PROJECT –SPECIFIC DESIGNATED SUBSTANCES & HAZARDOUS MATERIALS ASSESSMENT R1

Avon Crest Facility

86 John Street South
Stratford, Ontario
N5A 2Y6

Prepared for:
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Huron Perth Healthcare Alliance
46 General Hospital Drive
Stratford, Ontario
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EXECUTIVE SUMMARY

Safetech Environmental Limited (Safetech) was retained by Francesco Sabatini of the Huron Perth Healthcare Alliance (HPHA) to conduct a project-specific and "demolition level" designated substances and hazardous materials (DSHM) assessment for the Avon Crest facility located at 86 John Street South in Stratford, Ontario (site).

The objective of our assessment was to determine the presence, location, condition and quantities of designated substances and other hazardous building materials within the site that will require abatement prior to scheduled demolition of the Avon Crest building.

A summary of the designated substances and hazardous building materials identified is provided below in Table 1a and Table 1b. This should be considered a summary only. Please refer to Table 4 (Results of Assessment for Asbestos-Containing Materials, Avon Crest Facility of Stratford General Hospital, 86 John Street South, Stratford, ON), the Results (Section 3), Conclusions and Recommendations (Section 4) and the Figures H100 to H105 provided in Appendix B of the report for additional details.

Remove all asbestos-containing materials prior to demolition activities in accordance with Ontario Regulation 278/05 *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations.*

Table 1a: Summary of Asbestos-Containing Materials

Asbestos-Containing Materials	
Friable	
Aircell (corrugated paper) Pipe Insulation	4" lines located within the crawlspace beneath the former porch area. (35 m) 4" line located at ceiling height within the Power Plant Office. (3 m)
Mag Block (preformed) Pipe Insulation	4" line located at ceiling height within the Power Plant Office. (3 m)
Caposite (preformed) Pipe Insulation	3" lines located at ceiling height within Rooms 030 and 035 in the basement.
Parged Cement Pipe Fitting Insulation	Approximately 1985 fittings of various sizes located on water lines within the basement and power plant and laundry facility, and hydronic system lines throughout the facility.
Parged Cement Pipe Hanger Insulation	Approximately 180 pipe hangers with asbestos parged cement insulation on horizontal pipes within the corridor of the basement.

Asbestos-Containing Materials	
Friable (Continued)	
Mag Block (preformed) Boiler Insulation	Located on Boiler #1 and Boiler #2 within the Power Plant (146 m^2)
Mag Block (preformed) Boiler Breaching Insulation	Located on Boiler Breaching connecting Boilers #1 and #2 and the exhaust stack (310 m^2)
Mag Block (preformed) Hot Water Tank Insulation	Located on the hot water tank east of Boiler #1 within the Power Plant (21 m^2)
Unit Heater Mechanical Insulation	Parged asbestos cement applied over cork. Located on the ceiling mounted gas-fired unit heaters within the corners of the laundry facility (18 m^2).
Soft Ceiling Texture Coat	Soft (friable) textured coating applied to the plaster ceiling of room 024 within the basement.
Non-Friable	
Sweat Wrap (layered paper) Pipe Insulation	6" cold water and soft water lines located in the central corridor within the basement, entering from the Hospital Tunnel. (130 m) All other lines of sweat wrap were identified as non-asbestos.
Ceiling Plaster	Present within the basement level of the Power Plant (200 m^2).
Various Styles (colours and patterns) of 9"x9" and 12"x12" Vinyl Floor Tiles	All vinyl floor tiles throughout the facility are asbestos-containing (1,193 m^2 total) Associated black mastic is also asbestos-containing.
Various Styles (colours and patterns) of Vinyl Sheet Floor and Vinyl Rolled Flooring	All vinyl sheet floor styles throughout the facility are asbestos-containing (1,132 m^2 total) Associated black mastic is also asbestos-containing.
Black Floor Topping	Comprising the floor within room 344.
Grey Door Caulk	Present interfacing exterior door frames and the surrounding brick cladding (40 m)
Deemed Asbestos-Containing Materials (Non-Friable)	
Gaskets associated with mechanical equipment	Gaskets on boiler access doors, steam pipe flanges, and hot water flanges. Assume 10 m of rope gasket and 100 pipe flange gaskets.
Underground Services	It is assumed that buried services may be assessment containing (such as transite drain pipes). Use caution if excavating.
Arc shields in electrical equipment / switch gear	Electrical equipment and switch gear was not opened to investigate arc shields. Separate and document arc shields upon demolition. Confer with Owner's consultant for identification.

Asbestos-Containing Materials	
Deemed Asbestos-Containing Materials (Non-Friable) (Continued)	
Fire Doors	Fire doors are present at the following locations: • Entrance to the Hospital Tunnel • Elevator 2 and Elevator 3 within the basement • Elevator 2 on the first, second, and third floors. Assume fire doors have asbestos cores and dispose of intact as asbestos waste (6 doors).
Elevator Brakes	Assume elevator brakes are asbestos-containing. Remove intact and dispose of as asbestos waste (Assume 9 brakes).

A summary of the assessment results and general recommendations based on our findings for the other Designated Substances and Hazardous Materials are provided in Table 1b. This table should be considered a summary only. Please refer to the Results (Section 3.0), Table 4, Conclusions and Recommendations (Section 4.0), and Site Drawings (Appendix B) of our report for additional details.

Table 1b: Summary of Other Designated Substances and Hazardous Materials

Designated Substance	Findings	Recommendations
Lead	Fourteen (14) of the sixteen (16) paints sampled throughout the facility were confirmed to be lead-containing or lead-based (>1000 µg/g). The following materials are assumed to be lead-containing: • Glazing associated with ceramic tiles • Batteries associated with emergency lighting • Solder in copper pipe fittings • Solder in electrical components • Bell and spigot joint gaskets in sanitary drain lines	Disturbance of lead-containing materials must be conducted in accordance with the Ontario Ministry of Labour, Immigration, Training and Skills Development (MLITSD) Lead on Construction Projects guideline (2011) and/or the Environmental Abatement Council of Canada (EACC) Lead Guideline (October 2014). For additional details, refer to Section 3.1.2 (Results) and Section 4.1.2 (Conclusions and Recommendations). Lead-containing and lead-based coatings need not be removed from their underlying materials prior to demolition; however, waste materials shall be subject to a Toxicity Characteristic Leachate Profile test for waste classification in accordance with R.R.O. 1990, Regulation 347, *General- Waste Management.* Other lead wastes should be separated and recycled wherever practicable or handled and disposed of according to R.R.O. 1990, Regulation 347, *General- Waste Management.*

Designated Substance	Findings	Recommendations
Mercury	Source of mercury were observed in the subject area an include the following: • Vapour in fluorescent lamps • Liquid in switches associated with the boilers in the power plant	Fluorescent lamps and mercury switches should be handled with care and kept intact to avoid potential exposure to liquid mercury and/or mercury vapour. Any mercury-containing lamps or equipment that are to be removed are recommended to be recycled rather than disposed of in landfill. Waste should be handled and disposed of under R.R.O. 1990 Regulation 347, "General – Waste Management", made under the Environmental Protection Act. Alternatively, utilize a Bulb Eater®, or equivalent to safely crush and store waste lamps prior to recycling or disposal.
Silica	Building materials identified that are suspected to contain crystalline silica and may be disturbed as part of the planned construction project include: • Texture Finishes • Plaster • Caulking and Mastics • Ceramic Tiles and Grout • Brick and Associated Mortar • Concrete • Acoustical Ceiling Tiles • Roofing Materials	Any work involving the disturbance of silica-containing materials should follow the procedures outlined in the Ontario Ministry of Labour, Immigration, Training and Skills Development "Silica on Construction Projects" guideline. For additional information, refer to Section 3.1.4 (Results) and Section 4.1.4 (Conclusions and Recommendations).
Other Hazardous Materials	**Findings**	**Recommendations**
Urea Foam Formaldehyde Foam Insulation	No UFFI was identified or is suspected within the building.	No action required.
Mould Contamination	Mould growth and severe water damage was identified on various surfaces throughout the building, including the north wing of the basement, and the connection between the north and west wing on the second and third floor (near Elevator #1).	If the building will be demolished without being re-occupied, mould growth need not be remediated provided all workers performing work (such as abatement or demolition work) are protected from exposure to mould.
Polychlorinated Biphenyls	PCB-containing lamp ballasts are suspected within T12 lamp fixtures and stored within the crawlspace beneath the former porch area.	When light fixtures are to be decommissioned, any PCB-containing ballasts that are found should be removed and separated from other waste and disposed of as PCB waste at an authorized destruction facility.

Other Hazardous Materials	Findings	Recommendations
Ozone Depleting and Global Warming Substances	No equipment was observed that is suspected to contain ozone depleting and/or global warming substances	No action required.

This assessment satisfies the Owner's requirements under Section 30 of the Ontario Occupational Health and Safety Act (OHSA), Revised Statues of Ontario 1990, as amended. Should you have any questions regarding the information contained in the report, please contact our office at 519.954.2732.

Safetech Environmental Limited

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February 28, 2023
***Revised* March 3, 2023**

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Re: Project-Specific Designated Substances & Hazardous Materials Assessment
Avon Crest Facility – Stratford General Hospital
86 John Street South, Stratford, Ontario

1.0 INTRODUCTION

1.1 Background and Objectives

Safetech Environmental Limited (Safetech) was commissioned by Mr. Francesco Sabatini, Manager, Facilities Management Projects for the Huron Perth Healthcare Alliance (HPHA) (the Client) to conduct a project-specific and "demolition level" Designated Substances and Hazardous Materials (DSHM) Assessment of the Avon Crest building of Stratford General Hospital, which is located at 86 John Street South in Stratford, Ontario (site).

This assessment was conducted in advance of proposed building demolition to identify and quantify designated substances and other hazardous building materials that will require abatement or special handling prior to, or during, the demolition works. The objective of our assessment was to update the existing "Designated Substances and Hazardous Materials Assessment Update 2021" report, prepared by Safetech (dated September 30, 2021), as a prudent action to ensure technical accuracy, quality assurance and clarity of material quantification. This was achieved by conducting destructive assessment methods and accessing previously inaccessible rooms and locations.

This report documents the findings of our intrusive site inspection that was conducted on February 17, 2023, and provides conclusions and recommendations based on our findings.

1.2 Scope of Work

Our scope of work included the following activities:

- A thorough review of existing documents, including past environmental assessment reports (listed below);
- An assessment of building materials including intrusive sampling and destructive assessment methods to identify concealed materials and conditions previously inaccessible while the facility was in operation and verify the asbestos content of previously "suspected" materials, where possible, in order to determine appropriate control measures for the protection of workers during demolition;
- Collection, analysis, and interpretation of representative bulk samples of previously unidentified and/or previously "suspected" asbestos-containing building materials for the determination of the locations and quantity of asbestos-containing materials;
- Quantification of asbestos-containing materials for tendering purposes; and,
- Preparation of a report to document our findings (i.e. through our visual assessment and by bulk sample verification testing) and provide recommendations regarding control measures and/or special handling procedures for designated substances prior to or during demolition activities.

Documents reviewed to aid in our assessment included the following:

1. "Designated Substances and Hazardous Building Materials Audit – 46 General Hospital Drive, Stratford, ON", prepared by MTE Consultants Inc., dated March 30, 2012.
2. "Revised 2016 Asbestos Audit Update of Stratford General Hospital – 46 General Hospital Drive, Stratford, ON", prepared by MTE Consultants Inc., dated July 11, 2016
3. "Avoncrest – Designated Substances Audit Report – 86 John Street South, Stratford, Ontario", prepared by MTE Consultants Inc., dated July 6, 2018.
4. "Hazardous Materials and Designated Substances Assessment Update 2019 R1; Stratford General Hospital and Associated Buildings", prepared by Safetech, dated (revised) July 12, 2019.

5. “Designated Substances and Hazardous Materials Assessment Update 2021; Stratford General Hospital and Associated Buildings”, prepared by Safetech, dated September 30, 2021.

This assessment only identified hazardous building materials and designated substances that were deemed to be part of the building or somehow otherwise incorporated into the building structure and its finishes. Assessing occupant items such as stored products, furnishings, items and materials used or produced as part of a manufacturing process, etc. were beyond the scope of this assessment. In addition, our assessment did not include an investigation for underground materials or equipment (vessels, drums, underground storage tanks, pipes, cables, etc.). Furthermore, this assessment was limited to the areas investigated.

1.3 Description of Assessment Area – Avon Crest Facility of Stratford General Hospital

The Avon Crest facility was constructed in 1893 for use as the original hospital building. The building is constructed of four floors (basement, first, second, and third) and consists of two main wings (north and west). Additionally, an attic space is present above a limited portion of the west wing.

The building is constructed with a concrete foundation, wood structure, and brick veneer. Roof systems were noted to be a combination of built-up bitumen and ballast (flat) and asphalt shingles (sloped).

The building includes an adjoining power plant which houses the hospital’s main laundry facility and previously provided heat to the building. Hydronic heat is now provided to the building from the main power plant located in the West Building.

Reference Figures H100 to H105, included in Appendix B, for the general lay-out of the building, extent of the survey area, and identified designated substances with quantities identified.

2.0 METHODOLOGY

The presence of hazardous materials was assessed by visual inspection. For the purpose of this assessment and this document, hazardous building materials include designated substances as well as other chemical, biological and environmental hazards as defined below:

- **Designated Substances (as prescribed by Ontario Regulation 490/09):**
  - Acrylonitrile, Arsenic, Asbestos, Benzene, Coke Oven Emissions, Ethylene Oxide, Isocyanates, Lead, Mercury, Silica and Vinyl Chloride.

- **Other Hazardous Materials:**
  - ***Chemical Hazards*** – Urea Formaldehyde Foam Insulation (UFFI)
  - ***Biological Hazards*** – Mould Contamination
  - ***Environmental Hazards*** – Polychlorinated Biphenyls (PCBs), and Ozone Depleting & Global Warming Substances

Intrusive sampling and a limited destructive assessment was conducted. Exterior concrete block was opened at the north side of Avon Crest, as well as two locations on the east side of the Power Plant/Laundry building. A total of four (4) openings were conducted in ceilings, eight (8) openings were conducted in walls/service chases, to investigate conditions within concealed building systems where plumbing or other services were suspected. Additionally, flooring finishes were lifted in approximately ten (10) rooms per floor level to assess flooring layers. However, motors, blowers, electrical panels, etc., were not de-energized or disassembled to examine concealed conditions. Building materials that are not detailed within this assessment which are uncovered during demolition activities should be assessed by a qualified person prior to their disturbance.

Bulk sampling followed by laboratory analysis was conducted to confirm the presence/absence of selected hazardous materials. Bulk sampling was limited to asbestos in building materials and lead paint. <u>All other designated substances were identified by visual inspection only, unless otherwise stated</u>. Specific methodology for each individual hazardous material assessed is further detailed below.

2.1 Designated Substances

2.1.1 *Asbestos*

A visual inspection for the presence of both friable and non-friable asbestos-containing material (ACM) was performed within the assessment areas. The condition of ACM was rated as Good, Fair or Poor based on our assessment criteria provided in 2.3 Condition Assessment Criteria for Asbestos-Containing Materials.

Bulk samples of previously inaccessible building materials and materials listed as "suspected" ACM were collected by Safetech for verification. Bulk samples were retrieved in accordance with Section 3 and Table 1 of Ontario Regulation 278/05, *"Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations"*. The number of samples collected for each material was based on the type and quantity of the material present within the area(s) investigated. Each individual sample was placed in a labelled, sealable plastic sampling bag for transportation to an independent laboratory (EMC Scientific Inc.). EMC is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for bulk asbestos fibre analysis.

Analysis for asbestos content was performed by the independent laboratory in accordance with the U.S. Environmental Protection Agency (EPA) Test Method EPA/600/R-93-116:Method for the Determination of Asbestos in Bulk Building Materials. June 1993. This method identifies the asbestos fibre content of building materials using polarized light microscopy (PLM) analytical techniques, with confirmation of presence and type of asbestos made by dispersion staining optical microscopy. This analytical method meets the requirements set forth in Section 3 of O.Reg. 278/05.

In accordance with O. Reg. 278/05, an asbestos-containing material is defined as material that contains 0.5 per cent or more asbestos by dry weight. Vermiculite is an exception to this definition. Any detection of asbestos in loose vermiculite shall constitute it as asbestos-contaminated. Products where vermiculite is bound within the material matrix will require additional assessment using more sophisticated analytical methods (e.g. gravimetric). The laboratory was instructed to conduct "stop-positive" analysis for all materials. If a sample was found to be asbestos-containing no further analysis was conducted for samples taken from the same homogeneous material. The Laboratory Certificate of Analysis is included in Appendix C.

Locations where ACM have been identified are detailed in this report. Recommendations pertaining to ACM were made based on the friability, accessibility and condition of the material in conjunction with the potential for the planned building renovation work to disturb the ACM.

2.1.2 *Lead*

For the purpose of this assessment, Safetech relied upon the findings of previous assessments for the identification of lead-containing and lead-based paints and surface coatings. No additional samples of surface coatings were collected.

The presence of lead in other materials, such as lead sheeting, pigmented mortar, lead piping, lead solder, etc. were noted where observed and not previously identified, but were not sampled to verify lead content. Lead can be present in these materials to varying degrees, depending on their age of application (refer to Section 3.0 for additional details) and should be considered lead-containing until proven otherwise.

2.1.3 *Mercury*

The type, quantity and location of mercury-containing equipment and devices within the areas assessed were determined by visual inspection based on appearance, age and knowledge of historical uses. Sampling for mercury-containing building materials and dismantling of suspect mercury-containing equipment was not performed. Where possible, attempts were made to verify the presence/absence of mercury by gathering additional information such as equipment model number, serial number, etc.

2.1.4 *Silica*

The presence of crystalline silica in building materials was determined through visual inspection of building materials only, based on knowledge of the historic use of silica-content in certain building materials. Sampling to verify the presence/absence of silica in building materials was not performed.

2.1.5 *Other Designated Substances*

Other designated substances (i.e. acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxide, isocyanates, and vinyl chloride) are typically not expected to be encountered in building materials as significant constituents or in a form that would represent an exposure concern. These substances were not included in our assessment unless specific information regarding their use (e.g. in a manufacturing process) was provided to us. Please refer to Section 3.0 for information regarding where these designated substances are typically found or used. No sampling for these potential designated substances and/or hazardous chemicals was performed.

2.2 Other Hazardous Materials

2.2.1 *Chemical Hazards*

Urea Formaldehyde Foam Insulation (UFFI)

A visual inspection to evaluate the possible presence of Urea Formaldehyde Foam Insulation (UFFI) was conducted within the areas assessed. Our visual inspection was limited to looking for evidence of possible UFFI installation (i.e. repaired nozzle holes in walls) and overspray at wall/ceiling joints, etc. No destructive testing or material sampling was conducted as part of our assessment.

2.2.2 *Biological Hazards*

Mould Contamination

A visual inspection to determine the possibility of mould growth was conducted within the areas assessed. Our assessment was limited to looking for evidence of mould growth and water damage (staining, material deterioration, efflorescence, etc.) on the surface of building materials, which may be an indicator of hidden mould growth. No moisture content readings of building materials were taken to determine their current condition. Additionally, destructive assessment to confirm the presence/absence of hidden mould growth and material sampling to verify the presence/absence of mould on suspect surfaces was beyond the scope of this assessment.

2.2.3 *Environmental Hazards*

Polychlorinated Biphenyls (PCBs)

The presence of PCB-containing electrical equipment within the areas assessed was identified through visual inspection and knowledge of the timeline of historical use.

For stand-alone transformers and capacitors, information from the manufacturer nameplate (such as the date of manufacture, dielectric fluid trade name or “Type Number”, etc.) was gathered, where possible, to further evaluate if the equipment may contain PCB’s. This information was then compared to the information provided in the Environment Canada document entitled *“Handbook on PCB’s in Electrical Equipment”* (Third Edition, April 1988) to aid in identification. Transformers and capacitors confirmed to be manufactured after 1979 were assumed to not contain PCBs. If appropriate information could not be obtained it was assumed that the transformer or capacitor contained PCBs.

Light fixture ballasts were not removed to obtain manufacturer information that may be on the back of the ballast due to an electrical shock hazard. If visual confirmation of ballast type could not be made it was assumed that light fixtures in these areas were installed prior to 1980 and therefore deemed PCB-containing. At the time of light fixture removal, ballast information should be compared to the information provided in the Environment Canada document entitled *"Identification of Lamp Ballasts Containing PCBs" (Report EPS 2/CC/2 (revised) August 1991)* to aid in identification.

Sampling of dielectric fluids, grease, or other compounds was not conducted to verify the presence/absence of PCBs. Inspection and testing of other materials for PCB content, including (but not limited to) caulking, asphalt, oil-based paint, plastics, switches, electric cables and hydraulic fluids was beyond the scope of our assessment.

Ozone Depleting and Global Warming Substances

The presence of fixed equipment likely to contain ozone-depleting substances (ODS) and/or global-warming substances (GWS) was identified through visual inspection and knowledge of the timeline of historical use. This included equipment such as chillers, air-conditioners, walk-in refrigeration and freezer units and fixed dry-chemical fire extinguishers, where chemicals such as hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs) or halons may be present. Where possible, information regarding the type and quantity of refrigerant present was obtained from the manufacturer nameplate. Our visual assessment was limited to fixed equipment within the areas assessed and did not include portable equipment such as stand-alone refrigerators, freezers, water coolers, air-conditioners and fire extinguishers, etc.

2.3 Condition Assessment Criteria for Asbestos-Containing Materials

The condition of asbestos-containing materials identified within the surveyed areas was assessed as Good (G), Fair (F) or Poor (P). The assessment criteria used to determine condition is dependent on material characteristics, such as friability. The following Table summarizes the criteria used by Safetech to evaluate the condition of ACM.

Table 2: Condition Assessment Criteria for Asbestos-Containing Materials

Sprayed Fireproofing, Sprayed Insulation and Sprayed Texture Finishes	
Good	• Surface shows no significant signs of damage, deterioration, or delamination (i.e. <1%). • Unencapsulated or unpainted fireproofing or texture finishes, where no delamination or damage is observed. • Encapsulated fireproofing or texture finishes where encapsulation applied after damage or fallout.
Fair	• Not utilized as part of condition assessment for these materials.
Poor	• Greater than 1% damage, delamination, or deterioration to surface.
In areas where damage exists in isolated locations, both Good and Poor may be applicable.	
Mechanical Insulation (boilers, breeching, ductwork, piping, tanks, equipment, etc.)	
Good	• Insulation completely covered in jacketing and exhibits no evidence of damage or deterioration. • Jacketing may have minor damage (i.e. scuffs or stains), but is not penetrated.
Fair	• Minor penetrating damage to jacketed insulation (cuts, tears, nicks, deterioration or delamination). • Undamaged insulation that had never been jacketed. • Insulation is exposed but not showing surface disintegration. • Extent of missing insulation ranges from minor to none. • Damage that can be repaired.
Poor	• Original insulation jacket is missing, damaged, deteriorated, or delaminated. • Insulation is exposed and significant areas have been dislodged. • Damage that cannot be easily repaired.
Non-Friable and Potentially Friable Materials (includes materials such as plaster finishes, drywall compound, ceiling tiles, asbestos cement products, vinyl asbestos tile and asbestos paper backed vinyl sheet flooring, etc., which have the potential to become friable when handled)	
Good	• No significant damage. • Material may be cracked or broken but is stable and not likely to become friable upon casual contact. • No friable debris present
Fair	• Not utilized as part of condition assessment for these materials.
Poor	• Material is severely damaged. • Debris is present or binder has disintegrated to the point where the material has become friable.
Asbestos-Containing Debris (noted separately from the presumed source material)	
Poor	• Debris is always considered to be in Poor condition.

3.0 RESULTS

Results of our visual assessment and bulk sample analytical findings are summarized in the sections below.

3.1 Designated Substances

3.1.1 *Asbestos*

Historical Sample Results

Laboratory reported results of bulk material sampled collected historically by MTE Consultants Inc. were referenced and relied upon during this assessment. Verification samples were collected and analyzed where any data gaps or inconsistencies were identified.

Data from the historical samples collected by MTE Consultants Inc. are listed below in Table 3a. Materials have been classified by Safetech as "ACM", "Non-ACM", "Suspected ACM" or "Presumed Non-ACM" based on the original analytical results.

Table 3a
Historical Bulk Sample Analytical Results for Determination of Asbestos Content (2007 to 2016)
Avon Crest Facility of Stratford General Hospital
86 John Street South, Stratford, ON
Historical Designated Substance and Hazardous Building Material Audits

Sample No.	Material Description	Sample Location	Asbestos Content	Material Classification
2007 Asbestos Audit				
S01C	**Tan Ceiling Plaster**	**Laundry and Power Plant**	**1.3% Chrysotile**	**ACM**
S02A	**Parging over Insulation**	**Laundry and Power Plant**	**40% Chrysotile**	**ACM**
S03A	**Parging on Header of Boiler 2**	**Laundry and Power Plant**	**Trace % Chrysotile***	**Suspect ACM†**
S04A	**Boiler Breeching**	**Laundry and Power Plant**	**50% Chrysotile**	**ACM**
S05A	**Insulation on Hot Water Tank**	**Laundry and Power Plant**	**60% Chrysotile**	**ACM**
S06A	Sweat Wrap on Boiler 2	Laundry and Power Plant	None Detected	Non-ACM
S06B				
S06C				

Sample No.	Material Description	Sample Location	Asbestos Content	Material Classification
S07	**Pipe Insulation on Low Pressure Steam Pipe**	**Laundry and Power Plant**	**None Detected**	**Suspect ACM†**
S08A S08B S08C	Parging on City Water Valve	Laundry and Power Plant	None Detected	Non-ACM
S09	**Mag Block Pipe Insulation on Steam Pipe**	**Laundry and Power Plant**	**20% Chrysotile 20% Amosite**	**ACM**
S10A	**Aircell Pipe Insulation on Cold Water Pipe**	**Laundry and Power Plant**	**50% Chrysotile**	**ACM**
S11A S11B S11C	Sweat Wrap on Cold Water Pipe	Laundry and Power Plant	None Detected	Non-ACM
S12	White Wall Plaster	Room 030	None Detected	Non-ACM
S13	White Wall Plaster	Room 030	None Detected	Non-ACM
S14	**Caposite Pipe Insulation on Hot Water Pipe**	**Room 035**	**90% Amosite**	**ACM**
S15	White Wall Plaster	Stairwell No. 2	None Detected	Non-ACM
S16	White Wall Plaster	Corridor	None Detected	Non-ACM
S18A	**Tan Wall Texture Coat**	**Room 024**	**10% Chrysotile**	**ACM**
S19	White Wall Plaster	Corridor	None Detected	Non-ACM
S20A S20B S20C	White Vinyl Sheet Flooring	North Wing Lobby	None Detected	Non-ACM
S21A S21B S21C	Grey Cobblestone Vinyl Sheet Flooring	West Wing Room 117	None Detected	Non-ACM
2012 Designated Substance Audit				
S14A	**9" x 9" Floor Tile – Beige with Rust Fleck** **2 Phases** **a) Vinyl Floor Tile** **b) Mastic**	**Basement**	**a) 3.8% Chrysotile**	**ACM (Vinyl Floor Tile Only)**
			b) None Detected	
S14B			a) Not Analyzed	
			b) None Detected	
S14C			a) Not Analyzed	
			b) None Detected	
S15A S15B S15C	Black Floor	Basement	None Detected	Non-ACM

Sample No.	Material Description	Sample Location	Asbestos Content	Material Classification
S16A	**9" x 9" Floor Tile – Grey with White Fleck**	**Basement Centre Corridor**	**1.2% Chrysotile**	**ACM (Vinyl Floor Tile and Mastic)**
S16B			Not Analyzed	
S16C				
S17A	Gold Pebble Vinyl Sheet Flooring	Power Plant Office	None Detected	Non-ACM
S17B				
S17C				
S18A	**12" x 12" Floor Tile – White with Green Fleck** **2 Phases** **a) Vinyl Floor Tile** **b) Mastic**	**Level 1 Corridor**	**a) 1.3% Chrysotile**	**ACM (Vinyl Floor Tile Only)**
			b) None Detected	
S18B			a) Not Analyzed	
			b) None Detected	
S18C			a) Not Analyzed	
			b) None Detected	
S19A	**12" x 12" Floor Tile – Green with White Fleck** **2 Phases** **a) Vinyl Floor Tile** **b) Mastic**	**Level 1 Corridor**	**a) 1.4% Chrysotile**	**ACM (Vinyl Floor Tile Only)**
			b) None Detected	
S19B			a) Not Analyzed	
			b) None Detected	
S19C			a) Not Analyzed	
			b) None Detected	
S20a	Plaster 2 Phases a) Plaster – White b) Plaster – Tan	Basement	None Detected	Non-ACM
S20b		Basement		
S20c		1st Floor		
S20d		1st Floor		
S20e		2nd Floor		
S20f		2nd Floor		
S20g		2nd Floor		
S21a	**9" x 9" Floor Tile – Grey with White Fleck**	**221**	**0.75% Chrysotile**	**ACM (Vinyl Floor Tile and Mastic)**
S21b			Not Analyzed	
S21c				
S22a	**12" x 12" Floor Tile – Green**	**3rd Floor Corridor**	**2.2% Chrysotile**	**ACM (Vinyl Floor Tile and Mastic)**
S22b			Not Analyzed	
S22c				
S23a	**12" x 12" Floor Tile – White with Multi Colour Fleck**	**3rd Floor Corridor**	**1.4% Chrysotile**	**ACM (Vinyl Floor Tile and Mastic)**
S23b			Not Analyzed	
S23c				
S24a	**Beige Vinyl Sheet Flooring**	**338**	**25% Chrysotile**	**ACM**
S24b			Not Analyzed	
S24c				
S25a	**Brown Vinyl Sheet Flooring**	**338**	**25% Chrysotile**	**ACM**
S25b			Not Analyzed	
S25c				

Sample No.	Material Description	Sample Location	Asbestos Content	Material Classification
S26a	**9" x 9" Floor Tile – Red with White Fleck** **2 Phases** **a) Vinyl Floor Tile** **b) Mastic**	**308**	**a) 2.3% Chrysotile**	**ACM (Vinyl Floor Tile Only)**
			b) None Detected	
S26b			a) Not Analyzed	
			b) None Detected	
S26c			a) Not Analyzed	
			b) None Detected	
2016 Asbestos Audit Update (May 13, 2016)				
S01a S01b S01c	Pre-formed White Pipe Insulation (reported as "Mag. Block")	Power Plant Basement	None Detected	Non-ACM
S02a	**Mag. Block on Ducting/Boilers**	**Power Plant Basement**	**65% Chrysotile**	**ACM**
S02b S02c			Not Analyzed	
2016 Asbestos Audit Update (July 8, 2016)				
S08a	**9" x 9" Floor Tile – Blue with White Streak**	**2nd Floor Elevator Storage**	**2.18% Chrysotile**	**ACM (Vinyl Floor Tile and Mastic)**
S08b S08c			Not Analyzed	
S09a	**9" x 9" Floor Tile – Dark Grey with White/Red Streak**	**348**	**2.18% Chrysotile**	**ACM (Vinyl Floor Tile and Mastic)**
S09b S09c			Not Analyzed	
S10a	**Red Pebble Vinyl Sheet Flooring**	**353**	**20% Chrysotile**	**ACM**
S10b S10c			Not Analyzed	

*Trace means that asbestos was detected at a low concentration (i.e. <0.25%) that is not quantifiable.
† = An adequate number of samples were not collected during previous audits to classify this material as non-asbestos-containing. However, similar materials were classified as ACM, therefore this material is classified as ACM.

Results of bulk sample analysis collected for the determination of asbestos content retrieved by Safetech during the 2019 and 2021 DSHM assessments are summarized in Table 3b below. Materials have been classified as “ACM”, “Non-ACM”, “Suspected ACM”, or “Presumed Non-ACM” based on analytical results.

Refer to the reports listed in section 1.2 above, that were prepared by Safetech, for locations of bulk samples and laboratory certificates of analysis.

Table 3b
Bulk Sample Analytical Results for Determination of Asbestos Content
(2019 to 2021)
Avon Crest Facility of Stratford General Hospital
86 John Street South, Stratford, ON
DSHM Assessment Updates 2019 and 2021

Sample No.	Material Description	Sample Location	Asbestos Content	Material Classification
2019 Designated Substance and Hazardous Materials Assessment Update (March 22, 2019)				
AV-S01a	Black Roof Tar	Roof	None Detected	Non-ACM
AV-S01b				
AV-S01c				
AV-S02a	Grey Building Caulking	Elevator Machine Room - Exterior	None Detected	Non-ACM
AV-S02b				
AV-S02c				
AV-S03a	**Door Caulking** **2 Phases:** **a) White caulking** **b) Black caulking**	**Exterior Door**	**a) 2% Chrysotile**	**ACM**
AV-S03b			b) None Detected a) Not Analyzed	
AV-S03c			b) None Detected a) Not Analyzed b)None Detected	
AV-S04a	**Black Tar Flooring**	**#344 Storage Room**	**10% Chrysotile**	**ACM**
AV-S04b			Not Analyzed	
AV-S04c				

Sample No.	Material Description	Sample Location	Asbestos Content	Material Classification
2021 Designated Substance and Hazardous Materials Assessment Update (September 30, 2021)				
AV-R11a	**Sweat Wrap** 3 Phases: a) Beige, woven fibrous material b) Grey, cementitious material with fibres c) Grey, fibrous	**Basement – East Corridor**	a) None Detected b) **40% Chrysotile** c) None Detected	**ACM**
AV-R11b	**Sweat Wrap** 3 Phases: a) Grey, cementitious material with fibres b) Grey, fibrous c) Black, fibrous with tar	**Basement – Centre Corridor**	a) **40% Chrysotile** b) None Detected c) None Detected	
AV-R11c	Sweat Wrap 2 Phases: a) Brown, layered paper b) Black, fibrous with tar	Basement – East Corridor	a) None Detected b) None Detected	

As per Ontario Regulation 278/05, ACM contains ≥0.5% asbestos by dry weight.

Project-Specific / Demolition Level Sample Results

Results of bulk sample analysis for the sampled collected during this this project-specific assessment are summarized in Table 1c below. These samples were collected to verify additional suspect asbestos-containing materials that previously could not be sampled without compromising those materials or were concealed by building systems and discovered during intrusive assessment. Materials have been classified as “ACM” or “Non-ACM”, based on analytical results. The Laboratory Certificates of Analysis are included in Appendix C.

TABLE 3c
Bulk Sample Analytical Results for Determination of Asbestos Content
Avon Crest Facility of Stratford General Hospital
86 John Street South, Stratford, ON
Sample Collection Date: February 17, 2023

Sample No.	Material Description	Sample Location	Asbestos Content	Material Classification
AVC23-AVUL01a	Floor Underlay	Third Floor West Wing	None Detected	Non-ACM
AVC23-AVUL01b				
AVC23-AVUL01c				
AVC23-AVWC01a	Window Caulking (Avon Crest)	Exterior Window – South Wall	None Detected	Non-ACM
AVC23-AVWC01b		Exterior Window – East Wall		
AVC23-AVWC01c		Exterior Window – North Wall		
AVC23-AVRM01a	Roof Membrane	Flat Roof West Wing	None Detected	Non-ACM
AVC23-AVRM01b				
AVC23-AVRM01c				

Sample No.	Material Description	Sample Location	Asbestos Content	Material Classification
AVC23-LPWC01a	Window Caulking (Laundry/Power Plant)	Upper Level Exterior Window – Laundry Room East Wall	None Detected	Non-ACM
AVC23-LPWC01b		Upper Level Exterior Window – Power Plant South Wall		
AVC23-LPWC01c		Ground Level Exterior Window – Power Plant South Wall		
AVC23-AVBM01a	**Black Floor Mastic**	Second Floor – Centre Corridor	**3% Chrysotile**	**ACM**
AVC23-AVBM01b		Third Floor – North Corridor	Not Analyzed	
AVC23-AVBM01c		First Floor – West Corridor		
AVC23-LPCK01a	Building Joint Caulking (Grey)	Laundry & Power Plant Exterior Building Joints	None Detected	Non-ACM
AVC23-LPCK01b				
AVC23-LPCK01c				
AVC23-PPRM01a	Roof Membrane (Lower Roof)	Southeast Roof	None Detected	Non-ACM
AVC23-PPRM01b				
AVC23-PPRM01c		South Roof		
AVC23-PPRM02a	Roof Membrane (Upper Roof)	Upper Roof	None Detected	Non-ACM
AVC23-PPRM02b				
AVC23-PPRM02c				
AVC23-SW01a	Sweat Wrap	City Water Line Power Plant Crawlspace Service Tunnel	None Detected	Non-ACM
AVC23-SW01b		City Water Line Power Plant Crawlspace Service Tunnel		
AVC23-SW01c		Soft Water Line Power Plant Crawlspace Service Tunnel		

Sample No.	Material Description	Sample Location	Asbestos Content	Material Classification
AVC23-BRB01a	Refractory Brick	Power Plant Boilers	None Detected	Non-ACM
AVC23-BRB01b				
AVC23-BRB01c				
AVC23-BrMr01a	Brick Mortar	Laundry Room – Exterior East Wall	None Detected	Non-ACM
AVC23-BrMr01b		Laundry Room – Interior South Wall		
AVC23-BrMr01c		Avoncrest – Exterior East Wall		
AVC23-BrMr01d		Avoncrest – Exterior North Wall		
AVC23-BrMr01e		Avoncrest – Exterior West Wall		
AVC23-SW02a	Sweat Wrap Pipe Insulation	Room 204	None Detected	Non-ACM
AVC23-SW02b		Room 238		
AVC23-SW02c		Room 239		
AVC23-AVJC01a	Building Joint Caulking	North Wing	None Detected	Non-ACM
AVC23-AVJC01b		West Wing, South Side		
AVC23-AVJC01c		West Wing, North Side		
AVC23-IWC01a	Interior Window Caulking (White)	Room 123	None Detected	Non-ACM
AVC23-IWC01b		Room 125		
AVC23-IWC01c		Room 128		
AVC23-LNRM01a	Roof Membrane	Laundry Building (East Lower Roof)	None Detected	Non-ACM
AVC23-LNRM01b		Laundry Building (Middle (Upper) Roof)		
AVC23-LNRM01c		Laundry Building (West Lower Roof)		

Results of Assessment for Asbestos-Containing Materials

Materials assessed for asbestos content are summarized in Table 4 based on the type/use of the material. The condition and friability of materials confirmed or suspected to be asbestos-containing (based on our visual assessment and the results of bulk sample analysis) is provided. Condition (Cond.) ratings are provided as Good (G), Fair (F) or Poor (P) based on our methodized Assessment Criteria. Estimates of quantities have been provided for confirmed or suspected asbestos-containing materials.

TABLE 4
Results of Assessment for Asbestos-Containing Materials
Avon Crest Facility of Stratford General Hospital
86 John Street South, Stratford, ON

Sprayed and Loose Fill Insulating Materials	Location/Description	Cond.	Est. Quantity	Friability
Sprayed Fireproofing	None identified in the area(s) assessed.	N/A	N/A	N/A
Sprayed Insulation	None identified in the area(s) assessed.	N/A	N/A	N/A
Loose Fill / Vermiculite Insulation	Intrusive inspection was conducted in representative locations of exterior walls throughout the building. No vermiculite was identified. Loose fill vermiculite insulation is not suspected present within the facility.	N/A	N/A	N/A
Thermal System Insulation	**Location/Description**	**Cond.**	**Est. Quantity**	**Friability**
Mechanical Pipe Insulation – Straights	**Aircell pipe insulation**, a common asbestos-containing pipe insulation, was identified within the power plant office and the crawlspace underneath the former porch area. The material was sampled during the 2007 DSHM survey and was determined to contain 50% Chrysotile asbestos (refer to sample **S10a** of Table 3a).	**G**	**38 m**	**Friable**
	Mag. Block pipe insulation was identified within the power plant office on steam pipes. The material was sampled during the 2007 DSHM survey and was determined to contain 20% Chrysotile and 20% Amosite asbestos (refer to sample **S09** of Table 3a).	**G**	**2 m**	**Friable**
	Caposite pipe insulation was identified within the basement in rooms 030 and 035. The material was sampled during the 2007 DSHM survey and was determined to contain 90% Amosite asbestos (refer to sample **S14** of Table 3a).	**G**	**10 m**	**Friable**

Mechanical Pipe Insulation – Straights (Continued))	**Sweat wrap insulation** was observed on cold water piping within the power plant. The material was sampled during the 2007 DSHM survey and determined to be non-asbestos containing (refer to sample set **S11** in Table 3a).	N/A	N/A	N/A
	Sweat wrap insulation was identified present on a boiler within the power plant. The material was sampled during the 2007 DSHM survey and was determined to be non-asbestos (refer to sample set **S06** in Table 3a).	N/A	N/A	N/A
	Sweat wrap insulation was identified on "city water" lines and "soft water" piping within the service tunnel between the power plant and the west wing of the basement. The material was sampled and determined to be non-asbestos containing (refer to sample set **AVC23-SW01** in Table 3c).			
	Sweat wrap insulation was discovered on cold water piping within enclosed service chases in the north and west wings. The material was sampled and determined to be non-asbestos containing (refer to sample set **AVC23-SW02** in Table 3c).			
	Sweat wrap insulation was identified present on 6" pipes entering the basement of the Avon Crest building from the service tunnels and extending down the East and Centre corridors to Stair No. 3, where they turn and enter the stairwell and exit at the foundation wall. The material was sampled during the 2019 HDMS Update as part of the West Building survey (refer to sample set **W-S32** in Table 3b). This material was additionally sampled within the Avon Crest basement and confirmed present during the 2021 DSHM Update (refer to sample set **A-R11** in Table 3b) and was confirmed to be asbestos-containing.	**G**	**130 m**	**Non-Friable**
	All other pipe straights were observed to be uninsulated or insulated with non-asbestos fibreglass insulation.	N/A	N/A	N/A
Mechanical Pipe Insulation – Fittings (elbows, valves, tees, hangars, etc.)	**Parged cement insulation** in good condition was identified on pipe fittings (i.e., elbows, valves, tees, etc.) throughout the basement, first floor, second floor, and power plant (refer to figures H100 to H105 for locations). The material was sampled during the 2007 DSHM survey and found to contain up to 40% Chrysotile asbestos (refer to sample set **S02, S03, S08** of Table 3a (2007)). Due to the fact that non-asbestos and asbestos parging cement are not visually distinguishable, all parging cement within the facility should be treated as asbestos.	**G**	**1,948 ea.**	**Friable**

Mechanical Pipe Insulation – Fittings (elbows, valves, tees, hangars, etc.) (Continued)	**Parged cement insulation** in fair condition was identified on pipe fittings (i.e., elbows, valves, tees, etc.) within the crawlspace beneath the former porch area. The material was sampled during the 2007 DSHM survey and found to contain up to 40% Chrysotile asbestos (refer to sample set **S02, S03, S08** of Table 3a (2007)). Due to the fact that non-asbestos and asbestos parging cement are not visually distinguishable, all parging cement within the facility should be treated as asbestos.	**F**	**30 ea.**	**Friable**
	Parged cement insulation in poor condition was identified on pipe fittings (i.e. elbows, valves, tees, etc.) within the power plant, power plant laundry, room 016, and the basement corridor (refer to figures H100 to H105 for specific locations). The material was sampled during the 2007 DSHM survey and found to contain up to 40% Chrysotile asbestos (refer to sample set **S02, S03, S08** of Table 3a (2007)). Due to the fact that non-asbestos and asbestos parging cements are not visually distinguishable, all parging cement within the facility should be treated as asbestos.	**P**	**7 ea.**	**Friable**
	Parged cement insulation was identified on **pipe hangers** in the centre and east corridors in the basement. The parging cement insulation was visually confirmed to be the same material as parged cement insulation identified on pipe fittings, which was sampled during the 2007 DSHM survey and found to contain up to 40% Chrysotile asbestos (refer to sample set **S02, S03, S08** of Table 3a).	**G**	**180 ea.**	**Friable**
	All other pipe fittings were observed to be uninsulated or insulated with non-asbestos fibreglass insulation.	N/A	N/A	N/A
HVAC Duct Insulation	None identified in the area(s) assessed.	N/A	N/A	N/A
Breeching / Exhaust Insulation	**Boiler breeching** was observed in the power plant. The material was sampled during the 2007 DSHM survey and determined to contain 50% Chrysotile asbestos (refer to sample **S04** in Table 3a).	**G**	**310 m^2**	**Friable**
Tank Insulation	**Insulation on hot water tanks** was identified present within the power plant. The material was sampled during the 2007 DSHM survey and was determined to contain 60% Chrysotile asbestos (refer to sample set **S05** in Table 3a).	**G**	**21 m^2**	**Friable**
Boiler Insulation	**Mag. Block insulation** was identified present on boilers within the power plant. The material was sampled during the May 13, 2016 DSHM survey and was determined to contain 65% Chrysotile asbestos (refer to sample set **S02** in Table 3a (2016)).	**G**	**146 m^2**	**Friable**

Duct Vibration Dampeners	**Duct vibration dampeners** within the assessed area were noted to be constructed of a non-asbestos vinyl material	N/A	N/A	N/A
Other Mechanical Equipment Insulation	**Gaskets** associated with mechanical equipment (i.e. boilers, steam lines, etc.) are suspected to contain asbestos.	**N/D**	**N/D**	**N/D**
	Unit Heater Mechanical Insulation (parged asbestos cement applied over cork) on ceiling-mounted unit heaters within the laundry facility. The material was sampled during the 2007 DSHM survey and found to contain 40% Chrysotile asbestos (refer to sample set **S02** of Table 3a (2007)).	**G**	**18 m^2**	**Friable**
	Remaining mechanical equipment was either un-insulated or insulated with fiberglass insulation.	N/A	N/A	N/A
Architectural Finishes & Finishing Materials	**Location/Description**	**Cond.**	**Est. Quantity**	**Friability**
Sprayed Texture / Stucco Finishes	**Tan ceiling texture coat** (soft) was identified present within Storage Room 024. The material was sampled during the 2007 DSHM survey and determined to contain 10% Chrysotile asbestos (refer to sample **S18** in Table 3a).	**G**	**25 m^2**	**Friable**
Plaster Finishes	Original **plaster finishes** are present throughout the Avon Crest facility. The material was sampled during the 2007 DSHM survey and was found to be non-asbestos (refer to samples **S12, S13, S15, S16, S19** in Table 3a). Seven (7) confirmatory samples were taken during the 2012 DSHM survey and the material was confirmed to be non-asbestos (refer to sample set **S20** in Table 3a).	N/A	N/A	N/A
	Tan ceiling plaster was observed within the Laundry and Power Plant. The material was sampled during the 2007 DSHM survey and determined to contain 1.3% Chrysotile asbestos (refer to sample **S01** in Table 3a).	**G**	**200 m^2**	**Non-Friable**
Drywall Joint Compound	None identified in the area(s) assessed.	N/A	N/A	N/A

Ceiling Tiles	Location/Description	Cond.	Est. Quantity	Friability
Lay-in Acoustic Ceiling Tiles	Various styles of ceiling tile were visually identified throughout the assessed area, but contained manufacture's stamps on the back that indicated that the tile was manufactured subsequent to the time when asbestos was used in these materials.	N/A	N/A	N/A
Glued-on Acoustic Ceiling Tiles	None identified in the area(s) assessed.	N/A	N/A	N/A
Transite Ceiling Panels	**Transite ceiling panels** are present within the Power Plant Office and in the Valve Room (025A). This material was visually confirmed by the assessor to be asbestos-containing.	**G**	**51 m^2**	**Non-Friable**
Flooring	**Location/Description**	**Cond.**	**Est. Quantity**	**Friability**
Vinyl Floor Tiles	**9" x 9" Beige with Rust Fleck Vinyl Floor Tile** was identified present in the storage rooms (002, 003, 004, 005, 006), locker room (026) and the payroll office (137). The material was sampled during the 2012 DSHM survey and was determined to contain 3.8% Chrysotile asbestos (refer to sample set **S14** of Table 3a). The associated floor tile mastic was sampled in one (1) location and determined to be non-asbestos. In accordance with the requirements of Table 3 of Ontario Regulation 278/05, three (3) samples of floor tile mastic must be collected to determine that the material is non-asbestos-containing.	**G**	**1,193 m^2 (Total of All Vinyl Floor Tile Styles)**	**Non-Friable**
	9" x 9" Grey with White Fleck Vinyl Floor Tile was identified present in the pump room (030), carpentry rooms (031, 036, 037), north basement corridor, centre third floor corridor, storage rooms (316, 319), offices (318, 350, 351) and medical record rooms (321, 322, 323, 324, 326). The material was sampled during the 2012 DSHM survey and was determined to contain 1.2% Chrysotile asbestos (refer to sample set **S16** of Table 3a). The associated floor tile mastic was not sampled and is suspected to contain asbestos.	**G**		**Non-Friable**

Vinyl Floor Tiles (Continued)	**12" x 12" White with Green Fleck Vinyl Floor Tile** was identified present in the first floor south, centre and west corridors, storage rooms (115, 134, 228), office room (135), second floor centre and west corridors and stairwells No. 1 and No. 2. The material was sampled during the 2012 DSHM survey and was determined to contain 1.3% Chrysotile asbestos (refer to sample set **S18** of Table 3a). The associated floor tile mastic was sampled in one (1) location and determined to be non-asbestos. In accordance with the requirements of Table 3 of Ontario Regulation 278/05, three (3) samples of floor tile mastic must be collected to determine that the material is non-asbestos-containing.	**G**	**1,193 m^2 (Total of All Vinyl Floor Tile Styles)**	**Non-Friable**
	12" x 12" Green with White Fleck Vinyl Floor Tile was identified present in the first floor centre and west corridors, storage rooms (115, 134, 221, 228), office room (135), second floor centre and west corridors and the conference room (355). The material was sampled during the 2012 DSHM survey and was determined to contain 1.4% Chrysotile asbestos (refer to sample set **S19** of Table 3a). The associated floor tile mastic was sampled in two (2) location and determined to be non-asbestos. In accordance with the requirements of Table 3 of Ontario Regulation 278/05, three (3) samples of floor tile mastic must be collected to determine that the material is non-asbestos-containing.	**G**		**Non-Friable**
	12" x 12" Grey with White Fleck Vinyl Floor Tile was identified present in the storage rooms (025, 105), sewing room (028A), office rooms (125, 221), and the floor medical records room (327). The material was sampled during the 2012 DSHM survey and was determined to contain 1.2% Chrysotile asbestos (refer to sample set **S21** of Table 3a). The associated floor tile mastic was not sampled and is suspected to contain asbestos.	**G**		**Non-Friable**
	12" x 12" Green Vinyl Floor Tile was identified present on the landing of stairwell No.3. The material was sampled during the 2012 DSHM survey and was determined to contain 2.2% Chrysotile asbestos (refer to sample set **S22** of Table 3a). The associated floor tile mastic was not sampled and is suspected to contain asbestos.	**G**		**Non-Friable**

Vinyl Floor Tiles (Continued)	**12" x 12" White with Multi-Coloured Fleck Vinyl Floor Tile** was identified present on stairwell No. 4. The material was sampled during the 2012 DSHM survey and was determined to contain 1.4% Chrysotile asbestos (refer to sample set **S23** of Table 3a). The associated floor tile mastic was sampled in one (1) location and determined to be non-asbestos. In accordance with the requirements of Table 3 of Ontario Regulation 278/05, three (3) samples of floor tile mastic must be collected to determine that the material is non-asbestos-containing.	**G**	**1,193 m^2 (Total of All Vinyl Floor Tile Styles)**	**Non-Friable**
	9" x 9" Red with White Fleck Vinyl Floor Tile was identified present in the storage room (024), the lunch room (308) and the elevator room (313). The material was sampled during the 2012 DSHM survey and was determined to contain 2.3% Chrysotile asbestos (refer to sample set **S26** of Table 3a). The associated floor tile mastic was also sampled and was determined to be non-asbestos containing.	**G**		**Non-Friable**
	9" x 9" Blue with White Streak Vinyl Floor Tile was identified present in the elevator room on the second floor. The material was sampled during the July 8, 2016 DSHM survey and was determined to contain 2.18% Chrysotile asbestos (refer to sample set **S08** of Table 3a). The specific locations of this style of vinyl floor tile were not reported in the previous audit; however, the overall extent of all asbestos-containing vinyl floor tile styles are indicated on the attached figures H100 to H105 in Appendix B. The associated floor tile mastic was not sampled and is suspected to contain asbestos.	**G**		**Non-Friable**
	9" x 9" Dark Grey with White and Red Streak Vinyl Floor Tile was identified present in the storage rooms (344, 348). The material was sampled during the July 8, 2016 DSHM survey and was determined to contain 2.18% Chrysotile asbestos (refer to sample set **S09** of Table 3a). The associated floor tile mastic was not sampled and is suspected to contain asbestos.	**G**		**Non-Friable**
Vinyl Sheet Flooring	**White Vinyl Sheet Flooring** was identified within the west wing of the facility. The material was sampled during the 2007 DSHM survey and was determined to be non-asbestos containing (refer to sample set **S20** in Table 3a).	N/A	N/A	N/A
	Grey Cobblestone Vinyl Sheet Flooring was identified within the north wing of the facility. The material was sampled during the 2007 DSHM survey and was determined to be non-asbestos containing (refer to sample set **S21** in Table 3a).	N/A	N/A	N/A

Vinyl Sheet Flooring	**Gold Pebble Vinyl Sheet Flooring** was identified within the facility. The material was sampled during the 2012 DSHM survey and was determined to be non-asbestos containing (refer to sample set **S17** in Table 3a).	N/A	N/A	N/A
	Beige Vinyl Sheet Flooring was identified present in the offices (107, 120, 120A, 121, 122, 124, 127 and 127A, 230), audiology rooms (109, 111, 112), corridor (118), payroll office (139), pace maker implants room (201), conference room (201A), treatment room (211), therapy rooms (212, 218, 220, 232), nursing archives room (229), washroom (325) and the medical records rooms (338, 339). The material was sampled during the 2012 DSHM survey and was determined to contain 25% Chrysotile asbestos (refer to sample set **S24** of Table 3a).	**G**	**1,132 m^2 (Total of All Vinyl Sheet Floor Styles)**	**Non-Friable**
	Brown Vinyl Sheet Flooring was identified present in the financial rooms (129, 129A, 130), offices (132, 202, 224), reception room (209), therapy rooms (223, 225), conference room (227), storage room (237), physiotherapy room (238), third floor east corridor and medical records rooms (338, 343). The material was sampled during the 2012 DSHM survey and was determined to contain 25% Chrysotile asbestos (refer to sample set **S25** of Table 3a).	**G**		**Non-Friable**
	Red Pebble Vinyl Sheet Flooring was identified present in the conference room (205) and offices (222, 353). The material was sampled during the July 8, 2016 DSHM survey and was determined to contain 20% Chrysotile asbestos (refer to sample set **S10** of Table 3a).	**G**		**Non-Friable**
Tarred Flooring Underlay	A **Tarred Flooring Underlay** was identified underneath vinyl sheet floor on the third floor of the west wing of Avon Crest. This material was sampled and found to be non-asbestos (refer to sample set **AVC23-AVUL01** in Table 3c)			
Other Flooring Materials	**Black Floor Topping** was identified within the storage room (344). The material was sampled and determined to contain 10% Chrysotile asbestos (refer to sample set **AV-S04** in Table 3b).	**G**	**4 m^2**	**Non-Friable**
	Black Mastic was identified underneath vinyl floor tiles and vinyl sheet flooring throughout the facility. This material was sampled and was determined to contain 3% Chrysotile asbestos (refer to sample set **AVC23-AVBM01** in Table 3c).	**G**	**2,325 m^2**	**Non-Friable**

Asbestos Cement Products	Location/Description	Cond.	Est. Quantity	Friability
Piping	None identified in areas assessed.	N/A	N/A	N/A
Roofing, Siding, Wallboard	None identified in areas assessed.	N/A	N/A	N/A
Other Cement Products	None identified in areas assessed.	N/A	N/A	N/A
Misc. Materials	**Location/Description**	**Cond.**	**Est. Quantity**	**Friability**
Caulking and Window Putty	**Grey Elevator Caulking** was identified around the exterior of the elevator shaft in the elevator machine room. The material was sampled and determined to be non-asbestos containing (refer to sample set **AV-S02** in Table 3b).	N/A	N/A	N/A
	Grey Building Joint Caulking was identified at exterior building joints throughout the Avon Crest Facility. The material was sampled and determined to be non-asbestos containing (refer to sample set **AVC23-AVJC01** in Table 3c)	N/A	N/A	N/A
	Grey Building Joint Caulking was identified at exterior building joints throughout the Laundry and Power Plant building. The material was sampled and determined to be non-asbestos containing (refer to sample set **AVC23-LPCK01** in Table 3c)	N/A	N/A	N/A
	White Window Caulking was identified at exterior window frames throughout the Avon Crest facility. The material was sampled and determined to be non-asbestos containing (refer to sample set **AVC23-AVWC01** in Table 3c)	N/A	N/A	N/A
	White Window Caulking was identified at exterior window frames throughout the Laundry and Power Plant facility. The material was sampled and determined to be non-asbestos containing (refer to sample set **AVC23-LPWC01** in Table 3c)	N/A	N/A	N/A
	White Window Caulking was identified at interior window frames throughout the Avon Crest facility. The material was sampled and determined to be non-asbestos containing (refer to sample set **AVC23-IWC01** in Table 3c)	N/A	N/A	N/A
	Door Caulking was identified around exterior facility doors. The material was sampled and determined to contain 2% Chrysotile asbestos (refer to sample set **AV-S03** in Table 3b).	**G**	**40 m**	**Non-Friable**
Roofing Materials	**Black Roof Tar** was identified present on the building roof. The material was sampled and determined to be non-asbestos containing (refer to sample set **AV-S01** in Table 3b).	N/A	N/A	N/A

Roofing Materials (Continued)	**Bitumen and Ballast Roof Membrane** is present over part of the west wing of the Avon Crest Facility. The membrane was sampled and determined to be non-asbestos containing (refer to sample set **AVC23-AVRM01** in Table 3c).	N/A	N/A	N/A
	Bitumen and Ballast Roof Membrane is present on the power plant roofs. The membrane was sampled and determined to be non-asbestos containing (refer to sample set **AVC23-PPRM01** in Table 3c).	N/A	N/A	N/A
	Bitumen and Ballast Roof Membrane is present on the power plant roofs. The membrane was sampled and determined to be non-asbestos containing (refer to sample set **AVC23-PPRM02** in Table 3c).	N/A	N/A	N/A
	Bitumen and Ballast Roof Membrane is present on the laundry building roof. The membrane was sampled and determined to be non-asbestos containing (refer to sample set **AVC23-LNRM01** in Table 3c).	N/A	N/A	N/A
Refractory Brick	**Refractory Brick** was present and accessible within the boilers in the power plant. This material was sampled and determined to be non-asbestos containing (refer to sample set **AVC23-BRB01** in Table 3c)	N/A	N/A	N/A
Brick Mortar	**Brick Mortar** was sampled in representative locations throughout the throughout the Avon Crest facility and the Laundry and Power Plant, including interior and exterior brick. This material was sampled and determined to be non-asbestos containing (refer to sample set AVC23-BrMr01 in Table 3c).	N/A	N/A	N/A
Fire Door Cores	**Fire Doors** were identified at elevator shafts on all floors and are presumed to enclose asbestos-containing core material. This material could not be access and sampled by normal means available to the inspector. Therefore the cores of these fire doors should be treated as asbestos-containing.	**G**	**6 ea.**	**Friable**
Other Materials	Asbestos may be a component of other materials within the assessed area(s) but were not sampled due to inaccessibility such as underground services. Any additional materials uncovered that are suspected of containing asbestos must be sampled prior to proceeding with any work.	N/D	N/D	N/D

Notes: N/A=Not Applicable; N/D=Not Determined

3.1.2 *Lead*

Historical sample results for the 2018 Designated Substance Audit Report by MTE Consultants Inc. were referenced during the assessment. Data from historical samples is summarized in Table 5a below.

Table 5a
Historical Results of Lead Content in Paint
Avon Crest Facility of Stratford General Hospital
86 John Street South, Stratford, ON
2018 Designated Substance and Hazardous Building Materials Audit

Sample No.	Location	Surface	Paint Colour	Lead Conc. (µg/g)	EACC Classification†
LP1	**3rd Floor West Corridor**	**Plaster**	**Yellow**	**2840**	**Lead-Containing**
LP2	**Room 338**	**Plaster**	**Light Orange**	**1540**	**Lead-Containing**
LP3	**Stair No. 2**	**Plaster**	**Beige**	**1540**	**Lead-Containing**
LP4	**Room 339**	**Plaster**	**Light Pink**	**1300**	**Lead-Containing**
LP5	**Room 331**	**Wood Window Trim**	**Light Grey**	**1920**	**Lead-Containing**
LP6	**Room 329**	**Plaster**	**Green**	**2580**	**Lead-Containing**
LP7	**Room 212**	**Plaster**	**Pink**	**2630**	**Lead-Containing**
LP8	**Roof Access Exterior Door**	**Wood**	**White**	**1780**	**Lead-Containing**
LP9	**Room 216**	**Plaster**	**White**	**2380**	**Lead-Containing**
LP10	**Room 109**	**Plaster**	**Dark Pink**	**28400**	**Lead-Based**
LP11	Room 109	Wood Window Trim	White	50	*"De Minimis"*
LP12	**Power Plant**	**Concrete Wall**	**Blue**	**3280**	**Lead-Containing**
LP13	Power Plant	Concrete Wall	White	818	*"De Minimis"*
LP14	**Stair No. 2**	**Wood Door**	**White**	**21700**	**Lead-Based**

LP15	North Fire Escape	Metal	Black	1790	Lead-Containing

Laboratory analytical results for paints tested during Safetech's 2019 Audit Update to determine lead content are summarized below in Table 5b. Refer to the original report for sample locations and certificates of analysis.

Table 5b
Results of Lead Content in Paint
Avon Crest Facility of Stratford General Hospital
86 John Street South, Stratford, ON
Sample Collection Dates: March 7 and March 11, 2019

Sample No.	Location	Surface	Paint Colour	Condition	Lead Conc. (µg/g)	EACC Classification†
AV-LP01	Exterior - Roof	Wood Trim	White	Poor	2790	Lead-Containing

Paint samples which were found to have concentrations below 1000 µg/g are considered to have a '*de minimis*' level of lead in paint (virtually safe) in accordance with the October 2014 Environmental Abatement Council of Canada (EACC) publication *Lead Guideline for Construction, Renovation, Maintenance or Repair* and require no extra precautions provided they and the surfaces they're adhered to are not aggressively disturbed (e.g. sand blasted).

Yellow, light orange, beige, light pink, light grey, green, pink, white, blue, and black paints sampled within the facility were found to contain between 1000 µg/g and 5000 µg/g and are considered 'lead-containing' in accordance with the October 2014 EACC *Lead Guideline for Construction, Renovation, Maintenance or Repair*. Materials coated with lead-containing paint require special procedures when performing work that may disturb them or their coatings.

Dark pink paint sampled from plaster walls in Room 109 and white paint sampled from exterior roof doors were found to contain above 5000 µg/g and are considered 'lead-based in accordance with the October 2014 EACC *Lead Guideline for Construction, Renovation, Maintenance or Repair*. Materials coated with lead-based paint require special procedures when performing work that may disturb them or their coatings.

Suspect lead-containing materials visually identified or suspected within the investigated areas include:

- Possible lead-containing batteries within emergency lighting;
- Solder in pipe fittings and electrical components;

- Ceramic tile glazing; and
- Sanitary drain pipe bell and spigot connection gaskets.

3.1.3 *Mercury*

Mercury is present throughout the facility in the form of vapour within fluorescent lamps. Mercury is also present in electrical switch gear, such as thermostat switches on the boiler regulator in the power plant.

3.1.4 *Silica*

A number of building materials were identified within the surveyed areas that are suspected to contain crystalline silica. This includes the following materials:

- Concrete/concrete block walls and associated mortar;
- Concrete flooring;
- Exterior brick walls and associated mortar;
- Plaster walls and ceilings;
- Texture coat on plaster ceilings;
- Textured plaster;
- Ceramic tiles and grout;
- Lay-in acoustic ceiling tiles;
- Window and door caulking; and
- Asphalt shingles and roof papers and felts.

3.1.5 *Other Designated Substances*

Acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxide, isocyanates, and vinyl chloride were not included in our assessment as these substances are not expected to be a significant component of building materials or present in a form that would represent an exposure concern. Additionally, no specific information regarding their use was provided to us. The presence of these substances at the site may have been noted based on the assessor's observation.

3.2 Other Hazardous Materials

3.2.1 *Chemical Hazards*

No visible evidence of UFFI installation (i.e. injection openings) or overspray of foam insulation at wall/ceiling joints was identified.

3.2.2 *Biological Hazards*

Mould Contamination

Significant mould growth is present throughout the north portion of the basement north wing of the facility (rooms 001-008). Severe water damage is also present at the junction between the north and west wings, near Elevator #1, on the second and third floor. Mould growth is present on susceptible materials in these areas.

3.2.3 *Environmental Hazards*

Polychlorinated Biphenyls (PCBs)

Ballasts associated with florescent light fixtures are suspected to contain PCBs.

Furthermore, stored ballasts without labels were present within the crawlspace beneath the former porch area, and should be treated as PCB-containing.

Ozone Depleting and Global Warming Substances

No equipment was identified that may contain Ozone Depleting / Global Warming Substance.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Designated Substances

4.1.1 *Asbestos*

Results of our assessment indicated that the following asbestos-containing materials are present within the Avon Crest Facility of Stratford General Hospital. Refer to Table 4 in section 3.1.1, above, for detailed locations of the following materials:

Friable Materials

- Aircell pipe insulation (refer to sample set **S10** in Table 3a). The material was found to be in good condition;
- Mag. Block pipe insulation (refer to sample set **S09** in Table 3a). The material was found to be in good condition;
- Caposite pipe insulation (refer to sample set **S14** in Table 3a). The material was found to be in good condition;
- Parged cement insulation on pipe fittings (refer to sample sets **S02, S03, and S08** in Table 3a). The material was found to be in good to poor condition;
- Boiler breeching (refer to sample set **S04** in Table 3a). The material was found to be in good condition;
- Mag block boiler insulation (refer to sample set **S02** in Table 3a). The material was found to be in good condition;
- Insulation on hot water tanks (refer to sample set **S05** in Table 3a). The materials was found to be in good condition;
- Mechanical insulation on ceiling-mounted unit heaters (refer to sample set **S02** in Table 3a). The material was found to be in good condition;
- Parging cement insulation on mechanical pipe hangers. The material was found to be in good condition; and,
- Soft, tan ceiling texture coat (refer to sample set **S18** in Table 3a). The material was found to be in good condition.

Non-Friable Materials

- Sweat wrap insulation (refer to sample set **AV-R11** in Table 3b);
- Tan ceiling plaster (power plant) (refer to sample set **S01** of Table 3a). The material was found to be in good condition;
- 9” x 9” beige with rust fleck vinyl floor tile (refer to sample set **S14** of Table 3a). The material was found to be in good condition;
- 9” x 9” grey with white fleck vinyl floor tile (refer to sample set **S16** of Table 3a). The material was found to be in good condition;
- 12” x 12” white with green fleck vinyl floor tile (refer to sample set **S18** of Table 3a). The material was found to be in good condition;

- 12” x 12” green with white fleck vinyl floor tile (refer to sample set **S19** of Table 3a). The material was found to be in good condition;
- 12” x 12” grey with white fleck vinyl floor tile (refer to sample set **S21** of Table 3a). The material was found to be in good condition;
- 12” x 12” green vinyl floor tile (refer to sample set **S22** of Table 3a). The material was found to be in good condition;
- 12” x 12” white with multi-coloured fleck vinyl floor tile (refer to sample set **S23** of Table 3a). The material was found to be in good condition;
- 9” x 9” red with white fleck vinyl floor tile (refer to sample set **S26** of Table 3a). The material was found to be in good condition;
- 9” x 9” blue with white streak vinyl floor tile (refer to sample set **S08** of Table 3a). The material was found to be in good condition;
- 9” x 9” dark grey with white and red streak vinyl floor tile (refer to sample set **S09** of Table 3a). The material was found to be in good condition;
- Beige vinyl sheet flooring (refer to sample set **S24** of Table 3a). The material was found to be in good condition;
- Brown vinyl sheet flooring (refer to sample set **S25** of Table 3a). The material was found to be in good condition;
- Red pebble vinyl sheet flooring (refer to sample set **S10** of Table 3a). The material was found to be in good condition;
- Various styles of stored rolls of asbestos-vinyl sheet flooring. The material was found to be in good condition;
- Black mastic (refer to sample set **AVC23-AVBM01** of Table 3c). The material was found to be in good condition;
- Black floor topping (refer to sample set **AV-S04** of Table 3b). The material was found to be in good condition; and,
- Grey exterior door caulking (refer to sample set **AV-S03** in Table 3b). The material was found to be in good condition.

The following building materials shall be treated as asbestos-containing and removed and disposed of following asbestos operations prior to demolition work:

- Gaskets associated with mechanical equipment;
- Arc shields in electrical equipment / switch gear;
- Underground services;
- Flange gaskets on hot equipment pipework;
- Fire doors; and,
- Elevator brakes.

No other materials suspected of containing asbestos were identified through bulk sample analysis or visual confirmation as part of our assessment.

As per the requirements of O. Reg. 278/05, non-friable materials, including vinyl floor tiles, mastics, tar flooring, and exterior door caulking may be removed as a Type 1 procedure provided they can be adequately wetted and be removed using non-powered hand tools.

Asbestos-containing vinyl sheet flooring materials are also considered non-friable asbestos-containing materials; however, as the paper material beneath contains asbestos and likely cannot be wetted prior to removal, is it recommended that the removal of vinyl sheet flooring be removed following Type 2 or Type 3 asbestos procedures. Stored rolls of asbestos-containing vinyl sheet flooring should be removed intact from the facility using Type 1 procedures and disposed of as asbestos waste.

Plaster is also a non-friable material that cannot be adequately wetted during removal. Therefore removal of this material must be performed following either Type 2 or Type 3 procedures.

As per O. Reg. 278/05, removal or disturbance of less than 1 m^2 of friable ACM, such as asbestos-containing Aircell, Mag. Block, Caposite, or parged cement insulation, is classified as a Type 2 operation. Removal of greater than 1 m^2 of friable ACM shall be conducted as a Type 2 Glove Bag or Type 3 operation.

The removal or disturbance of ACM must follow the measures and procedures indicated in O. Reg. 278/05. This work should be conducted by workers who have received proper training by a “competent person” in the hazards of asbestos exposure, personal hygiene and work practices, and the use and care of respirators and protective clothing. Any worker/supervisor who works in a Type 3 operation must successfully complete the Asbestos Abatement Worker or Supervisor Training Program approved by the Ministry of Training, Colleges, and Universities.

It is recommended that all work involving the removal or disturbance of ACM be subject to inspection and testing to document conformance with O. Reg. 278/05 requirements. The degree of inspection and testing is dependent on site-specific conditions such as the type, duration, size, and location of the work. In most circumstances Type 3 operations require a visual inspection and clearance air testing to be conducted by a competent worker on completion of the work. However, the requirement for Type 3 clearance inspection and air testing does not apply to buildings that are being demolished, where no person will enter the building following asbestos abatement except the workers involved in the asbestos operation and the workers involved in the demolition.

No loose fill vermiculite insulation was identified or is suspected to be present within the surveyed area. However, although intrusive testing was conducted, there is a remote possibility that vermiculite insulation could be hidden within locations such as exterior

wall cavities or block voids that were not investigated. If suspect vermiculite insulation is identified during demolition activities work should be stopped and the area should be re-assessed to evaluate conditions and determine appropriate control measures and worker protection, if necessary.

4.1.2 *Lead*

Fourteen (14) of the sixteen (16) paints sampled were determined to have either a concentration of lead above 5000 µg/g which is considered a 'lead-based' paint, or below 5000 µg/g but above 1000 µg/g which is considered a 'lead-containing' paint, as per the October 2014 Environmental Abatement Council of Canada (EACC) Lead Guideline for Construction, Renovation, Maintenance or Repair. Materials coated with lead-containing and lead-based paint require special procedures when performing work that may disturb them or their coatings. Inform all workers of the presence of paint finishes which contain lead. For the demolition work which can be done without removing or stripping the paint, a basic dust suppression and worker protection plan is sufficient.

Additional suspect lead-containing products include:

- Possible lead-containing batteries within emergency lighting;
- Solder in pipe fittings;
- Ceramic tile glazing; and,
- Sanitary drain pipe bell and spigot connection gaskets.

Removal or disturbance of these materials, if applicable, should be performed using non-powered hand tools and no hot work should be performed on pipes containing solder.

If practicable, all bulk lead waste materials should be separated from other wastes and sent to a recycling facility. If not practicable, lead-containing waste should be handled and disposed of according to R.R.O. 1990 Regulation 347 (Reg. 347), *"General – Waste Management"*, made under the Environmental Protection Act. Under this regulation (and depending on the quantity of waste generated) the waste may be subject to analysis following the Toxicity Characteristic Leaching Procedure (TCLP) to determine if it is a "leachate toxic waste" based on the leachate quality criteria provided in Schedule 4 of the regulation. Such wastes must meet specific treatment requirements (Schedule 5) or undergo alternative treatment for hazardous debris (Schedule 8) prior to land disposal.

4.1.3 *Mercury*

Fluorescent lamps should be handled with care and kept intact to avoid potential exposure to mercury vapour present within the lamps. Any mercury-containing lamps or equipment that are to be removed are recommended to be recycled rather than disposed of in landfill. Waste should be handled and disposed of under R.R.O. 1990 Regulation 347, *"General – Waste Management"*, made under the Environmental Protection Act. Alternatively, utilize a Bulb Eater®, or equivalent to safely crush and store waste lamps prior to recycling or disposal.

Mercury switches were identified in boiler regulator equipment (4 identified). It is cautioned that thermometers, barometers and other measuring devices (pressure gauges/sensors, vacuum gauges, manometers, etc.), thermostats and a variety of other electrical switches (temperature sensitive, tilt switches, float switches, etc.) may contain mercury that may not be visible without dismantling the equipment. Such devices should be assumed to contain mercury until proven otherwise and similar precautions to those outlined above upon dismantling equipment.

4.1.4 *Silica*

Suspect silica-containing materials were identified throughout the assessed areas. In their current state, building materials containing silica do not represent a risk to building occupants or construction workers. Risks associated with exposure to silica arise during demolition activities that cause silica dust to be created (particularly grinding, drilling or cutting operations and during major demolition), resulting in a crystalline silica inhalation hazard.

Measures and procedures to control dust migration and worker exposure to silica dust should be put in place during demolition activities. Workers that have the potential to be exposed to airborne silica should also wear appropriate protective clothing and respiratory protection. Any work involving the disturbance of silica-containing materials should follow the procedures outlined in the MOL *"Silica on Construction Projects"* guideline (April 2011). The appropriate engineering controls, work practices, hygiene practices, personal protective measures and training necessary to conduct the work in a safe manner are provided in this guideline. The general measures and procedures (or Type of operation) necessary depends on the type of work to be conducted.

4.1.5 *Other Designated Substances*

No other designated substances are expected to be a component of building materials within the surveyed area in a form that would represent an exposure concern. Therefore, no protective measures or procedures specific to acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxide, isocyanates, and vinyl chloride are considered necessary.

4.2 Other Hazardous Materials

4.2.1 *Chemical Hazards*

As no UFFI was identified or is suspected to be present within the surveyed area no further action is required. However, although intrusive testing was conducted, there is a remote possibility that UFFI could be hidden within locations such as exterior wall cavities that were not investigated. If suspect foam insulation is identified during demolition activities work should be stopped and the area should be re-assessed to evaluate conditions and determine appropriate control measures and worker protection, if necessary.

4.2.2 *Biological Hazards*

Mould Contamination

Significant mould growth is present throughout the north portion of the basement of the facility (rooms 001-008), as well as areas of significant water damage on the second and third floor.

If the building will be demolished without being re-occupied, mould growth need not be remediated provided all workers performing work (such as abatement or demolition work) are protected from exposure to mould.

4.2.3 *Environmental Hazards*

Polychlorinated Biphenyls (PCBs)

The federal government has set strict regulations for the handling, storage and disposal of PCBs. The *PCB Regulations* (SOR/2008-273) came into effect on September 5th, 2008 and consolidates and replaces the *Chlorobiphenyls Regulations* (SOR/91-152) and the *Storage of PCB Material Regulations* (SOR/92-507). The purpose of the PCB Regulations is to improve the protection of Canada's environment and the health of Canadians by minimizing the risks posed by the use, storage and release of PCBs by accelerating the elimination of these substances.

As of December 31, 2009, all current PCB storage sites are to have been eliminated and there should no longer be any electrical capacitors, electrical transformers, electromagnets, heat transfer equipment, or any other equipment in service that contains PCBs at a concentration greater than 500 mg/kg (500 ppm). As of this time, all of this equipment should have been removed from service and sent for destruction. Furthermore, the PCB Regulations restricts the use of equipment containing PCBs (other than light ballasts or pole-top electrical transformers) at concentrations exceeding 50 mg/kg (50 ppm) in sensitive areas (such as drinking water treatment plants, schools, hospitals and senior citizen care facilities) by the same date. All other locations have until December 31, 2025 to decommission equipment containing 50 ppm to 500 ppm PCBs.

When light fixtures are to be decommissioned, any PCB-containing ballasts that are found should be removed and separated from other waste and disposed of as PCB waste at an authorized destruction facility. The PCB content of "assumed PCB-containing" fluorescent light ballasts and HID lamp ballasts should be verified at this time by determining the date of manufacture and other pertinent information by referring to the Environment Canada document entitled *"Identification of Lamp Ballasts Containing PCBs" (Report EPS 2/CC/2 (revised) August 1991)* to aid in identification. Furthermore, a pile of approximately 20 lamp ballasts were identified within the crawlspace underneath the former porch area of Avon Crest. Labels we no longer present on the ballasts, and as such they could not be definitively identified as PCB or Non-PCB, and should therefore be treated as PCB-containing.

Ozone Depleting and Global Warming Substances

Ontario Regulation 463/10, "Ozone Depleting Substances and Other Halocarbons" (O. Reg. 463/10, made under the Environmental Protection Act) controls the use, discharge, sale, transfer, transport, storage, and disposal of ozone depleting substances and halocarbons in Ontario. This regulation enhances the control and management of ODS and other halocarbons to prevent or minimize emissions, which serves a dual environmental benefit of lowering emissions of substances that deplete the ozone layer and contribute to global warming.

Any refrigerant that is removed from an air-conditioning unit, heat pump, refrigeration or freezer unit (that is not mobile) is defined as a Stationary Refrigerant Waste under R.R.O. 1990 Regulation 347, *General – Waste Management* and must be collected, handled, transported and recycled or disposed of in accordance with the requirements set forth in Sections 30 to 35 of this regulation.

No ODS-containing equipment was identified during the assessment.

5.0 LIMITATIONS

The information and recommendations detailed in this report were carried out by trained professional and technical staff in accordance with generally accepted environmental and industrial hygiene work practices and procedures. Recommendations provided in this report have been generated in accordance with accepted industry guidelines and practices. These guidelines and practices are considered acceptable as of the date of this report.

In preparation of this report, Safetech Environmental Limited (Safetech) relied on information supplied by others, including without limitation, information pertaining to the history and operation of the site, and testing services provided by independent laboratories. Except as expressly set out in this report, Safetech has not made any independent verification of information provided by independent entities.

The collection of samples at the location noted was consistent with the scope of work agreed-upon with the person or entity to whom this report is addressed and the information obtained concerning prior site investigations. As conditions between samples may vary, the potential remains for the presence of unknown additional contaminants for which there were no known indicators.

The analytical method used for determination of asbestos content meets the requirements of O.Reg. 278/05. However, small asbestos fibres may be missed by PLM due to resolution limitations of the optical microscope. Interfering binder/matrix and/or low asbestos content may also hinder positive identification by PLM. These conditions are common for vermiculite attic insulation (VAI) and non-friable organically bound (NOB) materials such as vinyl floor tiles, roofing materials, mastics and caulking and can lead to “false negative” results. If PLM analytical results for these types of materials indicate no asbestos detected they have been reported as “Presumed Non-ACM”. Due to limitations of the analytical method we cannot confirm that low quantities of asbestos are not present in these samples using solely PLM analysis. Additional analytical procedures should be considered for such materials to rule out false negative results.

Conclusions are based on site conditions at the time of inspection and can only be extrapolated to an undefined limited area around inspected locations. The extent of the limited area depends on building construction and conditions. Building materials that are not detailed within this survey due to inaccessibility during the time of survey and/or are uncovered during demolition activities should be properly assessed by a qualified person prior to their disturbance. Safetech cannot warrant against undiscovered environmental liabilities. If any information becomes available that differs from the findings in this report, we request that we be notified immediately to reassess the conclusions provided herein.

No other person or entity is entitled to use or rely upon this report without the express written consent of Safetech Environmental Limited and the person or entity to who it is addressed. Any use that a third party makes of this report, or any reliance based on conclusions and recommendations made, are the responsibility of such third parties. Safetech accepts no responsibility for damages suffered by third parties as a result of actions based on this report.

Appendix A

Condition Assessment Criteria for Asbestos-Containing Materials

The condition of asbestos-containing materials identified within the surveyed area(s) was assessed as Good (G), Fair (F) or Poor (P). The assessment criteria used to determine condition is dependent on material characteristics, such as friability. The following Table summarizes the criteria used by Safetech to evaluate the condition of ACM.

Condition Assessment Criteria for Asbestos-Containing Materials

Sprayed Fireproofing, Sprayed Insulation and Sprayed Texture Finishes	
Good	• Surface shows no significant signs of damage, deterioration, or delamination (i.e. <1%). • Unencapsulated or unpainted fireproofing or texture finishes, where no delamination or damage is observed. • Encapsulated fireproofing or texture finishes where encapsulation applied after damage or fallout.
Fair	• Not utilized as part of condition assessment for these materials.
Poor	• Greater than 1% damage, delamination, or deterioration to surface.
In areas where damage exists in isolated locations, both Good and Poor may be applicable.	
Mechanical Insulation (boilers, breeching, ductwork, piping, tanks, equipment, etc.)	
Good	• Insulation completely covered in jacketing and exhibits no evidence of damage or deterioration. • Jacketing may have minor damage (i.e. scuffs or stains), but is not penetrated.
Fair	• Minor penetrating damage to jacketed insulation (cuts, tears, nicks, deterioration or delamination). • Undamaged insulation that had never been jacketed. • Insulation is exposed but not showing surface disintegration. • Extent of missing insulation ranges from minor to none. • Damage that can be repaired.
Poor	• Original insulation jacket is missing, damaged, deteriorated, or delaminated. • Insulation is exposed and significant areas have been dislodged. • Damage that cannot be easily repaired.
Non-Friable and Potentially Friable Materials (includes materials such as plaster finishes, drywall compound, ceiling tiles, asbestos cement products, vinyl asbestos tile and asbestos paper backed vinyl sheet flooring, etc., which have the potential to become friable when handled)	
Good	• No significant damage. • Material may be cracked or broken but is stable and not likely to become friable upon casual contact. • No friable debris present
Fair	• Not utilized as part of condition assessment for these materials.
Poor	• Material is severely damaged. • Debris is present or binder has disintegrated to the point where the material has become friable.
Asbestos-Containing Debris (noted separately from the presumed source material)	
Poor	• Debris is always considered to be in Poor condition.

Appendix B

Figures H100 to H105: Locations of Major ACM and other DSHM

GENERAL NOTES:

1. REFER TO REPORT TITLED "DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS ASSESSMENT 2023; AVON CREST FACILITY; 11 AVONCREST DRIVE, STRATFORD, ONTARIO, N5A 2Y6" AND DATED FEBRUARY 24, 2023 (THE DSHM REPORT).
2. ALL KNOWN, DEEMED, OR SUSPECTED ASBESTOS-CONTAINING MATERIALS MAY NOT BE DEPICTED ON THE FIGURE. REFER TO THE REPORT FOR A COMPLETE LIST OF IDENTIFIED AND SUSPECTED ASBESTOS-CONTAINING MATERIALS WITHIN THE SCOPE OF THE ASSESSMENT AREA.
3. FIGURE TO BE REFERENCED WITH THE REPORT.
4. DO NOT SCALE THE FIGURE (NTS).
5. THE FIGURE IS COLOUR DEPENDENT; PHOTOCOPIES MAY ALTER INTERPRETATIONS OF THE FIGURE. REFER TO THE ORIGINAL FIGURE AND REPORT.
6. THE QUANTITIES OF ASBESTOS-CONTAINING MATERIALS ARE APPROXIMATE.
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ASBESTOS-CONTAINING MECHANICAL PIPE INSULATION SCHEDULE (BASEMENT)

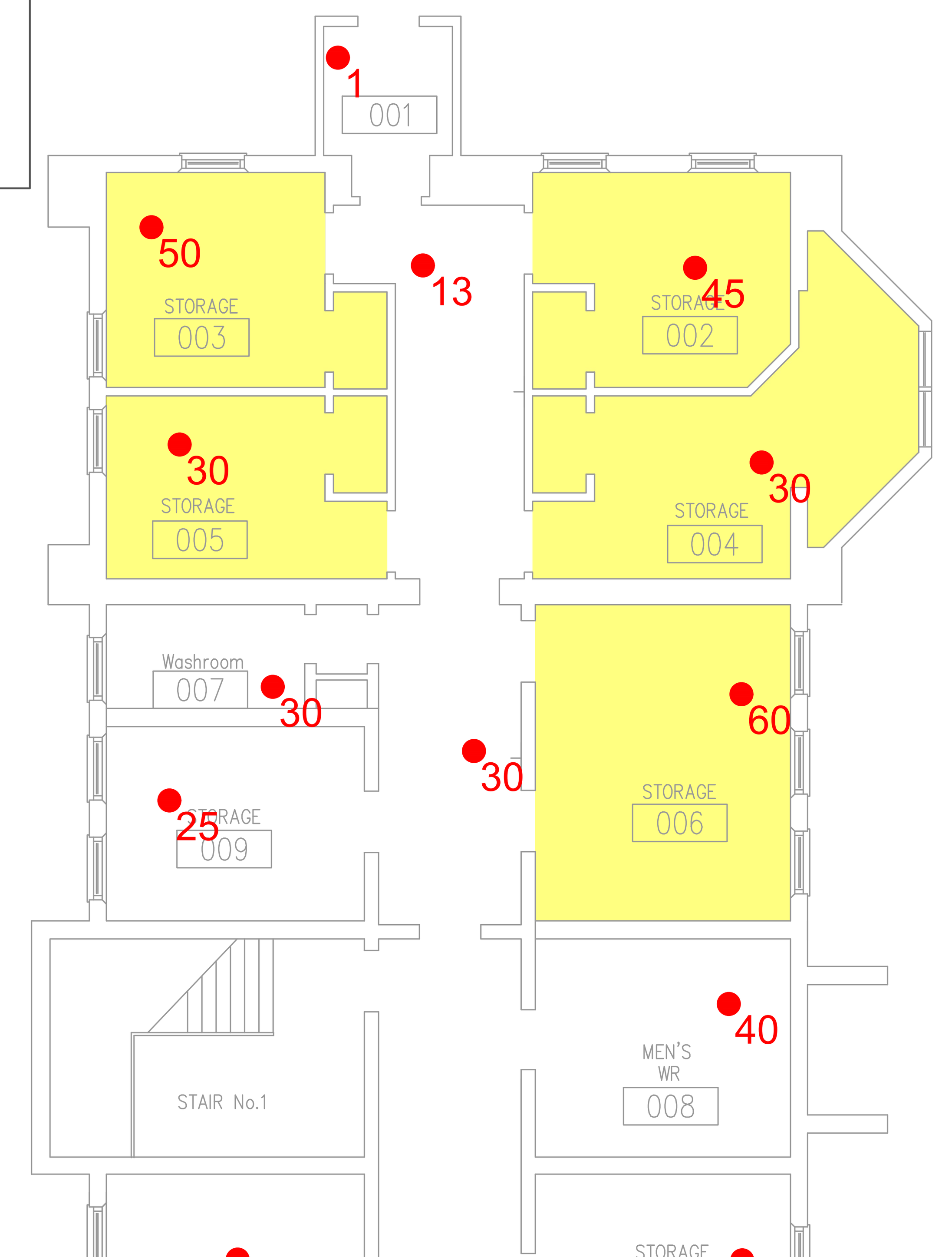
Pipe Diameter	Fitting Quantity (ea.)	Pipe Insulation Quantity (m)			
		Aircell	Sweat Wrap	Mag Block	Caposite
0'-3"	874	-	-	-	10
0'-4"	492	35	-	-	-
0'-6"	78	-	130	-	-
0'-8"	-	-	-	-	-
0'-10"	-	-	-	-	-
Total	1,444	35	130	0	10
Parging Cement on Pipe Hangers: 180					

ASBESTOS-CONTAINING FINISHES SCHEDULE (BASEMENT)

Material	Surface Area (m^2)
Vinyl Floor Tiles	290
Vinyl Sheet Floor	10
Transite Ceiling Panels	30
Ceiling Texture Coat	25

ASBESTOS-CONTAINING MATERIALS LEGEND

Vinyl Floor Tile & Mastic	Parged Cement Pipe Fitting Insulation with Quantity and Condition Rating
Vinyl Sheet Flooring & Mastic	Pipe Insulation (Horizontal and Vertical)
Textured Ceiling Coat	Mercury-containing Thermometer
Ceiling Tile	Sink Undercoat
Ceiling Plaster	ACM Debris (Above False Ceiling)
Transite Ceiling Tiles	Fire Door with Presumed ACM Core



AVONCREST, WEST WING – BASEMENT

HURON PERTH HEALTHCARE ALLIANCE

No.	DESCRIPTION	DATE
2	REVISED FOR REPORT	2023/03/03
1	ISSUED FOR REPORT	2023/02/25

REVISIONS:

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www.safetechenv.com

CONSULTANTS:

PROJECT: **Avon Crest Demolition, 86 John Street South, Stratford, Ontario N5A 2Y6**

DRAWING TITLE: **Avon Crest Facility Basement**

DRAWN BY: J. Miller	DATE: February 25, 2023
CHECKED BY: J. Gore	SCALE: N.T.S.

PROJECT NO.: 2-3230024

DRAWING NO.: **H100**

GENERAL NOTES:

1. REFER TO REPORT TITLED "DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS ASSESSMENT 2023; AVON CREST FACILITY; 11 AVONCREST DRIVE, STRATFORD, ONTARIO, N5A 2Y6" AND DATED FEBRUARY 24, 2023 (THE DSHM REPORT).
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ASBESTOS-CONTAINING MECHANICAL PIPE INSULATION SCHEDULE (BASEMENT)

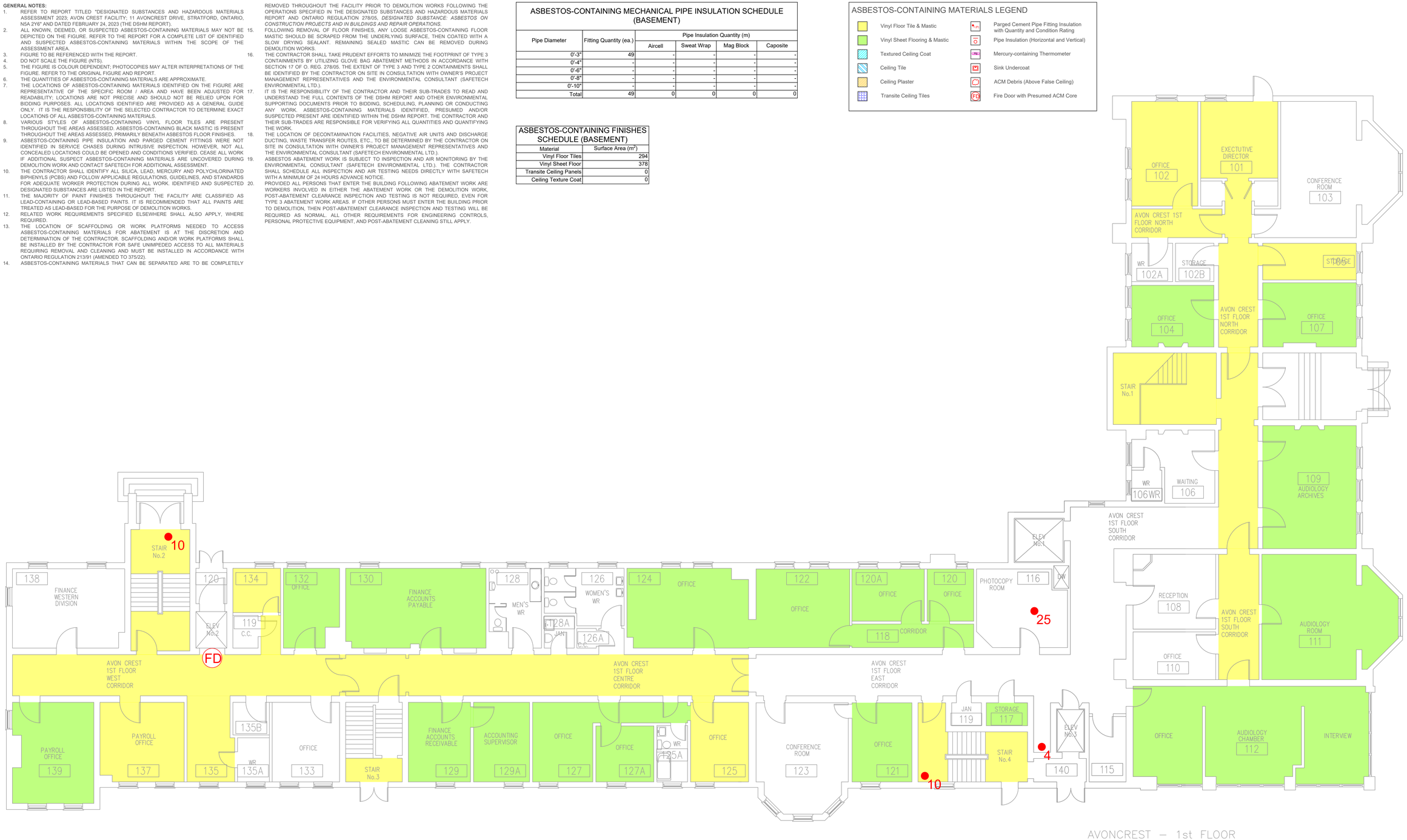
Pipe Diameter	Fitting Quantity (ea.)	Pipe Insulation Quantity (m)			
		Aircell	Sweat Wrap	Mag Block	Caposite
0'-3"	49	-	-	-	-
0'-4"	-	-	-	-	-
0'-6"	-	-	-	-	-
0'-8"	-	-	-	-	-
0'-10"	-	-	-	-	-
Total	49	0	0	0	0

ASBESTOS-CONTAINING FINISHES SCHEDULE (BASEMENT)

Material	Surface Area (m^2)
Vinyl Floor Tiles	294
Vinyl Sheet Floor	378
Transite Ceiling Panels	0
Ceiling Texture Coat	0

ASBESTOS-CONTAINING MATERIALS LEGEND

- Vinyl Floor Tile & Mastic
- Vinyl Sheet Flooring & Mastic
- Textured Ceiling Coat
- Ceiling Tile
- Ceiling Plaster
- Transite Ceiling Tiles
- Parged Cement Pipe Fitting Insulation with Quantity and Condition Rating
- Pipe Insulation (Horizontal and Vertical)
- Mercury-containing Thermometer
- Sink Undercoat
- ACM Debris (Above False Ceiling)
- Fire Door with Presumed ACM Core



AVONCREST – 1st FLOOR

HPHA HURON PERTH HEALTHCARE ALLIANCE

TRUE NORTH | CONSTRUCTION NORTH

KEY PLAN

KEY PLAN

NO.	DESCRIPTION	DATE
1	ISSUED FOR REVIEW	2024/05/02
2	ISSUED FOR PERMIT	2024/06/03
3	ISSUED FOR TENDER	2024/06/24

REVISIONS

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CONSULTANTS

PROJECT:

Avon Crest Demolition
86 John Street South,
Stratford, Ontario
N5A 2Y6

DRAWING TITLE:

Avon Crest Facility
First Floor

DRAWN BY: J. Miller	DATE: February 25, 2023
CHECKED BY: J. Gore	SCALE: N.T.S.

PROJECT NO.: 2-3220024

DRAWING NO.: **H101**

GENERAL NOTES:

1. REFER TO REPORT TITLED "DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS ASSESSMENT 2023; AVON CREST FACILITY; 11 AVONCREST DRIVE, STRATFORD, ONTARIO, N5A 2Y6" AND DATED FEBRUARY 24, 2023 (THE DSHM REPORT).
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ASBESTOS-CONTAINING MECHANICAL PIPE INSULATION SCHEDULE (BASEMENT)

Pipe Diameter	Fitting Quantity (ea.)	Pipe Insulation Quantity (m)			
		Aircell	Sweat Wrap	Mag Block	Caposite
0'-3"	374	-	-	-	-
0'-4"	-	-	-	-	-
0'-6"	-	-	-	-	-
0'-8"	-	-	-	-	-
0'-10"	-	-	-	-	-
Total	374	0	0	0	0

ASBESTOS-CONTAINING FINISHES SCHEDULE (BASEMENT)

Material	Surface Area (m^2)
Vinyl Floor Tiles	191
Vinyl Sheet Floor	511
Transite Ceiling Panels	0
Ceiling Texture Coat	0

ASBESTOS-CONTAINING MATERIALS LEGEND

- Vinyl Floor Tile & Mastic
- Vinyl Sheet Flooring & Mastic
- Textured Ceiling Coat
- Ceiling Tile
- Ceiling Plaster
- Transite Ceiling Tiles
- 1 (P) Parged Cement Pipe Fitting Insulation with Quantity and Condition Rating
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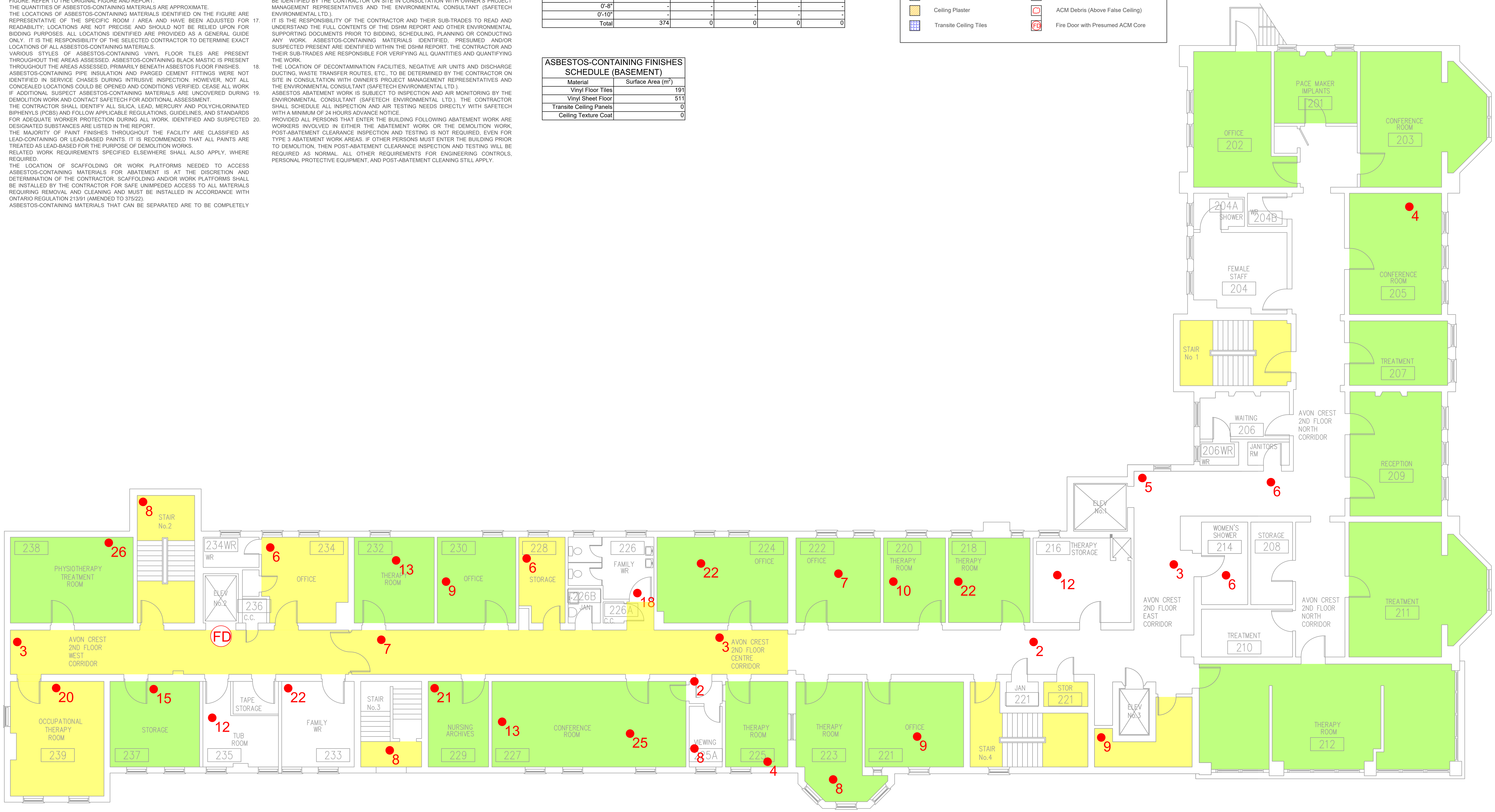
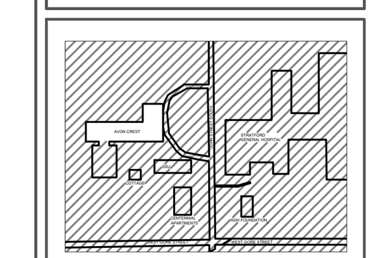


AVONCREST — 2ND FLOOR



2 REVISED FOR REPORT 2023/03/03
1 ISSUED FOR REPORT 2023/02/25

No.	DESCRIPTION	DATE
2	REVISED FOR REPORT	2023/03/03
1	ISSUED FOR REPORT	2023/02/25

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CONSULTANTS:

PROJECT:

Avon Crest Demolition
86 John Street South,
Stratford, Ontario
N5A 2Y6

DRAWING TITLE:

Avon Crest Facility
Second Floor

DRAWN BY: J. Miller	DATE: February 25, 2023
CHECKED BY: J. Gore	SCALE: N.T.S.

PROJECT NO.: 2-3230024

DRAWING NO.: **H102**

GENERAL NOTES:

1. REFER TO REPORT TITLED "DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS ASSESSMENT 2023, AVON CREST FACILITY; 11 AVONCREST DRIVE, STRATFORD, ONTARIO, N5A 2Y6" AND DATED FEBRUARY 24, 2023 (THE DSHM REPORT).
2. ALL KNOWN, DEEMED, OR SUSPECTED ASBESTOS-CONTAINING MATERIALS MAY NOT BE DEPICTED ON THE FIGURE. REFER TO THE REPORT FOR A COMPLETE LIST OF IDENTIFIED AND SUSPECTED ASBESTOS-CONTAINING MATERIALS WITHIN THE SCOPE OF THE ASSESSMENT AREA.
3. FIGURE TO BE REFERENCED WITH THE REPORT.
4. DO NOT SCALE THE FIGURE (NTS).
5. THE FIGURE IS COLOUR DEPENDENT; PHOTOCOPIES MAY ALTER INTERPRETATIONS OF THE FIGURE. REFER TO THE ORIGINAL FIGURE AND REPORT.
6. THE QUANTITIES OF ASBESTOS-CONTAINING MATERIALS ARE APPROXIMATE.
7. THE LOCATIONS OF ASBESTOS-CONTAINING MATERIALS IDENTIFIED ON THE FIGURE ARE REPRESENTATIVE OF THE SPECIFIC ROOM / AREA AND HAVE BEEN ADJUSTED FOR READABILITY; LOCATIONS ARE NOT PRECISE AND SHOULD NOT BE RELIED UPON FOR BIDDING PURPOSES. ALL LOCATIONS IDENTIFIED ARE PROVIDED AS A GENERAL GUIDE ONLY. IT IS THE RESPONSIBILITY OF THE SELECTED CONTRACTOR TO DETERMINE EXACT LOCATIONS OF ALL ASBESTOS-CONTAINING MATERIALS.
8. VARIOUS STYLES OF ASBESTOS-CONTAINING VINYL FLOOR TILES ARE PRESENT THROUGHOUT THE AREAS ASSESSED. ASBESTOS-CONTAINING BLACK MASTIC IS PRESENT THROUGHOUT THE AREAS ASSESSED, PRIMARILY BENEATH ASBESTOS FLOOR FINISHES.
9. ASBESTOS-CONTAINING PIPE INSULATION AND PARGED CEMENT FITTINGS WERE NOT IDENTIFIED IN SERVICE CHASES DURING INTRUSIVE INSPECTION. HOWEVER, NOT ALL CONCEALED LOCATIONS COULD BE OPENED AND CONDITIONS VERIFIED. CEASE ALL WORK IF ADDITIONAL SUSPECT ASBESTOS-CONTAINING MATERIALS ARE UNCOVERED DURING DEMOLITION WORK AND CONTACT SAFETECH FOR ADDITIONAL ASSESSMENT.
10. THE CONTRACTOR SHALL IDENTIFY ALL SILICA, LEAD, MERCURY AND POLYCHLORINATED BIPHENYLS (PCBS) AND FOLLOW APPLICABLE REGULATIONS, GUIDELINES, AND STANDARDS FOR ADEQUATE WORKER PROTECTION DURING ALL WORK. IDENTIFIED AND SUSPECTED DESIGNATED SUBSTANCES ARE LISTED IN THE REPORT.
11. THE MAJORITY OF PAINT FINISHES THROUGHOUT THE FACILITY ARE CLASSIFIED AS LEAD-CONTAINING OR LEAD-BASED PAINTS. IT IS RECOMMENDED THAT ALL PAINTS ARE TREATED AS LEAD-BASED FOR THE PURPOSE OF DEMOLITION WORKS.
12. RELATED WORK REQUIREMENTS SPECIFIED ELSEWHERE SHALL ALSO APPLY, WHERE REQUIRED.
13. THE LOCATION OF SCAFFOLDING OR WORK PLATFORMS NEEDED TO ACCESS ASBESTOS-CONTAINING MATERIALS FOR ABATEMENT IS AT THE DISCRETION AND DETERMINATION OF THE CONTRACTOR. SCAFFOLDING AND/OR WORK PLATFORMS SHALL BE INSTALLED BY THE CONTRACTOR FOR SAFE UNIMPEDED ACCESS TO ALL MATERIALS REQUIRING REMOVAL AND CLEANING AND MUST BE INSTALLED IN ACCORDANCE WITH ONTARIO REGULATION 213/91 (AMENDED TO 375/22).
14. ASBESTOS-CONTAINING MATERIALS THAT CAN BE SEPARATED ARE TO BE COMPLETELY REMOVED THROUGHOUT THE FACILITY PRIOR TO DEMOLITION WORKS FOLLOWING THE OPERATIONS SPECIFIED IN THE DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS REPORT AND ONTARIO REGULATION 278/05, *DESIGNATED SUBSTANCE: ASBESTOS ON CONSTRUCTION PROJECTS AND IN BUILDINGS AND REPAIR OPERATIONS*.
15. FOLLOWING REMOVAL OF FLOOR FINISHES, ANY LOOSE ASBESTOS-CONTAINING FLOOR MASTIC SHOULD BE SCRAPED FROM THE UNDERLYING SURFACE, THEN COATED WITH A SLOW DRYING SEALANT. REMAINING SEALED MASTIC CAN BE REMOVED DURING DEMOLITION WORKS.
16. THE CONTRACTOR SHALL TAKE PRUDENT EFFORTS TO MINIMIZE THE FOOTPRINT OF TYPE 3 CONTAINMENTS BY UTILIZING GLOVE BAG ABATEMENT METHODS IN ACCORDANCE WITH SECTION 17 OF O. REG. 278/05. THE EXTENT OF TYPE 3 AND TYPE 2 CONTAINMENTS SHALL BE IDENTIFIED BY THE CONTRACTOR ON SITE IN CONSULTATION WITH OWNER'S PROJECT MANAGEMENT REPRESENTATIVES AND THE ENVIRONMENTAL CONSULTANT (SAFETECH ENVIRONMENTAL LTD.).
17. IT IS THE RESPONSIBILITY OF THE CONTRACTOR AND THEIR SUB-TRADES TO READ AND UNDERSTAND THE FULL CONTENTS OF THE DSHM REPORT AND OTHER ENVIRONMENTAL SUPPORTING DOCUMENTS PRIOR TO BIDDING, SCHEDULING, PLANNING OR CONDUCTING ANY WORK. ASBESTOS-CONTAINING MATERIALS IDENTIFIED, PRESUMED AND/OR SUSPECTED PRESENT ARE IDENTIFIED WITHIN THE DSHM REPORT. THE CONTRACTOR AND THEIR SUB-TRADES ARE RESPONSIBLE FOR VERIFYING ALL QUANTITIES AND QUANTIFYING THE WORK.
18. THE LOCATION OF DECONTAMINATION FACILITIES, NEGATIVE AIR UNITS AND DISCHARGE DUCTING, WASTE TRANSFER ROUTES, ETC., TO BE DETERMINED BY THE CONTRACTOR ON SITE IN CONSULTATION WITH OWNER'S PROJECT MANAGEMENT REPRESENTATIVES AND THE ENVIRONMENTAL CONSULTANT (SAFETECH ENVIRONMENTAL LTD.).
19. ASBESTOS ABATEMENT WORK IS SUBJECT TO INSPECTION AND AIR MONITORING BY THE ENVIRONMENTAL CONSULTANT (SAFETECH ENVIRONMENTAL LTD.). THE CONTRACTOR SHALL SCHEDULE ALL INSPECTION AND AIR TESTING NEEDS DIRECTLY WITH SAFETECH WITH A MINIMUM OF 24 HOURS ADVANCE NOTICE.
20. PROVIDED ALL PERSONS THAT ENTER THE BUILDING FOLLOWING ABATEMENT WORK ARE WORKERS INVOLVED IN EITHER THE ABATEMENT WORK OR THE DEMOLITION WORK, POST-ABATEMENT CLEARANCE INSPECTION AND TESTING IS NOT REQUIRED, EVEN FOR TYPE 3 ABATEMENT WORK AREAS. IF OTHER PERSONS MUST ENTER THE BUILDING PRIOR TO DEMOLITION, THEN POST-ABATEMENT CLEARANCE INSPECTION AND TESTING WILL BE REQUIRED AS NORMAL. ALL OTHER REQUIREMENTS FOR ENGINEERING CONTROLS, PERSONAL PROTECTIVE EQUIPMENT, AND POST-ABATEMENT CLEANING STILL APPLY.

ASBESTOS-CONTAINING MECHANICAL PIPE INSULATION SCHEDULE (BASEMENT)

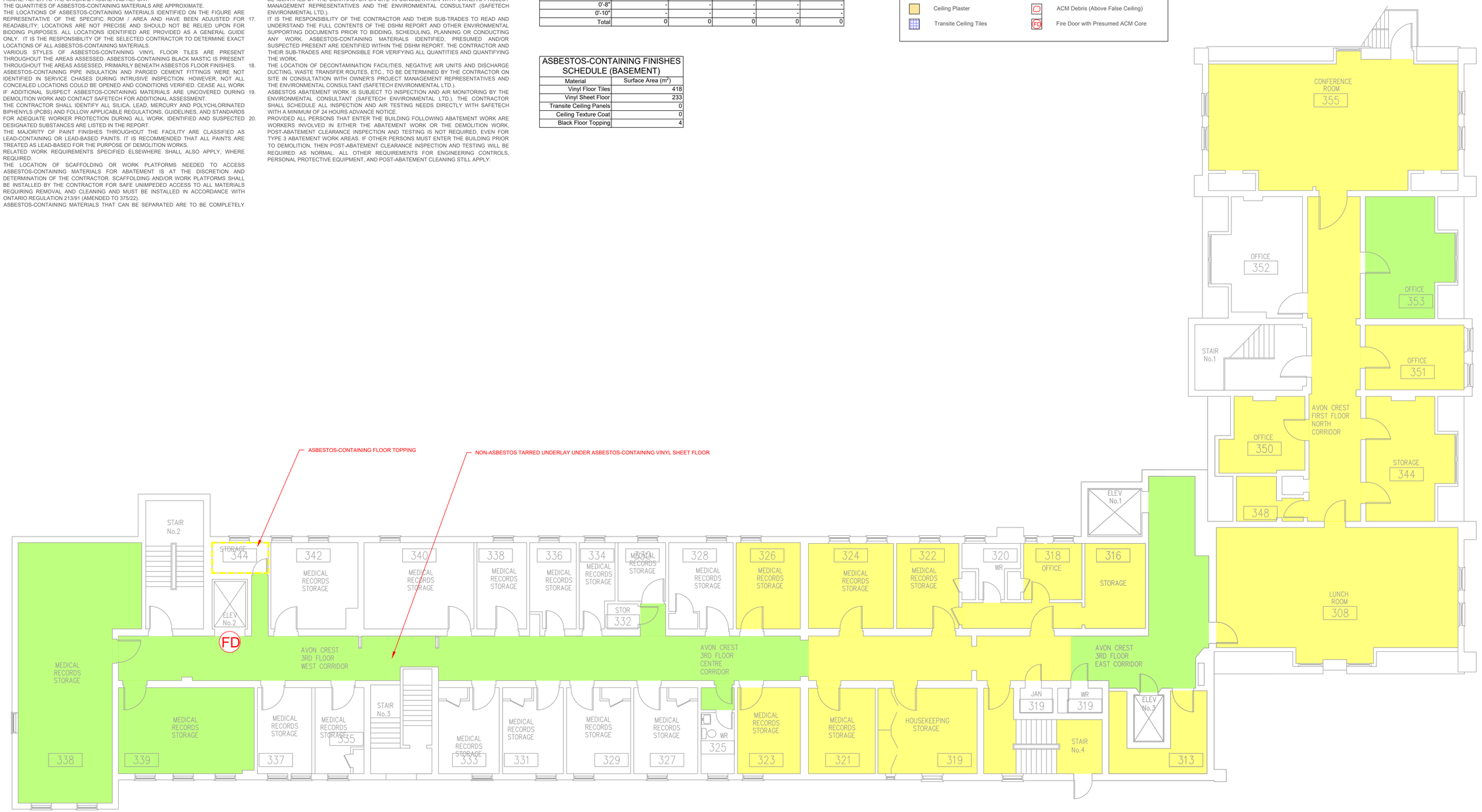
Pipe Diameter	Fitting Quantity (ea.)	Pipe Insulation Quantity (m)			
		Aircell	Sweat Wrap	Mag Block	Caposite
0'-3"	-	-	-	-	-
0'-4"	-	-	-	-	-
0'-6"	-	-	-	-	-
0'-8"	-	-	-	-	-
0'-10"	-	-	-	-	-
Total	0	0	0	0	0

ASBESTOS-CONTAINING FINISHES SCHEDULE (BASEMENT)

Material	Surface Area (m^2)
Vinyl Floor Tiles	418
Vinyl Sheet Floor	233
Transite Ceiling Panels	0
Ceiling Texture Coat	0
Black Floor Topping	4

ASBESTOS-CONTAINING MATERIALS LEGEND

- Vinyl Floor Tile & Mastic
- Vinyl Sheet Flooring & Mastic
- Textured Ceiling Coat
- Ceiling Tile
- Ceiling Plaster
- Transite Ceiling Tiles
- Parged Cement Pipe Fitting Insulation with Quantity and Condition Rating
- Pipe Insulation (Horizontal and Vertical)
- Mercury-containing Thermometer
- Sink Undercoat
- ACM Debris (Above False Ceiling)
- Fire Door with Presumed ACM Core



AVONCREST – 3RD FLOOR

HPHA HURON PERTH HEALTHCARE ALLIANCE

TRUE NORTH | CONSTRUCTION NORTH

KEY PLAN

KEY PLAN

NO.	DESCRIPTION	DATE
1	ISSUED FOR PERMIT	2023/02/28
2	ISSUED FOR PERMIT	2023/03/31

REVISIONS:

THE PLANS REPRESENTED ON THESE FIGURES MAKE UP PART OF THE DETAILED DESIGN DRAWING SET. REFER TO DETAILED DESIGN DRAWING SET FOR NOTATIONS NOT RELATED TO ABATEMENT WORK.

DO NOT SCALE THESE DRAWINGS.

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Kitchener, Ontario N2C 2E2
519-954-2732
www.safetechenv.com

CONSULTANTS:

PROJECT:

Avon Crest Demolition
86 John Street South,
Stratford, Ontario
N5A 2Y6

DRAWING TITLE:

Avon Crest Facility
Third Floor

DRAWN BY: J. Miller	DATE: February 25, 2023
CHECKED BY: J. Gore	SCALE: N.T.S.

PROJECT NO.: 3-2230024

DRAWING NO.: **H103**

GENERAL NOTES:

1. REFER TO REPORT TITLED "DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS ASSESSMENT 2023, AVON CREST FACILITY; 11 AVONCREST DRIVE, STRATFORD, ONTARIO, N5A 2Y6" AND DATED FEBRUARY 24, 2023 (THE DSHM REPORT).
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ASBESTOS-CONTAINING MECHANICAL PIPE INSULATION SCHEDULE (BASEMENT)

Pipe Diameter	Fitting Quantity (ea.)	Pipe Insulation Quantity (m)			
		Aircell	Sweat Wrap	Mag Block	Caposite
0'-3"	-	-	-	-	-
0'-4"	-	-	-	-	-
0'-6"	-	-	-	-	-
0'-8"	-	-	-	-	-
0'-10"	-	-	-	-	-
Total	0	0	0	0	0

ASBESTOS-CONTAINING FINISHES SCHEDULE (BASEMENT)

Material	Surface Area (m^2)
Vinyl Floor Tiles	0
Vinyl Sheet Floor	*STORED MATERIAL
Transite Ceiling Panels	0
Ceiling Texture Coat	0

ASBESTOS-CONTAINING MATERIALS LEGEND

- Vinyl Floor Tile & Mastic
- Vinyl Sheet Flooring & Mastic
- Textured Ceiling Coat
- Ceiling Tile
- Ceiling Plaster
- Transite Ceiling Tiles
- Parged Cement Pipe Fitting Insulation with Quantity and Condition Rating
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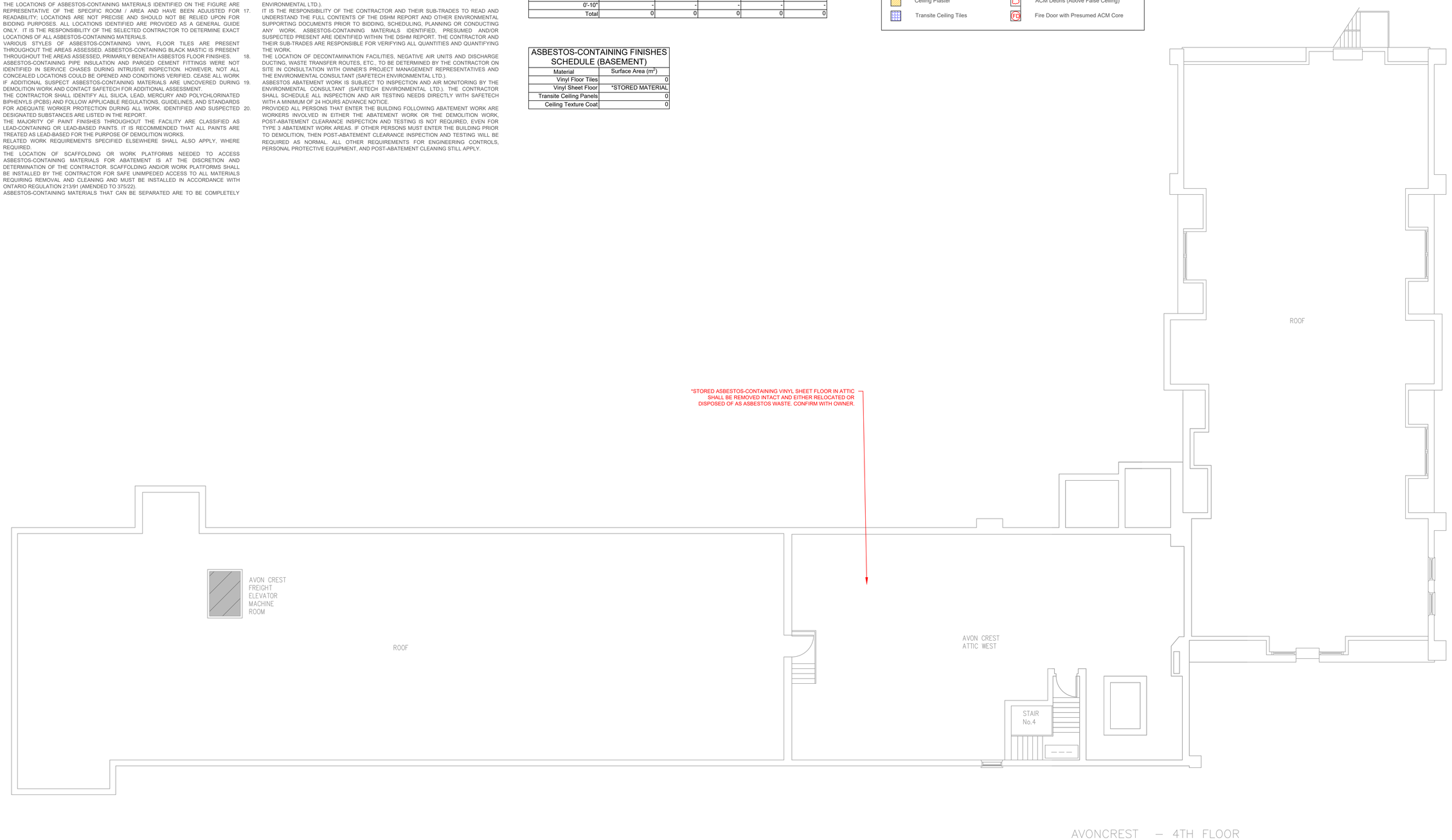

AVONCREST – 4TH FLOOR

HPHA HURON PERTH HEALTHCARE ALLIANCE

TRUE NORTH | CONSTRUCTION NORTH

KEY PLAN

KEY PLAN

1	ISSUED FOR REPORT	2023-02-23
2	ISSUED FOR REPORT	2023-03-10
NO.	DESCRIPTION	DATE

REVISIONS:

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100 Hanson Avenue, Unit 2
Kitchener, Ontario N2C 2E3
519-954-2732
www.safetechenv.com

CONSULTANTS:

PROJECT:

Avon Crest Demolition
86 John Street South,
Stratford, Ontario
N5A 2Y6

DRAWING TITLE:

Avon Crest Facility
Roof Plan

DRAWN BY: J. Miller	DATE: February 25, 2023
CHECKED BY: J. Gore	SCALE: N.T.S.

PROJECT NO: 2-3230024

DRAWING NO.: **H104**

GENERAL NOTES:

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ASBESTOS-CONTAINING MECHANICAL PIPE INSULATION SCHEDULE (BASEMENT)

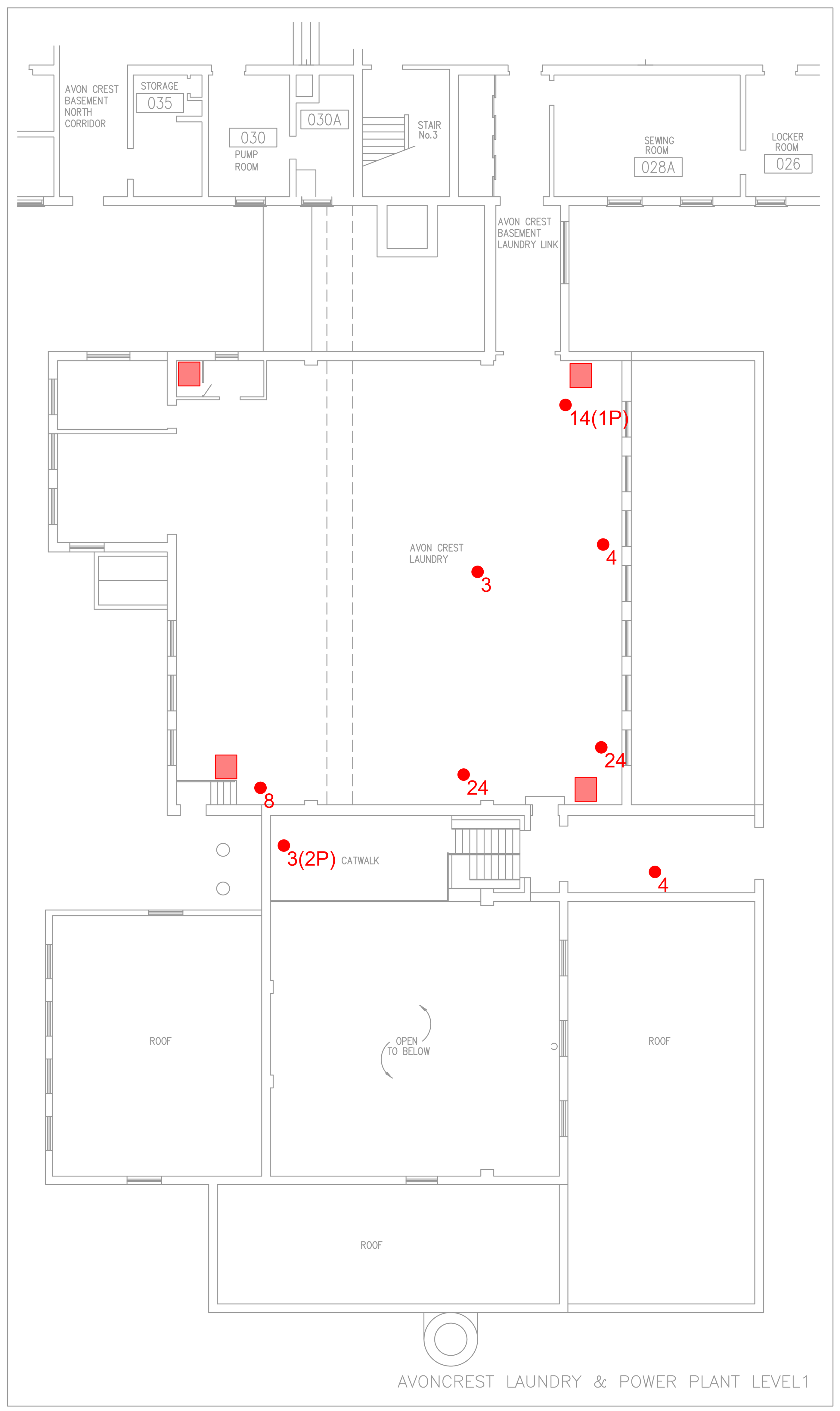
Pipe Diameter	Fitting Quantity (ea.)	Pipe Insulation Quantity (m)			
		Aircell	Sweat Wrap	Mag Block	Caposite
0'-3"	25	-	-	-	-
0'-4"	42	3	-	3	-
0'-6"	51	-	-	-	-
0'-8"	-	-	-	-	-
0'-10"	-	-	-	-	-
Total	118	3	0	3	0

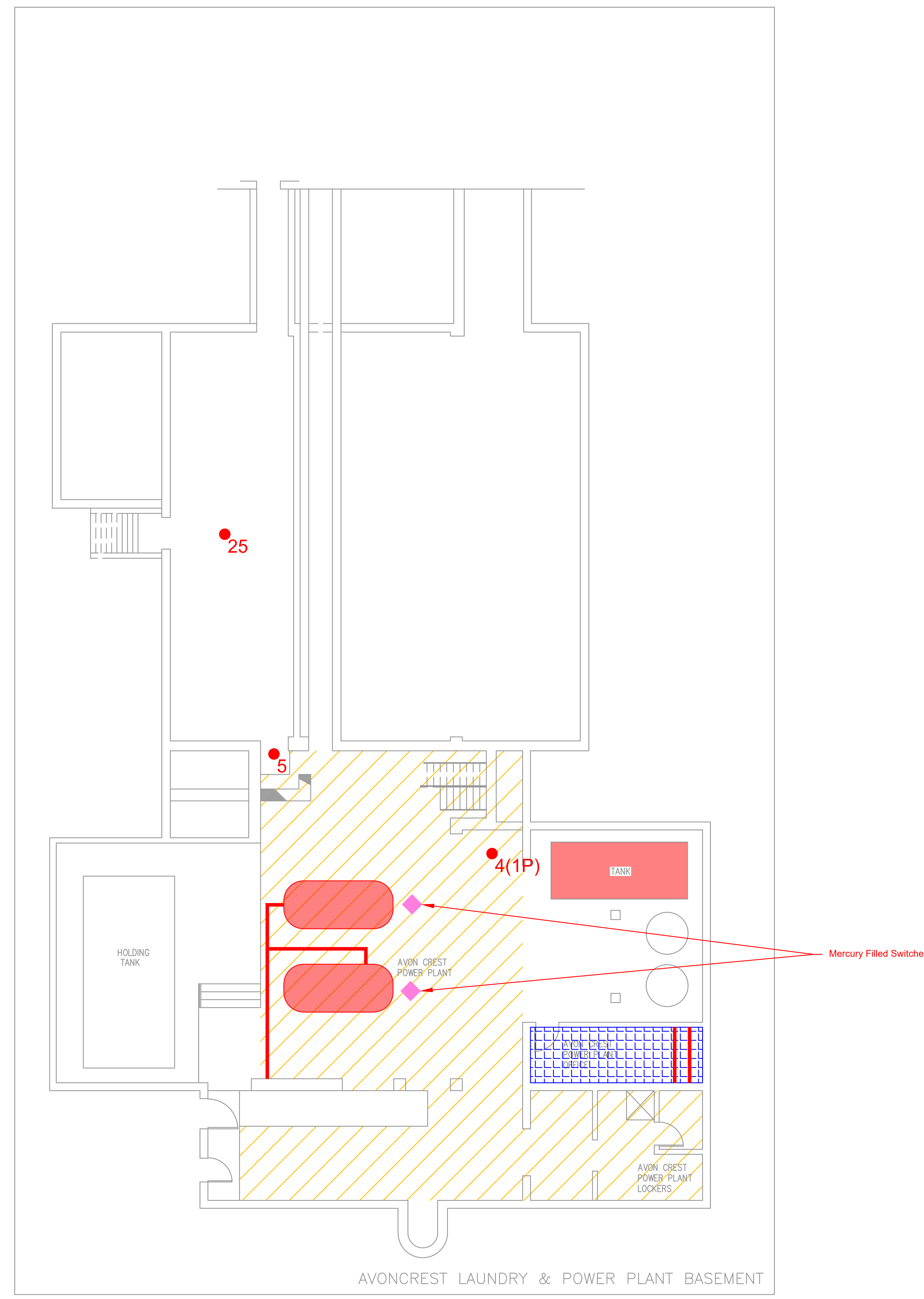
ASBESTOS-CONTAINING FINISHES SCHEDULE (BASEMENT)

Material	Surface Area (m^2)
Vinyl Floor Tiles	0
Vinyl Sheet Floor	0
Transite Ceiling Panels	21
Ceiling Plaster	200
Boiler Tank Insulation	146
Boiler Breaching Insulation	310
Other Mechanical Insulation	39

ASBESTOS-CONTAINING MATERIALS LEGEND

Symbol	Material	Symbol	Material
	Vinyl Floor Tile & Mastic	1 (P)	Parged Cement Pipe Fitting Insulation with Quantity and Condition Rating
	Vinyl Sheet Flooring & Mastic		Pipe Insulation (Horizontal and Vertical)
	Textured Ceiling Coat	Hg	Mercury-containing Thermometer
	Ceiling Tile		Sink Undercoat
	Ceiling Plaster		ACM Debris (Above False Ceiling)
	Transite Ceiling Tiles	FD	Fire Door with Presumed ACM Core

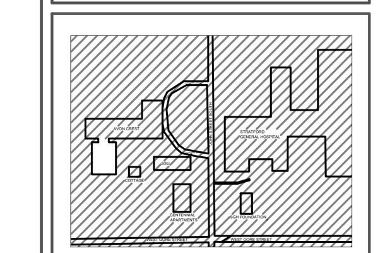




HPHA HURON PERTH HEALTHCARE ALLIANCE

TRUE NORTH
CONSTRUCTION NORTH

KEY PLAN



KEY PLAN

No.	DESCRIPTION	DATE
2	REVISED FOR REPORT	2023/03/03
1	ISSUED FOR REPORT	2023/02/25

REVISIONS:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND REPORT ANY ERRORS AND / OR OMISSIONS TO THE ARCHITECT / CONSULTANT BEFORE COMMENCING THE WORK.

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Stratford, Ontario
N5A 2Y6**

DRAWING TITLE:
**Avon Crest Facility
Laundry and Power Plant**

DRAWN BY: J. Miller	DATE: February 25, 2023
CHECKED BY: J. Gore	SCALE: N.T.S.

PROJECT NO.: 2-3230024

DRAWING NO.: **H105**

Appendix C

Laboratory Certificate of Analysis – Asbestos

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Laboratory Analysis Report

To:

Josh Metler
Safetech Environmental Ltd.
100 Hanson Avenue, Unit 2
Kitchener, Ontario
N2C 2E2

EMC LAB REPORT NUMBER: A88613
Job/Project Name: Avoncrest 2023 Demo DSHM
Analysis Method: Polarized Light Microscopy – EPA 600
Date Received: Feb 22/23 **Date Analyzed:** Feb 22/23
Analyst: Rahul Patel
Reviewed By: Malgorzata Sybydlo

No. of Phases Analyzed: 66
Job No: 2-3230024
Number of Samples: 47
Date Reported: Feb 22/23

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
AVC23-AVUL01a	A88613-1	Floor underlay	Black, tar	**ND**		5	95
AVC23-AVUL01b	A88613-2	Floor underlay	Black, tar	**ND**		5	95
AVC23-AVUL01c	A88613-3	Floor underlay	Black, tar	**ND**		5	95
AVC23-AVWC01a	A88613-4	Window caulking-Avoncrest	White, caulking	**ND**			100
AVC23-AVWC01b	A88613-5	Window caulking-Avoncrest	White, caulking	**ND**			100
AVC23-AVWC01c	A88613-6	Window caulking-Avoncrest	2 Phases: a) White, caulking b) Off white, caulking	 **ND** **ND**		 2 2	 98 98
AVC23-AVRM01a	A88613-7	Roof membrane-Avoncrest	2 Phases: a) Black, tar b) Black, tar with fibres	 **ND** **ND**		 20	 100 80
AVC23-AVRM01b	A88613-8	Roof membrane-Avoncrest	2 Phases: a) Black, tar b) Black, tar with fibres	 **ND** **ND**		 20	 100 80
AVC23-AVRM01c	A88613-9	Roof membrane-Avoncrest	2 Phases: a) Black, tar b) Black, tar with fibres	 **ND** **ND**		 20	 100 80

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Client's Job/Project Name/No.: 2-3230024
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Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
AVC23-LPWC01a	A88613-10	Window caulking-laundry/power plant	Off white, caulking	**ND**		2	98
AVC23-LPWC01b	A88613-11	Window caulking-laundry/power plant	2 Phases: a) White, caulking b) Off white, caulking	 **ND** **ND**		2	 98 100
AVC23-LPWC01c	A88613-12	Window caulking-laundry/power plant	White, caulking	**ND**			100
AVC23-AVBM01a	A88613-13	Black mastic-Avoncrest	Brown, mastic	**Chrysotile**	**3**	2	95
AVC23-AVBM01b	A88613-14	Black mastic-Avoncrest	NA	**NA**			
AVC23-AVBM01c	A88613-15	Black mastic-Avoncrest	NA	**NA**			
AVC23-LPCK01a	A88613-16	Building caulking-laundry/power plant	Grey, caulking	**ND**			100
AVC23-LPCK01b	A88613-17	Building caulking-laundry/power plant	White and grey, caulking	**ND**			100
AVC23-LPCK01c	A88613-18	Building caulking-laundry/power plant	White and grey, caulking	**ND**			100
AVC23-PPRM01a	A88613-19	Roof membrane-power plant lower roof	2 Phases: a) Black, tar b) Black, tar with fibres	 **ND** **ND**		 20	 100 80
AVC23-PPRM01b	A88613-20	Roof membrane-power plant lower roof	3 Phases: a) Black, tar b) Black, tar with fibres c) Brown, fibrous material	 **ND** **ND** **ND**		 20 75	 100 80 25

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Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
AVC23-PPRM01c	A88613-21	Roof membrane-power plant lower roof	2 Phases: a) Black, tar b) Black, tar with fibres	 **ND** **ND**		 20	 100 80
AVC23-PPRM02a	A88613-22	Roof membrane-power plant upper roof	2 Phases: a) Black, tar b) Black, tar with fibres	 **ND** **ND**		 20	 100 80
AVC23-PPRM02b	A88613-23	Roof membrane-power plant upper roof	2 Phases: a) Black, tar b) Black, tar with fibres	 **ND** **ND**		 20	 100 80
AVC23-PPRM02c	A88613-24	Roof membrane-power plant upper roof	2 Phases: a) Black, tar b) Black, tar with fibres	 **ND** **ND**		 20	 100 80
AVC23-SW01a	A88613-25	Sweatwrap-laundry/power plant	2 Phases: a) Black, fibrous material with tar b) Brown, fibrous material	 **ND** **ND**		 80 90	 20 10
AVC23-SW01b	A88613-26	Sweatwrap-laundry/power plant	2 Phases: a) Black, fibrous material with tar b) Brown, fibrous material	 **ND** **ND**		 80 90	 20 10
AVC23-SW01c	A88613-27	Sweatwrap-laundry/power plant	2 Phases: a) Black, fibrous material with tar b) Brown, fibrous material	 **ND** **ND**		 80 90	 20 10
AVC23-BRB01a	A88613-28	Refractory brick	Brown, cementitious material	**ND**			100
AVC23-BRB01b	A88613-29	Refractory brick	Brown, cementitious material	**ND**			100

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Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
AVC23-BRB01c	A88613-30	Refractory brick	Brown, cementitious material	**ND**			100
AVC23-BrMr01a	A88613-31	Brick mortar	Grey, cementitious material	**ND**			100
AVC23-BrMr01b	A88613-32	Brick mortar	Grey, cementitious material	**ND**			100
AVC23-BrMr01c	A88613-33	Brick mortar	Grey, cementitious material	**ND**			100
AVC23-BrMr01d	A88613-34	Brick mortar	Grey, cementitious material	**ND**			100
AVC23-BrMr01e	A88613-35	Brick mortar	Grey, cementitious material	**ND**			100
AVC23-SW02a	A88613-36	Sweatwrap-Avoncrest	2 Phases: a) Black, fibrous material with tar b) Brown, fibrous material	 **ND** **ND**		 80 90	 20 10
AVC23-SW02b	A88613-37	Sweatwrap-Avoncrest	2 Phases: a) Black, fibrous material with tar b) Brown, fibrous material	 **ND** **ND**		 80 90	 20 10
AVC23-SW02c	A88613-38	Sweatwrap-Avoncrest	2 Phases: a) Black, fibrous material with tar b) Brown, fibrous material	 **ND** **ND**		 80 90	 20 10
AVC23-AVJC01a	A88613-39	Building joint compound-Avoncrest	Grey, caulking	**ND**			100
AVC23-AVJC01b	A88613-40	Building joint compound-Avoncrest	Grey, caulking	**ND**			100

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Laboratory Analysis Report

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Client's Job/Project Name/No.: 2-3230024
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Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
AVC23-AVJC01c	A88613-41	Building joint compound-Avoncrest	Grey, caulking	**ND**			100
AVC23-IWC01a	A88613-42[5]	Interior window caulking-Avoncrest	White, caulking	**ND**			100
AVC23-IWC01b	A88613-43[5]	Interior window caulking-Avoncrest	White, caulking	**ND**			100
AVC23-IWC01c	A88613-44	Interior window caulking-Avoncrest	White and off white, caulking	**ND**			100
AVC23-LNRM01a	A88613-45	Roof membrane-laundry room	2 Phases: a) Black, tar b) Black, tar with fibres	 **ND** **ND**		 20	 100 80
AVC23-LNRM01b	A88613-46	Roof membrane-laundry room	2 Phases: a) Black, tar b) Black, tar with fibres	 **ND** **ND**		 20	 100 80
AVC23-LNRM01c	A88613-47	Roof membrane-laundry room	2 Phases: a) Black, tar b) Black, tar with fibres	 **ND** **ND**		 20	 100 80

Note:
1. Bulk samples are analyzed using Polarized Light Microscopy (PLM) and dispersion staining techniques. The analytical procedures are in accordance with EPA 600/R-93/116 method.
2. The results are only related to the samples analyzed. **ND** = None Detected (no asbestos fibres were observed), **NA** = Not Analyzed (analysis stopped due to a previous positive result)
3. This report may not be reproduced, except in full without the written approval of EMC Scientific Inc. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
4. The Ontario Regulatory Threshold for asbestos is 0.5%. The limit of quantification (LOQ) is 0.5%.
5. This sample is small in size.

Appendix D

Background Information on Designated Substances and Other Hazardous Materials

DESIGNATED SUBSTANCES

The Occupational Health and Safety Act of Ontario (OHSA) allows for certain toxic substances to be especially designated. The OHSA defines a designated substance as "a biological, chemical, or physical agent or combination thereof prescribed as a designated substance to which the exposure of a worker is prohibited, regulated, restricted, limited, or controlled." Ontario Regulation 490/09 - Designated Substances (O. Reg. 490/09), made under the Occupational Health and Safety Act outlines required steps to control exposure of workers to designated substances. Under O. Reg. 490/09 there are eleven (11) designated substances; acrylonitrile, arsenic, asbestos, benzene, coke oven emissions, ethylene oxide, isocyanates, lead, mercury, silica and vinyl chloride. This regulation applies to every employer and worker at a workplace where the designated substances are present, produced, processed, used, handled or stored and at which a worker is likely to be exposed to the designated substance.

Section 14 of O. Reg. 490/09 exempts an employer and the workers of an employer who engage in construction from the requirements of the regulation. However, designated substances are still required to be identified prior to the beginning of a demolition or renovation project to ensure that construction workers (and potentially building occupants) are adequately protected from the hazards posed by the presence of these materials if the planned work may cause them to be disturbed. Accordingly, under Section 30 of the OHSA building owners are required to perform an assessment to determine whether any designated substances are present at the project site before the beginning of the project. The owner is also required to prepare a list of designated substances that are present at the site and provide this list to prospective constructors before entering into a binding contract with the constructor. This way, contractors and construction workers are made aware of designated substances present within the work area so that appropriate measures can be taken during the work to limit exposure to these substances.

Designated Substances and Hazardous Materials Assessments are conducted to conform to the requirements of Section 30 of the OHSA. The assessments are performed to identify designated substances (and other hazardous materials) within the work area that may present a hazard to workers if disturbed. These substances are commonly a component of building materials or equipment found in buildings. Additional information regarding the eleven designated substances including their properties, uses and health effects are provided below.

Acrylonitrile

Acrylonitrile (ACN) is a clear, colourless or pale yellow liquid with a pungent onion- or garlic-like, irritating odour. It is highly flammable and as such is a severe fire and explosion hazard.

Acrylonitrile is used mainly as a monomer or comonomer in the production of acrylic fibres, plastics, resins and nitrile rubbers. Historically, a mixture of acrylonitrile and carbon tetrachloride was used as a pesticide; however, all pesticide uses have stopped. Based on its use as a chemical intermediate, exposure to acrylonitrile is primarily occupational, via inhalation during its manufacture and use. Therefore, this designated substance is not expected to be encountered in buildings where it is not either produced or used in a manufacturing process.

Acute (short-term) exposure of workers to acrylonitrile has been observed to cause mucous membrane irritation, headaches, dizziness, and nausea. More significant exposures may lead to symptoms such as limb weakness, labored and irregular breathing, impaired judgment, cyanosis, collapse, and convulsions. Exposure of the skin to high concentrations of acrylonitrile in the air may irritate the skin and cause it to turn red while direct skin contact with acrylonitrile may cause the skin to blister and peel. The International Agency for Research on Cancer (IARC) concluded that there is inadequate evidence in humans for the carcinogenicity of acrylonitrile, but has classified it as possibly carcinogenic to humans (Group 2B).

Arsenic

Arsenic is a naturally occurring mineral, widely distributed in the earth's crust. Elemental arsenic (sometimes referred to as metallic arsenic) is a silver-gray or white brittle metal. However, arsenic is usually found in the environment combined with other elements such as oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic has no odour and is almost tasteless.

Arsenic and its compounds have a variety of commercial uses. Inorganic arsenic compounds are mainly used as a wood preservative. Copper chromated arsenic (CCA) is used to make "pressure-treated" lumber. CCA-treated wood is no longer used for residential applications but may still be used in industrial applications. Arsenic is also used in metallurgy for hardening copper, lead and certain metal alloys, in pigment production, in the manufacture of certain types of glass, and in semiconductors and light-emitting diodes. Inorganic arsenic compounds are no longer used as pesticides in agriculture; however, organic arsenic compounds, namely cacodylic acid, disodium methylarsenate (DSMA), and monosodium methylarsenate (MSMA), are used, as yet, as pesticides – principally on cotton.

Today, workplace exposure to arsenic may still occur in some occupations that use arsenic, such as copper or lead smelting, wood treating, or pesticide application. Exposure to arsenic within buildings other than where it is used as part of the manufacturing process is unlikely and therefore arsenic is not expected to be encountered as part of a routine hazardous building materials assessment.

Human exposure to arsenic can cause both short and long term health effects. Short-term or acute effects can occur within hours or days of exposure. If you breathe high levels of inorganic arsenic, then you are likely to experience a sore throat and irritated lungs. Longer exposure at lower concentrations can lead to skin effects (such as darkened patches of skin and areas of thickened skin), and also to circulatory and peripheral nervous disorders. An important concern is the ability of inhaled inorganic arsenic to increase the risk of cancer. Long term exposure to arsenic has been linked to cancer of the bladder, lungs, skin, kidneys, nasal passages, liver and prostate. The IARC classifies arsenic and arsenic compounds as "carcinogenic to humans" (Group 1).

Asbestos

Asbestos is the name given to a number of naturally occurring fibrous minerals found in the environment. Ontario Regulation 490/09 (Designated Substances) defines asbestos as any one of the following fibrous silicates: actinolite; amosite; anthophyllite; chrysotile; crocidolite; and tremolite. Asbestos fibres have several desirable characteristics such as high textile strength, the ability to be spun and woven, and resistance to heat and most chemicals. These characteristics have resulted in the historical use of asbestos in a wide variety of building materials and other manufactured goods. Examples of products where asbestos has been used include roofing shingles, ceiling and floor tiles, insulation, sprayed fireproofing, gaskets, and friction products such as automotive brakes and clutches.

The peak years for asbestos use were in the 1960s and early 1970s. Therefore, asbestos is commonly found in building materials of this era. The use of asbestos in building materials and other products has decreased significantly since this time. Friable asbestos-containing materials (material that when dry can be crumbled, pulverized or powdered by hand pressure), such as sprayed fireproofing and sprayed insulation, ceased use circa 1973. Mechanical thermal system insulation ceased use circa 1981 while sprayed acoustic texture coat finishes ceased use circa 1982. Non-friable asbestos-containing materials were generally manufactured for a longer period of time (with the exception of plaster finishes which ceased use circa 1960’s). Asbestos-containing drywall joint compound ceased use circa 1980. Vinyl floor tiles, vinyl sheet flooring and acoustic ceiling tile ceased use 1982. Other non-friable materials continued to be produced into the 1990’s, including roofing materials (ceased use circa 1991) and floor adhesives (ceased use circa 1992). Today, asbestos is a controlled substance, and is banned for use in most products sold in Canada under the Hazardous Products Act (with the exception of certain roof shingles, clutch facings and brake linings).

Potentially harmful exposure to asbestos occurs through inhalation of air containing asbestos fibres. The greatest risk for workplace exposure to airborne asbestos is in occupations that produce and use asbestos, such as in mining and milling operations or in the manufacture of products containing asbestos. Exposure to airborne asbestos fibres may also occur to construction workers, trades people, maintenance workers and other building occupants in buildings constructed with asbestos-containing materials; especially during building renovations or repairs or if the materials are in poor condition or are otherwise disturbed.

Health risks associated with asbestos exposure are dependent on several factors such as the type and airborne concentration of asbestos, and period of exposure. In general, the greater the exposure to asbestos, the greater the chance of developing harmful health effects. Typically, chronic, daily exposure to elevated airborne concentrations of asbestos over a period of years is required for health effects to eventually manifest themselves. Health effects associated with exposure to asbestos can result in asbestosis (a scarring of the lungs which makes breathing difficult), mesothelioma (a rare cancer of the lining of the chest or abdominal cavity) and lung cancer. The link between exposure to asbestos and other types of cancers and health effects is less clear.

Benzene

Benzene is a clear, colourless liquid with a characteristic, sweet or aromatic hydrocarbon odour. It is a liquid at room temperature but evaporates into the air very quickly, making it a highly flammable vapour as well as an extremely flammable liquid.

Benzene is formed from both natural processes and human activities. Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke. It is produced from petroleum and coal sources and is used mainly in the manufacture of other chemicals which are used to make plastics, resins, and nylon and synthetic fibres. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides.

Exposure to pure benzene within buildings other than where it is produced or used as part of a manufacturing process is unlikely. Therefore benzene is not expected to be encountered as part of a routine hazardous building materials assessment.

Exposure to benzene primarily occurs through inhalation of airborne vapours. Short-term (acute) health effects associated with overexposure to benzene vapours can result in symptoms such as headache, nausea, dizziness, drowsiness and confusion, with unconsciousness or even death at very high levels. Long-term (chronic) exposure to Benzene may cause blood and bone marrow effects which can lead to anemia and leukemia (cancer of the blood-forming organs) as well as cause damage to the immune

system, increasing the chance for infection. The IARC classifies benzene as "carcinogenic to humans" (Group 1).

Coke Oven Emissions

Coke Oven Emissions refers to the benzene soluble fraction of total particulate matter emitted during the destructive distillation or carbonization of coal for the production of coke (pure carbon). These emissions are a mixture of coal tar, coal tar pitch, volatiles (including benzene, toluene and xylene), creosote, polycyclic aromatic hydrocarbons (PAHs – including benzo(a)pyrene, benzanthracene, chrysene and phenanthrene), and metals (including cadmium, arsenic, beryllium and chromium). Condensed coke oven emissions are a brownish, thick liquid or semisolid with a naphthalene-like odour, while uncondensed coke oven emissions are vapours that escape when the ovens are changed and emptied and are a component of fugitive emissions.

The coke produced is used as a component in the manufacturing of iron and steel. Coke is also used to synthesize calcium carbide and to manufacture graphite and electrodes. Additional chemicals recovered from the coke oven emissions (such as benzene, toluene, naphthalene, sulfur, and ammonium sulfate) are used as raw materials for plastics, solvents, dyes, drugs, waterproofing, paints, pipe coating, roads, roofing, insulation, and as pesticides and sealants.

Coke oven emissions would only be present within facilities producing or using coke as part of the manufacturing process and thus occupational exposure is limited to those workers in the aluminum, steel, graphite, electrical, and construction industries. Therefore, coke oven emissions are not a contaminant of concern during a routine hazardous building materials assessment.

Chronic (long-term) exposure to coke oven emissions can result in chronic bronchitis (particularly those who smoke) and additional health effects such as conjunctivitis, severe dermatitis, and lesions of the respiratory system and digestive system. However, the greatest concern regarding chronic exposure to coke oven emissions is the increased risk of cancer. The IARC classifies coke production as "carcinogenic to humans" (Group 1). The site at which excess cancer rates have been identified most commonly among workers in coke production is the lung. Excess risk for kidney cancer has also been associated with work in coke plants. Additional studies have also reported excess risks for other types of cancers such as cancer of the large intestine and pancreas.

Ethylene Oxide

Ethylene oxide is colourless gas with a somewhat sweet odour. It is extremely flammable and also dangerously reactive. Ethylene oxide exists as a compressed gas that has been produced since the early 1900s. It is used primarily as a chemical intermediate in the production of ethylene glycol, glycol ethers, non-ionic surfactants and other industrial chemicals. Much smaller amounts are used as a non-explosive mixture with nitrogen or carbon dioxide for sterilizing medical instruments and supplies in hospitals and industrially for the fumigation of spices.

Most people are not likely to be exposed to ethylene oxide because it is not commonly found in the environment. Exposure to ethylene oxide is generally limited to those facilities where it is made or used. Therefore, ethylene oxide is not a contaminant of concern during a routine hazardous building materials assessment, although the presence of it should be determined in buildings such as hospitals if construction activities are to occur in or adjacent to areas where it is used or stored.

Exposure to ethylene oxide can result in irritation to the skin or eyes; however, the greatest risk for health effects is through inhalation. This can result in irritation to the nose, throat and respiratory tract, with damage to the central nervous system at higher concentrations. Exposure to high concentrations may cause headache, nausea, dizziness, drowsiness, and incoordination. Exposure to ethylene oxide is also a cancer hazard and possible reproductive hazard. In epidemiological studies of exposure to ethylene oxide, the most frequently reported association has been with lymphatic and haematopoietic cancer. The IARC has concluded that there is limited evidence for the carcinogenicity of ethylene oxide in humans and sufficient evidence for carcinogenicity in experimental animals, classifying ethylene oxide as “carcinogenic to humans” (Group 1).

Isocyanates

Isocyanates are a family of highly reactive, low molecular weight, manufactured chemicals containing one or more isocyanate groups (-NCO). An isocyanate that has two isocyanate groups is known as a diisocyanate, which are the most common type of isocyanates used for manufacturing other products. The most commonly used diisocyanates include methylene diphenyl diisocyanate (MDI), toluene diisocyanate (TDI), and hexamethylene diisocyanate (HDI).

When isocyanates are combined with other compounds that contain free hydroxyl functional groups (i.e. –OH) they react and begin to form polyurethane polymers. These polyurethanes find significant application in the manufacture of rigid and flexible foams. Flexible foam is primarily used for cushioning, while rigid foam is used mainly for insulation. Polyurethanes are also used in the production of adhesives, elastomers, and

coatings and are increasingly used in the automobile industry, autobody repair, and building insulation materials.

This diversity of applications means that exposures to isocyanates can occur in a broad range of production facilities from small workshops to automated production lines. Jobs that may involve exposure to isocyanates include painting, foam-blowing, and the manufacture of many polyurethane products. Exposure to isocyanates within buildings where it is not produced or used as part of manufacturing is unlikely, as products such as rigid foam insulation that may be used in buildings has already undergone the curing process. Completely cured products are fully reacted and therefore are considered to be inert and non-toxic. However, some products such as spray foams, coatings, sealants and adhesives may be sold and used in an uncured form. An example would be an adhesive, which is sold to be initially applied in an uncured form and as it cures (hardens), bonds two pieces of wood together. Such products can provide potential exposure to building occupants and construction workers during the application and use of these products. However, for the purposes of a routine hazardous building materials assessment, products that may have contained isocyanate as part of the manufacturing process (e.g. rigid foam) or during the application/installation process (e.g. spray foam, adhesives and sealants) are assumed to be fully cured and would no longer contain free isocyanate.

Direct skin contact with isocyanates can cause marked skin irritation, resulting in reddening, swelling and blistering. However the greatest route of exposure to isocyanates is through inhalation of fine vapours or droplets. Airborne exposure to isocyanates can result in irritation to the mucous membranes of the eyes and respiratory tracts. This results in symptoms such as excessive tear secretion, dry throat, dry cough, chest pains and difficulty in breathing. Isocyanates are also a major cause of work-related asthma worldwide. Increased exposure to isocyanates can lead to sensitization. Once sensitized, individuals are subject to severe asthma attacks (which in some cases has been reported to result in death) if they are re-exposed.

Lead

Lead is a naturally occurring metal found in small amounts in the earth's crust. It is usually found in ore with zinc, silver and (most abundantly) copper, and is extracted together with these metals. Metallic lead is bluish-white in colour but soon tarnishes to a dull grey when exposed to air. When melted into liquid form it has a shiny chrome-silver appearance.

Lead is soft, dense, highly malleable and resistant to corrosion, with poor electrical conductivity as compared to most other metals. Such properties have resulted in lead being used in many applications, including products and materials commonly found in buildings. It is present as a component of lead-acid batteries, ammunition, PVC plastics, and older brass and chrome-plated brass faucets. As a building component, lead has

been used in water distribution piping, as an alloy in solder, in electrical conduits, roofs and roofing details, and as an additive to paints, ceramic glazes and mortars as pigments or for anti-corrosion properties. Lead has also used as sheeting inside buildings for shielding X-rays and for sound attenuation.

Exposure to lead can occur for workers in workplaces that produce the above materials but also to construction workers, building maintenance personnel and the general population due to the widespread historical use of lead in building materials and consumer products. Most exposure to lead occurs through ingestion or inhalation, with the health effects being the same. Overexposure to lead can result in damage to nervous connections and can cause blood and brain disorders, severe damage to the kidneys and ultimately death. Infants and young children are especially vulnerable to the health effects of lead, as overexposure has been proven to result in the permanent reduction in cognitive capacity. In pregnant women, high levels of exposure to lead may cause miscarriage. The IARC has concluded that lead and inorganic lead compounds are “possibly carcinogenic to humans” (Group 2B).

The known serious health effects associated with lead exposure has brought about widespread reduction in its use. The use of lead in building materials and consumer products has decreased substantially since the 1970s to where lead is no longer being used in building materials and consumer products or is present at significantly lower concentrations. For example, unleaded gasoline was introduced in Canada in 1975, after which leaded gasoline was phased out and banned in 1990. Lead-based solder has been banned since the1980s and most solder used today is either lead-free or has very low lead concentrations. Up until the 1960s, lead was added to paints in significant quantities. Since that time, the concentration of lead in paint has decreased. The federal government began reducing the amount of lead allowed in interior paint in 1976 (to 0.5% by weight). By 1991, paint manufacturers in Canada and the U.S. voluntarily stopped adding lead to paint, reducing lead concentrations to background levels. In 2005 the *Surface Coating Materials Regulations* came into effect to limit the concentration of lead in paint (to 0.06% by weight) for both interior and exterior paints sold to consumers. This was since amended in 2011 to further reduce the allowable lead limit (to 0.009% by weight) and extended to include all consumer paints and coatings.

Mercury

Mercury is a naturally occurring element found in the earth's crust, with natural deposits generally found as a vermilion red ore called cinnabar. Mercury can exist as metallic mercury, organic mercury or inorganic mercury. Metallic or elemental mercury has unique properties as compared to other metals. It is the only pure metal that is a liquid at room temperature, having a silvery-white, shiny appearance. Mercury is the densest liquid known, which produces a colourless, odourless vapour at room temperature.

The unique properties of mercury have resulted in it being used in a wide variety of applications. Properties such as its coefficient of expansion and ability to conduct electricity has resulted in mercury being used in thermometers, barometers and other measuring devices (blood pressure gauges, vacuum gauges, manometers, etc.), thermostats and a variety of other electrical switches (temperature sensitive, tilt switches, float switches, etc.). Mercury is also used in antifouling paints, dry cell or button batteries, and numerous lighting products, including fluorescent lamps and a variety of High Intensity Discharge (HID) lamps such as mercury vapour, metal halide and high pressure sodium lamps. HID lamps are used for street lights, floodlights and industrial lighting applications. Because of the wide variety of uses mercury can be found as a component of machinery, equipment and lighting within buildings; although many of its uses have been phased out over the years.

The health effects of mercury exposure depend on its chemical form (elemental, inorganic or organic), the route of exposure (inhalation, ingestion or skin contact), and the level of exposure. Vapours from liquid elemental mercury and methyl mercury are more easily absorbed than inorganic mercury salts and can, therefore, cause more harm. Exposure to mercury occurs mainly from breathing contaminated air or ingesting contaminated water and food. Mercury is a neurotoxin, which means it can adversely affect the central nervous system. Upon exposure, mercury tends to accumulate quickly in the brain where it tightly binds with the tissue and is released at a very slow rate. The nervous system effects of mercury toxicity are sometimes referred to as "Mad Hatter's Disease" since mercurous nitrate was used in making felt hats. High levels of exposure to mercury can also lead to harmful effects on the digestive and respiratory systems, and the kidneys. Many mercury compounds may also be teratogenic or capable of causing birth defects.

Mercury compounds can also be toxic at low levels in the environment. The characteristics of mercury that make it an environmental problem are its toxicity and persistence in the environment, and its ability to accumulate and bioconcentrate as methyl mercury in fish and fish-eating predators such as large fish or loons. Therefore, proper disposal of mercury-containing materials is essential. The improper disposal of mercury-containing products such as fluorescent light bulb tubes, high intensity discharge lamps, mercury vapour lamps, mercury thermometers and thermostats can lead to the release of mercury from municipal landfills. Used fluorescent and HID lamps may be classified as hazardous waste due to their mercury content and should be recycled if possible rather than being disposed of in landfill.

Silica

Silica (silicon dioxide) is the name of a group of minerals that contain silicon and oxygen in a chemical combination and have the general formula SiO_2. It is one of the most common minerals in the earth’s crust. Silica can be present as crystalline silica (free silica) or amorphous silica (combined silica), and exists in many forms. The three most

common crystalline forms of silica encountered in the workplace environment are quartz, tridymite, and cristobalite. Quartz is by far the most common crystalline silica found in nature, being abundant in most rock types, notably granites, sandstones, quartzites and in sands and soils. Cristobalite and tridymite are found in volcanic rocks. Amorphous silica is found in nature as biogenic silica and as silica glass of volcanic origin. One form of biogenic silica, diatomaceous earth, originates from the skeletons of diatoms deposited on sea floors. From a health perspective it is the crystalline silica forms that raise the biggest concerns.

Silica is present in numerous building materials and products, including concrete, brick, stone, terrazzo, refractory brick, etc. Low concentrations of silica are also possible in plaster, drywall, acoustical ceiling tiles, drywall joint compound, mortars and adhesives. Because of the wide usage of quartz-containing materials, workers may be exposed to crystalline silica in a large variety of industries and occupations. Occupational exposure to silica dust occurs in cement and brick manufacturing, asphalt pavement manufacturing, china and ceramic manufacturing, and the tool and die, steel and foundry industries. Exposure to silica also occurs during many different construction and maintenance activities. The most severe exposures to crystalline silica result from abrasive blasting activities using silica sand. Other activities that may produce crystalline silica dust include jack hammering, rock/well drilling, concrete mixing, concrete drilling, tuck pointing, and brick and concrete block cutting and sawing. Additionally, crystalline silica exposures occur in the maintenance, repair and replacement of refractory brick furnace linings.

Adverse health effects associated with silica exposure result from inhalation of the respirable fraction of crystalline silica, which can arise from many of the activities outlined above. The main health effects associated with silica exposure are lung cancer and silicosis. The IARC has concluded that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is “carcinogenic to Humans” (Group 1). Silicosis is caused by scarring of the lung tissue from breathing in silica dust. This scarring is permanent and causes a reduction in the lungs’ ability to take in oxygen, making it difficult to breathe and in severe cases can be disabling, or even fatal. Since silicosis affects lung function, it also makes one more susceptible to lung infections like tuberculosis.

Vinyl Chloride

Vinyl chloride is a manufactured substance that does not occur naturally. It is used as a chemical intermediate and not an end product. Vinyl chloride exists in liquid form if kept under high pressure or at low temperatures. At room temperature, it is a colourless gas. It burns easily and is not stable at high temperatures.

Most of the vinyl chloride produced is used to make a polymer called polyvinyl chloride (PVC). PVC is used to make a variety of plastic products including pipes, wire and cable coatings, vinyl flooring, vinyl wallpaper and window frames. It is also used to make furniture, upholstery and packaging materials. One of the concerns regarding PVC is that upon burning it will emit toxic fumes. Contaminants emitted when PVC is burned include hydrochloric acid, carbon monoxide, and carbon dioxide, along with lesser amounts of dioxin and furan.

Vinyl chloride is reported to be slightly irritating to the eyes and respiratory tract in humans. Central nervous system effects (including dizziness, drowsiness, fatigue, headache, visual and/or hearing disturbances, memory loss, and sleep disturbances) as well as peripheral nervous system symptoms (peripheral neuropathy, tingling, numbness, weakness, and pain in fingers) have been reported in workers exposed to vinyl chloride. Short-term (acute) exposure to extremely high levels of vinyl chloride has also reportedly caused loss of consciousness, lung and kidney irritation, and inhibition of blood clotting in humans. The most significant health effect associated with exposure to vinyl chloride is that it is a known human carcinogen that causes a rare cancer of the liver. It has been classified by the IARC as “carcinogenic to humans” (Group 1). Brain cancer, lung cancer, and some cancers of the blood also may be connected with breathing vinyl chloride over long periods.

OTHER HAZARDOUS MATERIALS

CHEMICAL HAZARDS

Urea Formaldehyde Foam Insulation

Urea-formaldehyde foam insulation (UFFI) was developed in as an improved means of insulating difficult-to-reach cavities. It was typically made at the construction site from a mixture of urea-formaldehyde resin, a foaming agent and compressed air. When the mixture is injected into the wall, urea and formaldehyde unite and "cure" into an insulating foam plastic. Its appearance is like ordinary shaving cream. Dry, it can be a white or tan colour, and fluffy like styrofoam. Over time UFFI shrinks significantly and may begin to degrade due to its crumbly texture.

UFFI was installed primarily in wall cavities during the 1970's as an energy conservation measure. The insulation was used most extensively from 1975 to 1978, during the period of the Canadian Home Insulation Program (CHIP), when financial incentives were offered by the government to upgrade home insulation levels. In addition to detached homes it can be found in common areas and walls of semi-detached homes, apartment buildings and condominiums. UFFI was also used to a lesser degree in some commercial and industrial buildings.

UFFI installation has been banned in Canada under the Hazardous Products Act (HPA) since December, 1980 due to concerns regarding the health effects of exposure to formaldehyde. Formaldehyde is a colourless, pungent-smelling gas. Health effects include eye, nose, and throat irritation; wheezing and coughing; fatigue; skin rash; nausea; headache; dizziness; and severe allergic reactions.

Sometimes, a slight excess of formaldehyde was often added to ensure complete "curing" with the urea to produce the urea-formaldehyde foam. The excess formaldehyde was given off after installation during the initial curing process, which typically took a few days to a week to complete. UFFI was sometimes improperly installed or used in locations where it should not have been, resulting in continued off-gassing of formaldehyde past the initial curing stage. Since UFFI was last installed in 1980, it should have little effect on indoor formaldehyde levels today. However, if UFFI comes in contact with water or moisture, it could begin to break down. Due to the age of the insulation UFFI may also begin to degrade and crumble into a fine powder. Under these conditions UFFI may release more formaldehyde and consideration should be given to removing the material using properly trained remediation personnel.

BIOLOGICAL HAZARDS

Mould

Mould is part of the fungi kingdom, which also includes mushrooms and yeasts. They are a naturally occurring and essential part of our environment since they break down dead organic material in the outdoor environment (such as leaves, wood and other plant debris), which they use as a food source.

Mould reproduces by means of tiny spores that are so small they can’t be seen by the naked eye. Because of their small size mould spores easily become airborne and can travel long distances, entering indoor environments through ventilation systems, open windows or doors, or tracked in on footwear. Therefore, mould spores are a commonly detected in indoor air and as a component of settled dust.

Under normal conditions, the presence of indoor mould is not an issue. However, if conditions exist that allow it to grow and multiply indoors it can become a potential hazard. Several factors will affect what moulds will grow within a building and how fast they will grow. This includes parameters such as temperature, airflow, and the pH (i.e. acidity/alkalinity) of the food substrate. However, the most important parameter affecting mould growth is water availability, as all moulds need some amount of moisture for them to be able to grow. Buildings that have had a history of water damage are at greater risk of indoor mould growth.

Indoor mould growth may present a risk to the building structure itself through decomposition of building materials. Health risks to building occupants may also occur

as a result of indoor mould growth. Construction or renovation work which disturbs mould-contaminated materials increases this risk of exposure to building occupants and the construction workers themselves. Health effects associated with exposure to mould most commonly results in allergic type reactions such as runny nose, cough, congestion, eye irritation and aggravation of asthma, headache and fatigue. Exposure to very high concentrations of airborne mould spores (such as those that may be observed during disturbance of mould-contaminated building materials) can result in more serious health effects such as Organic Dust Toxic Syndrome (ODTS) or Hypersensitivity Pneumonitis (HP), where flu-like symptoms (fever, chills, cough, fatigue, shortness of breath, body aches, etc.) are exhibited. The chronic form of HP may occur from long-term exposure to lower levels of mould and results in a continued worsening in shortness of breath or cough. A variety of species of mould have also been documented to cause serious invasive infections, which are generally limited to individuals whose immune systems are already somehow compromised.

ENVIRONMENTAL HAZARDS

Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) are a class of man-made organic chemicals known as chlorinated hydrocarbons. They vary in consistency from thin, light-coloured liquids to yellow or black waxy solids. They were manufactured in the United States from 1929 until their manufacture was banned in 1979. Although PCBs were not manufactured in Canada, they were imported from the U.S. over the years. Canada banned the import, manufacture and sale of PCBs in 1977.

PCBs are non-flammable, chemically stable over a wide range of temperature and physical conditions, not soluble in water, unaffected by acids, base or corrosive chemicals, and have a high dielectric or electrical insulating capacity. Due to these unique properties PCBs were used in hundreds of industrial and commercial applications, most commonly in electrical transformers and capacitors, including those capacitors found in light ballasts. They were also used as coolants, fire retardants and as insulation and in a number of other commercial applications including carbonless copy paper, dust suppressors for roads, hydraulic fluids, caulking compounds, plasticizers and lubricating oils and heat-transfer applications.

Although PCBs were found to be extremely useful in many industrial and commercial applications some of their chemical properties also made them an environmental and health hazard. PCBs are nearly indestructible and therefore persist if released into the natural environment. Their high fat and low water solubility result in a build-up (bioaccumulation) of PCBs in the fatty tissue of animals and humans if ingested/inhaled. Because PCBs persist in the fatty tissue of animals their concentration will tend to increase the higher up the food chain.

Most of what is known about the human health effects of PCBs is based on exposures due to accidental releases or job-related activities. These exposures are much higher than the levels normally found in the environment. The adverse health effects include a severe form of acne (chloracne), swelling of the upper eyelids, discolouring of the nails and skin, numbness in the arms and/or legs, weakness, muscle spasms, chronic bronchitis, and problems related to the nervous system. The International Agency for Research on Cancer (IARC) classifies PCBs as “probably carcinogenic to humans” (Group 2A) based on limited evidence that long-term, high-level occupational exposure can lead to increased incidence of liver and kidney cancers. The long-term impact of low-level exposures to PCBs that is common in the general population is unclear. The current state of knowledge suggests that low-level exposures to PCBs are unlikely to cause adverse health effects. However, people eating large amounts of certain sports fish, wild game and marine mammals are at increased risk for higher exposures and possible adverse health effects.

Ozone Depleting and Global Warming Substances

There are several different types of chemicals that are being or have been used as refrigerants in commercial, home and vehicle air conditioners and refrigerators or as fire extinguishing agents in portable and fixed fire extinguishing equipment. This includes groups of chemical compounds known as chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and halons. Some of these chemicals have also been used as foam blowing agents, as cleaning solvents for electrical components, as aerosol spray propellants, and in hospital sterilization procedures. Fixed halon fire extinguishing systems have historically been used in areas such as data centers, IT rooms, museums, libraries, surgical suites, and other locations where use of water-based suppressants could irreparably damage electronics or vital archival collections. There is a large number of halon fire extinguishing systems still in service in Canada.

The concern regarding past and present use of many of the chemicals used as refrigerants or fire extinguishing agents is that they are ozone-depleting substances (ODS). When released into the environment these chemicals break down in the stratosphere and release chlorine or bromine, which destroy the stratospheric ozone layer. The ozone layer screens the earth from some of the sun's harmful ultraviolet rays (UVB). As the ozone layer is depleted, higher UVB levels reach the earth, resulting in increased exposure to UVB. Increased exposure to UVB can cause skin cancer and plays a major role in malignant melanoma development. It can also increase the likelihood of cataracts and may also suppress proper functioning of the body's immune system and the skin's natural defenses.

CFCs, HCFCs and halons are also known to be greenhouse gases and contribute to global warming due to the build-up of these heat-trapping gases in the atmosphere. Hydrofluorocarbons (HFCs) are a common replacement chemical for CFC and HCFC

refrigerants; and although they do not have any ozone depleting potential they are a potent greenhouse gas.

Due to the ozone-depleting potential and/or global warming potential of CFCs, HCFCs, HFCs and halons it is important to control their use and emission into the environment. The manufacture and use of CFCs has stopped while transitional refrigerants (HCFCs) are scheduled to be phased out of production. No phase-out dates are currently planned for any HFCs. In Ontario, Regulation 463/10, “Ozone Depleting Substances and Other Halocarbons” (made under the Environmental Protection Act) enhances the control and management of substances that deplete the ozone layer and contribute to global warming. This regulation has requirements to prevent or minimize ozone-depleting substances and other halocarbons emissions, which serves a dual environmental benefit of lowering emissions that destroy the ozone layer and contribute to climate change.