	Glendale Secondary School 145 Rainbow Drive, Hamilton, Ontario	28228

Photo No. 5. **Date: November 24, 2023** **Location:** Mechanical Room 2090A **Description:** Parging Cement on Air Handling Unit. ***This material was sampled and determined by laboratory analysis to be asbestos-containing (55% Chrysotile)***	

Photo No. 6. **Date: November 24, 2023** **Location:** Corridor 1048 (Loc. 4049) **Description:** Transite panels on ceiling. ***This material was confirmed to be asbestos-containing***	b

Client Name:	Site Location:	Project No.
Hamilton Wentworth District School Board	Glendale Secondary School 145 Rainbow Drive, Hamilton, Ontario	28228

Photo No. 7. **Date: November 24, 2023** **Location:** Various locations **Description:** Yellow Paint gas pipe ***This material was sampled and determined by laboratory analysis to be lead-based (30000 ppm).***	

Photo No. 8. **Date: November 24, 2023** **Location:** Mechanical Room 1027 (Loc. 4026) **Description:** Blue Paint on Floor. ***This material was sampled and determined by laboratory analysis to be lead-containing (1300 ppm).***	

Client Name:	**Site Location:**	**Project No.**
Hamilton Wentworth District School Board	Glendale Secondary School 145 Rainbow Drive, Hamilton, Ontario	28228

Photo No. 9.

Date: November 24, 2023

Location:
Various locations

Description:

Grey paint on ducts and AHU

This material was sampled and determined by laboratory analysis to be lead-based (6400 ppm).