



July 12, 2017

CITY OF SASKATOON

# Asbestos-Containing Building Materials Assessment Report - Mayfair Library



REPORT

**Submitted to:**

The City of Saskatoon  
1101 Avenue P North  
Saskatoon, SK S7L 7K6

**Report Number: 1667963**

**Distribution:**

One Copy: City of Saskatoon  
One Copy: Golder Associates Ltd.





## Table of Contents

<b>1.0 INTRODUCTION.....</b>	<b>1</b>
<b>2.0 SCOPE OF WORK .....</b>	<b>1</b>
2.1 Asbestos-Containing Materials .....	1
<b>3.0 RESULTS AND DISCUSSION .....</b>	<b>2</b>
3.1 Asbestos-Containing Materials .....	2
3.1.1 List of Identified Asbestos-Containing Materials .....	2
3.1.2 Non Asbestos-Containing Materials .....	3
<b>4.0 EXCLUDED AREAS AND MATERIALS .....</b>	<b>3</b>
<b>5.0 CONCLUSIONS AND RECOMMENDATIONS.....</b>	<b>4</b>
5.1 Asbestos-Containing Materials .....	4
<b>6.0 SURVEY LIMITATIONS.....</b>	<b>5</b>
<b>7.0 CLOSURE.....</b>	<b>5</b>

### APPENDICES

#### APPENDIX A

Laboratory Certificate of Analysis Report

#### APPENDIX B

Site Photographs

#### APPENDIX C

Room by Room Spreadsheet

#### APPENDIX D

Floor Plans



## 1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by the City of Saskatoon (the Client) to conduct an asbestos-containing building materials assessment of the Mayfair Library (the Site) located at 602 – 33<sup>rd</sup> Street West in Saskatoon, Saskatchewan. This assessment report details our findings, conclusions and recommendations for the Site. A walkthrough of the Site was conducted on April 19, 2017 and the assessment was conducted on June 5, 2017 by Kody Henderson, OHS Project Manager. Asbestos-containing building materials were identified within the Mayfair Library during the assessment. Further information is provided in Section 3.0.

## 2.0 SCOPE OF WORK

In accordance with Tender 16-0844, Golder's scope of work included conducting an asbestos-containing building materials assessment of the Site to evaluate the quantities, locations, and conditions of asbestos-containing building materials.

Following the field work, Golder prepared this assessment report that includes laboratory analysis results, findings of the assessment, conclusions, and recommendations.

### 2.1 Asbestos-Containing Materials

The assessment involved a non-destructive inspection of the Site to assess the type and extent of suspect ACMs in the facility. The systems that were reviewed as part of the inspections included, but were not limited to:

- *Structural* - systems including: insulation between solid webbed joists, fireproofing, building envelope, and interior/exterior caulking around windows and doors;
- *Mechanical* - systems insulation including: hot water and steam system, condensate system, chilled water system, glycol system, domestic hot and cold water, emergency generator exhaust, boiler units, heat exchangers, and asbestos cement piping; and
- *Architectural* - systems including: texture coats, sheet flooring, vinyl floor tile, acoustical spray-applied materials, condensation control applications, ceiling tile, wall board, drywall joint compound, and asbestos sheet products.

Systematic sampling of suspect ACMs was conducted as part of the assessment. Samples were submitted under chain of custody to International Asbestos Testing Laboratory Inc. (IATL) and analyzed for asbestos type and percentage content using Polarized Light Microscopy (PLM) in accordance with EPA methodologies (EPA 600/R-93/116).

Further information related to the assessment and sample collection methods can be found in the Golder document *Golder Asbestos Assessment General Survey Plan and Protocol* provided to the Client.



### **3.0 RESULTS AND DISCUSSION**

The Mayfair Library was constructed in 1991 and consists of a front library area, washrooms, and various offices. As there were no known renovations or additions the entire building was treated as one functional space for this assessment.

- The Laboratory Certificate of Analysis report for the bulk asbestos samples is included in Appendix A.
- Photographs collected during the assessment are provided in Appendix B.
- A room by room spreadsheet outlining the locations, quantities, friability, and condition of identified asbestos-containing materials as well as additional information is provided in Appendix C.
- Floor plans outlining the sample locations and locations of identified asbestos-containing materials is provided in Appendix D.
- Please refer to Sections 4.0 and 6.0 of this report for a summary of the limitations encountered.

### **3.1 Asbestos-Containing Materials**

A total of twenty-seven (27) samples of building materials were collected and tested for asbestos content during the assessment of the Mayfair Library. Two (2) of the samples were found to contain asbestos.

#### **3.1.1 List of Identified Asbestos-Containing Materials**

A list of the identified asbestos-containing materials is provided below.

- Black Window Caulking.

Further information on the identified asbestos-containing materials listed is provided below.

##### ***Black Window Caulking***

Two (2) samples of black window caulking were collected during the assessment. The samples collected were found to contain 1.8% to 1.9% Chrysotile asbestos. Asbestos-containing black window caulking (see Photographs 1 and 2 in Appendix B) were observed in the following locations:

- Room 103 (approximately 20 linear ft); and
- Washroom Vestibule (approximately 20 linear ft).

The remaining windows were observed to have rubber window caulking and are not suspected to have asbestos-containing window caulking.



### **3.1.2 Non Asbestos-Containing Materials**

The following materials were sampled during this assessment and were found to not contain asbestos or were observed to be a non-suspect materials:

- Brick mortar;
- 4'x4' Grey floor tile;
- Tan floor mastic;
- Black floor mastic;
- 1'x1' Light green floor tile with black dots;
- 1'x1' Rose floor tile with black dots;
- 1'x1' Dark green floor tile with black dots;
- Drywall joint compound;
- White sink undercoat;
- Red/brown duct mastic;
- Loose fill attic insulation;
- Grey duct mastic;
- White firestop;
- Grey building caulking;
- Black exterior window caulking;
- Black exterior construction paper;
- The duct work throughout the site was observed to be uninsulated;
- The piping throughout the site was observed to be insulated with fibreglass with PVC fittings;
- The duct connector fabric throughout the site is not suspected to contain asbestos due to the vintage of construction; and
- The 2'x4'/2'x2' ceiling tile with circular pattered fissures and the 2'x2' ceiling tile with small pinholes and small divots were date coded to a time period in which asbestos use was not widespread.

## **4.0 EXCLUDED AREAS AND MATERIALS**

The following is a list of the areas and/or materials excluded during the assessment.

- During the assessment, approximately four floor locations were assessed for floor levelling compound. Floor levelling compound was not encountered at the time of the assessment. If floor levelling compound is encountered during renovation or demolition activities, additional sampling should be conducted to evaluate the presence or absence of asbestos.



- Building materials accessible by a ten foot ladder were assessed by Golder during the assessment. Materials located at heights that were inaccessible from a ten foot ladder were not assessed. If materials at heights are to be removed or impacted by future renovation or demolition activities, additional investigation and sampling of suspect materials may be required.
- The roof and associated components were not assessed by Golder during the assessment as per Tender 16-0844. If the roof and associated components are to be removed or impacted by future renovation or demolition activities, additional investigation and sampling of suspect materials may be required.
- Golder was unable to access the Storage Room of Room 108 during the assessment as the room was locked. If work activities are scheduled within this area, further sampling may be required. If building materials within the Storage Room of Room 108 are to be removed or impacted by future renovation or demolition activities, additional investigation and sampling of suspect materials may be required.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the visual assessment and the laboratory analytical results, the following project specific conclusions and recommendations are provided.

### 5.1 Asbestos-Containing Materials

Asbestos was positively identified within the black window caulking on Site. Asbestos was not identified in the remaining samples collected and analyzed.

If the building is scheduled for renovations that will impact the identified asbestos-containing materials, it must be removed. If additional suspect asbestos-containing building materials are encountered during renovation activities, additional sampling should be undertaken to evaluate asbestos content.

Removal work should be completed by workers that are adequately trained in the hazards and proper methods of working with asbestos. Throughout the abatement activities, appropriate air monitoring and inspections should be conducted by a competent person to document that contamination is contained and that ACM are disposed of appropriately. Ensure asbestos waste is disposed of in accordance with the requirements of the Government of Saskatchewan.

All quantities listed in the report are approximate and are based on the conditions at the time of the assessment. Prior to abatement work it is recommended that a competent person conduct a review of the site to quantify and obtain all measurements of all building materials detailed in this report for cost estimating purposes.

In anticipation of potential abatement, Golder's recommendations for the asbestos-containing materials identified during the assessment are outlined below.

#### **Black Window Caulking**

If scheduled for impact, asbestos-containing black window caulking should be abated following low-risk abatement work procedures as outlined in the *Saskatchewan Asbestos Abatement Manual (2017)*. Alternatively, as the black window caulking was observed in good condition, and with a priority rating of 5 (please see the room by room spreadsheet provided in Appendix C for a description of the priority ratings), it can be managed in place if not scheduled for impact.



## **6.0 SURVEY LIMITATIONS**

This report is based on data and information collected by Golder during the assessment conducted on June 5, 2017 and is based solely on site conditions encountered at the time of the assessment. Any use of this document or the findings, conclusions or recommendations provided in this report by any person other than the City of Saskatoon is at the sole risk of such user.

The conclusions and recommendations contained in this survey report are based upon professional opinions with regard to the subject matter. These opinions are in accordance with currently accepted environmental assessment standards and practices applicable to these locations and are subject to the following inherent limitations:

The data and findings presented in this report are valid as of the dates of the investigations. The passage of time, manifestation of latent conditions or occurrence of future events may warrant further exploration at the properties, analysis of the data, and re-evaluation of the findings, observations, and conclusions expressed in this report. No assurance is made regarding changes in conditions or practices subsequent to the time of the investigation. It was beyond the scope of this assessment to conduct a risk assessment and the potential health risks that may be associated with asbestos exposure for building occupants.

The data reported and the findings, observations and conclusions expressed in this report are limited by the Scope of Work. The Scope of Work was defined by Tender 16-0844 and the initial site walkthrough with the Client, the time and budgetary constraints imposed by the Client, and availability of access to the property.

Because of the limitations stated above, the findings, observations and conclusions expressed by Golder in this report are not, and must not be, considered an opinion concerning compliance of any past or present owner or operator of the site with any federal, provincial or local laws or regulations.

No warranty or guarantee, whether expressed or implied, is made with respect to the data or the reported findings, observations, and conclusions, which are based solely upon site conditions in existence at the time of investigation.

Golder's assessment reports present professional opinions and findings of a scientific and technical nature. While attempts were made to relate the data and findings to applicable environmental laws and regulations, the report shall not be construed to offer legal opinion or representations as to the requirements of, nor compliance with, environmental laws, rules, regulations or policies of federal, provincial, or local governmental agencies. Any use of the survey report constitutes acceptance of the limits of Golder's liability.

Golder's liability extends only to its client and not to other parties who may obtain this survey report. Issues raised by the report must be reviewed by appropriate legal counsel.

## **7.0 CLOSURE**

We trust the information presented in this report meets your requirements. If you have any questions please contact Kody Henderson at (780) 483-3499 or email at [kody\\_henderson@golder.com](mailto:kody_henderson@golder.com). Thank you for the opportunity to be of service. We look forward to working with you again in the future.



## Report Signature Page

### GOLDER ASSOCIATES LTD.

Prepared by:

Reviewed by:

Handwritten signature of Kody Henderson in black ink.

Kody Henderson, Dipl. Env. Sci., CRSP  
OHS Project Manager

Handwritten signature of Andrew Grant in black ink.

Andrew Grant, B.Sc., P.Eng., EP, CRSP  
Associate, OHS Project Director

KH/AG/ba

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation.

\\golder\galle\edmonton\active\2016\3 proj\1667963 cityofsaskatoon\_asbsurveys\_saskatoon\07 reports\07 - mayfair library\city of saskatoon - mayfair library - asbestos building material assessment report.docx





# **APPENDIX A**

## **Laboratory Certificate of Analysis Report**

## CERTIFICATE OF ANALYSIS

**Client:** Golder Associates Ltd  
16820 107 Ave  
Edmonton AB T5P 4C3

**Report Date:** 6/20/2017  
**Report No.:** 538682 - PLM  
**Project:** City of Saskatoon (Mayfair Library)  
**Project No.:** 1667963

**Client:** GOL572

### PLM BULK SAMPLE ANALYSIS SUMMARY

**Lab No.:** 6260399  
**Client No.:** A-001  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Grey Mortar  
**Client Description:** Brick Mortar  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 101  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260400  
**Client No.:** A-002  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Grey Floor Tile  
**Client Description:** Grey 4x4 Floor Tile  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 101  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260400(L2)  
**Client No.:** A-002  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Tan Mastic  
**Client Description:** Grey 4x4 Floor Tile  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 101  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260401  
**Client No.:** A-003  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Grey Caulk  
**Client Description:** Grey Building Caulking  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 101  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260402  
**Client No.:** A-004  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Blue Floor Tile  
**Client Description:** 12x12 Lt. Green Floor Tile With Black Dots  
Percent Non-Asbestos Fibrous Material:  
None Detected


**Location:** Room 102  
**Facility:**  
Percent Non-Fibrous Material:  
100

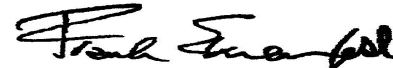
**Lab No.:** 6260402(L2)  
**Client No.:** A-004  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Black Mastic  
**Client Description:** 12x12 Lt. Green Floor Tile With Black Dots  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 102  
**Facility:**  
Percent Non-Fibrous Material:  
100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

**Date Received:** 6/13/2017  
**Date Analyzed:** 06/20/2017  
**Signature:**   
**Analyst:** Alex Wright

**Approved By:**   
Frank E. Ehrenfeld, III  
Laboratory Director

## CERTIFICATE OF ANALYSIS

**Client:** Golder Associates Ltd  
16820 107 Ave  
Edmonton AB T5P 4C3

**Report Date:** 6/20/2017  
**Report No.:** 538682 - PLM  
**Project:** City of Saskatoon (Mayfair Library)  
**Project No.:** 1667963

**Client:** GOL572

### PLM BULK SAMPLE ANALYSIS SUMMARY

**Lab No.:** 6260403  
**Client No.:** A-005  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Off-White Floor Tile  
**Client Description:** 12x12 Rose Floor Tile With Black Dots  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 102  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260403(L2)  
**Client No.:** A-005  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Black Mastic  
**Client Description:** 12x12 Rose Floor Tile With Black Dots  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 102  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260404  
**Client No.:** A-006  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Green Floor Tile  
**Client Description:** 12x12 Dk Green Floor Tile With Black Dots  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 102  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260404(L2)  
**Client No.:** A-006  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Black Mastic  
**Client Description:** 12x12 Dk Green Floor Tile With Black Dots  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 102  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260405  
**Client No.:** A-007  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** White Joint Compound  
**Client Description:** Drywall Joint Compound  
Percent Non-Asbestos Fibrous Material:  
None Detected


**Location:** Room 102  
**Facility:**  
Percent Non-Fibrous Material:  
100

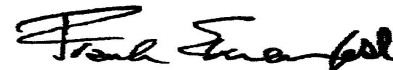
**Lab No.:** 6260406  
**Client No.:** A-008  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** White Insulation  
**Client Description:** White Sink Undercoat  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 109  
**Facility:**  
Percent Non-Fibrous Material:  
100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

**Date Received:** 6/13/2017  
**Date Analyzed:** 06/20/2017  
**Signature:**   
**Analyst:** Alex Wright

**Approved By:**   
Frank E. Ehrenfeld, III  
Laboratory Director

## CERTIFICATE OF ANALYSIS

**Client:** Golder Associates Ltd  
16820 107 Ave  
Edmonton AB T5P 4C3

**Report Date:** 6/20/2017  
**Report No.:** 538682 - PLM  
**Project:** City of Saskatoon (Mayfair Library)  
**Project No.:** 1667963

**Client:** GOL572

### PLM BULK SAMPLE ANALYSIS SUMMARY

<b>Lab No.:</b> 6260407	<b>Analyst Observation:</b> Black Caulk	<b>Location:</b> Washroom Vestibule
<b>Client No.:</b> A-009	<b>Client Description:</b> Black Window Caulking	<b>Facility:</b>
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>PC 1.9 Chrysotile</i>	None Detected	98.1

<b>Lab No.:</b> 6260408	<b>Analyst Observation:</b> White Joint Compound	<b>Location:</b> Washroom Vestibule
<b>Client No.:</b> A-010	<b>Client Description:</b> Drywall Joint Compound	<b>Facility:</b>
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	None Detected	100

<b>Lab No.:</b> 6260409	<b>Analyst Observation:</b> White Joint Compound	<b>Location:</b> Room 104
<b>Client No.:</b> A-011	<b>Client Description:</b> Drywall Joint Compound	<b>Facility:</b>
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	None Detected	100

<b>Lab No.:</b> 6260410	<b>Analyst Observation:</b> White Joint Compound	<b>Location:</b> Room 102
<b>Client No.:</b> A-012	<b>Client Description:</b> Drywall Joint Compound	<b>Facility:</b>
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	None Detected	100

<b>Lab No.:</b> 6260411	<b>Analyst Observation:</b> Red Caulk	<b>Location:</b> Room 102
<b>Client No.:</b> A-013	<b>Client Description:</b> Red/Brown Duct Mastic	<b>Facility:</b>
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	None Detected	100

<b>Lab No.:</b> 6260412	<b>Analyst Observation:</b> Black Caulk	<b>Location:</b> Room 103
<b>Client No.:</b> A-014	<b>Client Description:</b> Black Window Caulking	<b>Facility:</b>
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>PC 1.8 Chrysotile</i>	None Detected	98.2

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

**Date Received:** 6/13/2017  
**Date Analyzed:** 06/20/2017  
**Signature:**   
**Analyst:** Alex Wright

**Approved By:**   
Frank E. Ehrenfeld, III  
Laboratory Director

## CERTIFICATE OF ANALYSIS

**Client:** Golder Associates Ltd  
16820 107 Ave  
Edmonton AB T5P 4C3

**Report Date:** 6/20/2017  
**Report No.:** 538682 - PLM  
**Project:** City of Saskatoon (Mayfair Library)  
**Project No.:** 1667963

**Client:** GOL572

### PLM BULK SAMPLE ANALYSIS SUMMARY

**Lab No.:** 6260413  
**Client No.:** A-015  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Tan Insulation  
**Client Description:** Loose Fill Insulation  
Percent Non-Asbestos Fibrous Material:  
95 Cellulose

**Location:** Room 107  
**Facility:**  
Percent Non-Fibrous Material:  
5

**Lab No.:** 6260414  
**Client No.:** A-016  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** White Joint Compound  
**Client Description:** Drywall Joint Compound  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 107  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260415  
**Client No.:** A-017  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Grey Mastic  
**Client Description:** Grey Duct Mastic  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 106  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260416  
**Client No.:** A-018  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** White Putty  
**Client Description:** White Firestop  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 106  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260417  
**Client No.:** A-019  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Grey Sheetrock  
**Client Description:** Drywall Joint Compound  
Percent Non-Asbestos Fibrous Material:  
10 Cellulose


**Location:** Room 106  
**Facility:**  
Percent Non-Fibrous Material:  
90

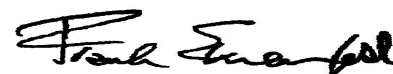
**Lab No.:** 6260417(L2)  
**Client No.:** A-019  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** White Joint Compound  
**Client Description:** Drywall Joint Compound  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 106  
**Facility:**  
Percent Non-Fibrous Material:  
100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

**Date Received:** 6/13/2017  
**Date Analyzed:** 06/20/2017  
**Signature:**   
**Analyst:** Alex Wright

**Approved By:**   
Frank E. Ehrenfeld, III  
Laboratory Director

## CERTIFICATE OF ANALYSIS

**Client:** Golder Associates Ltd  
16820 107 Ave  
Edmonton AB T5P 4C3

**Report Date:** 6/20/2017  
**Report No.:** 538682 - PLM  
**Project:** City of Saskatoon (Mayfair Library)  
**Project No.:** 1667963

**Client:** GOL572

### PLM BULK SAMPLE ANALYSIS SUMMARY

**Lab No.:** 6260418  
**Client No.:** A-020  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** White Joint Compound  
**Client Description:** Drywall Joint Compound  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Room 106  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260419  
**Client No.:** A-021  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Grey Mortar  
**Client Description:** Brick Mortar  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Exterior  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260420  
**Client No.:** A-022  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Grey Mortar  
**Client Description:** Brick Mortar  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Exterior  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260421  
**Client No.:** A-023  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Grey Mortar  
**Client Description:** Brick Mortar  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Exterior  
**Facility:**  
Percent Non-Fibrous Material:  
100

**Lab No.:** 6260422  
**Client No.:** A-024  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Grey Mortar  
**Client Description:** Brick Mortar  
Percent Non-Asbestos Fibrous Material:  
None Detected


**Location:** Exterior  
**Facility:**  
Percent Non-Fibrous Material:  
100

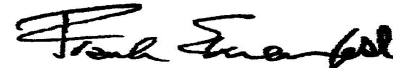
**Lab No.:** 6260423  
**Client No.:** A-025  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Grey Caulk  
**Client Description:** Grey Building Caulking  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Exterior  
**Facility:**  
Percent Non-Fibrous Material:  
100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

**Date Received:** 6/13/2017  
**Date Analyzed:** 06/20/2017  
**Signature:**   
**Analyst:** Alex Wright

**Approved By:**   
Frank E. Ehrenfeld, III  
Laboratory Director

## CERTIFICATE OF ANALYSIS

**Client:** Golder Associates Ltd  
16820 107 Ave  
Edmonton AB T5P 4C3

**Report Date:** 6/20/2017  
**Report No.:** 538682 - PLM  
**Project:** City of Saskatoon (Mayfair Library)  
**Project No.:** 1667963

**Client:** GOL572

### PLM BULK SAMPLE ANALYSIS SUMMARY

**Lab No.:** 6260424  
**Client No.:** A-026  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Black Caulk  
**Client Description:** Black Window Caulking  
Percent Non-Asbestos Fibrous Material:  
None Detected


**Location:** Exterior  
**Facility:**  
Percent Non-Fibrous Material:  
100


**Lab No.:** 6260425  
**Client No.:** A-027  
Percent Asbestos:  
*None Detected*

**Analyst Observation:** Black Roof Material  
**Client Description:** Black Construction Paper  
Percent Non-Asbestos Fibrous Material:  
None Detected

**Location:** Exterior  
**Facility:**  
Percent Non-Fibrous Material:  
100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

**Date Received:** 6/13/2017  
**Date Analyzed:** 06/20/2017  
**Signature:**   
**Analyst:** Alex Wright

**Approved By:**   
Frank E. Ehrenfeld, III  
Laboratory Director

## CERTIFICATE OF ANALYSIS

**Client:** Golder Associates Ltd  
16820 107 Ave  
Edmonton AB T5P 4C3

**Report Date:** 6/20/2017  
**Report No.:** 538682 - PLM  
**Project:** City of Saskatoon (Mayfair Library)  
**Project No.:** 1667963

**Client:** GOL572

### Appendix to Analytical Report

**Customer Contact:**

**Analysis:** US EPA 600, R93-116

This appendix seeks to promote greater understanding of any observations, exceptions, special instructions, or circumstances that the laboratory needs to communicate to the client concerning the above samples. The information below is used to help promote your ability to make the most informed decisions for you and your customers. Please note the following points of contact for any questions you may have.

**iATL Customer Service:** customerservice@iatl.com

**iATL Office Manager:** cdavis@iatl.com

**iATL Account Representative:** Pete Lesniak

**Sample Login Notes:** See Batch Sheet Attached

**Sample Matrix:** Bulk Building Materials

**Exceptions Noted:** See Following Pages

#### General Terms, Warrants, Limits, Qualifiers:

General information about iATL capabilities and client/laboratory relationships and responsibilities are spelled out in iATL policies that are listed at [www.iATL.com](http://www.iATL.com) and in our Quality Assurance Manual per ISO 17025 standard requirements. The information therein is a representation of iATL definitions and policies for turnaround times, sample submittal, collection media, blank definitions, quantification issues and limit of detection, analytical methods and procedures, sub-contracting policies, results reporting options, fees, terms, and discounts, confidentiality, sample archival and disposal, and data interpretation.

iATL warrants the test results to be of a precision normal for the type and methodology employed for each sample submitted. iATL disclaims any other warrants, expressed or implied, including warranty of fitness for a particular purpose and warranty of merchantability. iATL accepts no legal responsibility for the purpose for which the client uses test results. Any analytical work performed must be governed by our Standard Terms and Conditions. Prices, methods and detection limits may be changed without notification. Please contact your Customer Service Representative for the most current information.

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA LAP LLC, or any agency of local, state or province governments nor of any agency of the U.S. government.

This report shall not be reproduced except in full, without written approval of the laboratory.

#### Information Pertinent to this Report:

Analysis by US EPA 600 93-116: Determination of Asbestos in Bulk Building Materials by Polarized Light Microscopy (PLM).

#### Certifications:

- NIST-NVLAP No. 101165-0
- NY-DOH No. 11021
- AIHA-LAP, LLC No. 100188

Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analytical Methodology Alternatives: Your initial request for analysis may not have accounted for recent advances in regulatory requirements or advances in technology that are routinely used in similar situations for other qualified projects. You may have the option to explore additional analysis for further information. Below are a few options, listed as the matrix followed by the appropriate methodology. Also included are links to more information on our website.

Bulk Building Materials that are Non-Friable Organically Bound (NOB) by Gravimetric Reduction techniques employing PLM and TEM: ELAP 198.6 (PLM-NOB), ELAP 198.4 (TEM-NOB)

Loose Fill Vermiculite Insulation, Attic Insulation, Zonolite (copyright), etc.: US EPA 600 R-4/004 (multi-tiered analytical process)  
Sprayed On Insulation/Fireproofing with Vermiculite (SOF-V): ELAP 198.8 (PLM-SOF-V)>

Soil, sludge, sediment, aggregate, and like materials analyzed for asbestos or other elongated mineral particles (ex. erionite, etc.): ASTM D7521, CARB 435, and other options available



## CERTIFICATE OF ANALYSIS

**Client:** Golder Associates Ltd  
16820 107 Ave  
Edmonton AB T5P 4C3

**Report Date:** 6/20/2017  
**Report No.:** 538682 - PLM  
**Project:** City of Saskatoon (Mayfair Library)  
**Project No.:** 1667963

**Client:** GOL572

Asbestos in Surface Dust according to one of ASTM's Methods (very dependent on sampling collection technique – by TEM): ASTM D 5755, D5756, or D6480

Various other asbestos matrices (air, water, etc.) and analytical methods are available.

### Disclaimers / Qualifiers:

There may be some samples in this project that have a "NOTE:" associated with a sample result. We use added disclaimers or qualifiers to inform the client about something that requires further explanation. Here is a list with highlighted disclaimers that may be pertinent to this project. For a full explanation of these and other disclaimers, please inquire at [customerservice@iatl.com](mailto:customerservice@iatl.com).

- 1) Note: No mastic provided for analysis.
- 2) Note: Insufficient mastic provided for analysis.
- 3) Note: Insufficient material provided for analysis.
- 4) Note: Insufficient sample provided for QC reanalysis.
- 5) Note: Different material than indicated on Sample Log / Description.
- 6) Note: Sample not submitted.
- 7) Note: Attached to asbestos containing material.
- 8) Note: Received wet.
- 9) Note: Possible surface contamination.
- 10) Note: Not building material. 1% threshold may not apply.
- 11) Note: Recommend TEM-NOB analysis as per EPA recommendations.
- 12) Note: Asbestos detected but not quantifiable.
- 13) Note: Multiple identical samples submitted, only one analyzed.
- 14) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.080%.
- 15) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.125%.

### Recommendations for Vermiculite Analysis:

Several analytical protocols exist for the analysis of asbestos in vermiculite. These analytical approaches vary depending upon the nature of the vermiculite mineral being tested (e.g. un-processed gänge, homogeneous exfoliated books of mica, or mixed mineral composites). Please contact your client representative for pricing and turnaround time options available.

iATL recommends initial testing using the EPA 600/R-93/116 method. This method is specifically designed for the analysis of asbestos in bulk building materials. It provides an acceptable starting point for primary screening of vermiculite for possible asbestos.

Results from this testing may be inconclusive. EPA suggests proceeding to a multi-tiered analysis involving wet separation techniques in conjunction with PLM and TEM gravimetric analysis (EPA 600/R-04/004).

Further information on this method and other vermiculite and asbestos issues can be found at the following: Agency for Toxic Substances and Disease Registry (ATSDR) [www.atsdr.cdc.gov](http://www.atsdr.cdc.gov), United States Geological Survey (USGS) [www.minerals.usgs.gov/minerals/](http://www.minerals.usgs.gov/minerals/), US EPA [www.epa.gov/asbestos](http://www.epa.gov/asbestos). The USEPA also has an informative brochure "Current Best Practices for Vermiculite Attic Insulation" EPA 747F03001 May 2003, that may assist the health and remediation professional.

The following is a summary of the analytical process outlines in the EPA 600/R-04/004 Method:

- 1) **Analytical Step/Method:** Initial Screening by PLM, EPA 600R-93/116  
**Requirements/Comments:** Minimum of 0.1 g of sample. ~0.25% LOQ for most samples.
- 2) **Analytical Step/Method:** Wet Separation by PLM Gravimetric Technique, EPA R-04/004  
**Requirements/Comments:** Minimum 50g\*\* of dry sample. Analysis of "Sinks" only.
- 3) **Analytical Step/Method:** Wet Separation by PLM Gravimetric Technique, EPA R-04/004  
**Requirements/Comments:** Minimum 50g\*\* of dry sample. Analysis of "Floats" only.
- 4) **Analytical Step/Method:** Wet Separation by TEM Gravimetric Technique, EPA R-04/004  
**Requirements/Comments:** Minimum 50g\*\* of dry sample. Analysis of "Sinks" only.
- 5) **Analytical Step/Method:** Wet Separation by TEM Gravimetric Technique, EPA R-04/004  
**Requirements/Comments:** Minimum 50g\*\* of dry sample. Analysis of "Suspension" only.

LOQ, Limit of Quantitation estimates for mass and volume analyses.

\*With advance notice and confirmation by the laboratory.

\*\*Approximately 1 Liter of sample in double-bagged container (~9x6 inch bag of sample).



# **APPENDIX B**

## **Site Photographs**



**APPENDIX B**  
Site Photographs



**Photograph 1: Asbestos-Containing Black Window Caulking.**



**Photograph 2: Asbestos-Containing Black Window Caulking.**

\\golder\galledmonton\active\2016\3 proj\1667963 cityofsaskatoon\_asbsurveys\_saskatoon\07 reports\07 - mayfair library\appendix b - site photographs.docx



# **APPENDIX C**

## **Room by Room Spreadsheet**

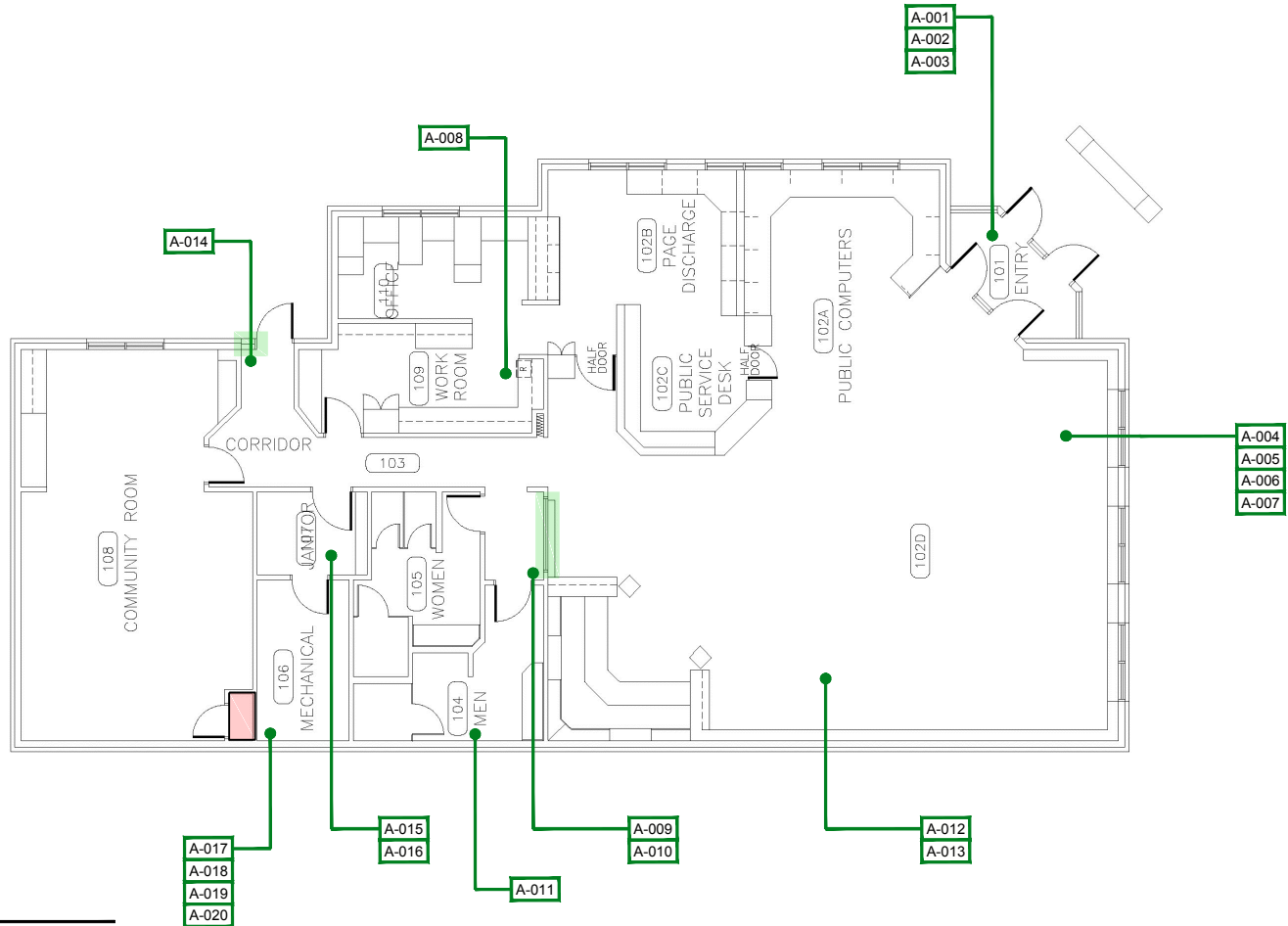
Appendix C  
Mayfair Library  
ACM Inventory

Included/Excluded	Floor	Room #	Area Description	Elements	Subelements	Material Description	Accessibility	Suspect?	Sampled?	Asbestos Containing Material?	Condition	Field Notes	Sample Type	Sample ID	Sample Date	Asbestos Type	ACM Product	% of asbestos	Friable	Sprayed-on	Maintenance	Inspection	Priority	Potential for Disturbance	Recommended Action	Quantity	Photograph ID	Labelling Type	
Included	All	All	Throughout	Doors	Regular Door	Non Suspect Door	High	No	No	No	Good	Non-suspect doors.																	
Included	All	All	Throughout	Mechanical	Duct Work	Duct Connector Fabric	High	No	No	No	Good	Non-suspect fabric.																	
Included	M	101	Entry	Walls	Brick Mortar	Brick Mortar	High	No	Yes	No	Good		Bulk	A-001	5-Jun-17														
Included	M	101	Entry	Floor	Floor	4x4 Grey Floor Tile	High	No	Yes	No	Good		Bulk	A-002	5-Jun-17														
Included	M	101	Entry	Ceiling	Ceiling	Drywall Joint Compound	High	No	Yes	No	Good			VS A-003															
Included	M	101	Entry	Walls	Walls	Grey Building Caulking	High	No	Yes	No	Good		Bulk	A-007	5-Jun-17														
Included	M	101	Entry	Windows	Windows	Rubber Window Caulking	High	No	No	No	Good																		
Included	M	102 A/B/C/D	Library and Front Desk	Walls	Walls	Drywall Joint Compound	High	No	Yes	No	Good		Bulk	A-007	5-Jun-17														
Included	M	102 A/B/C/D	Library and Front Desk	Floor	Floor	1x1 Light Green Floor Tile with Black Dots	High	No	Yes	No	Good		Bulk	A-004	5-Jun-17														
Included	M	102 A/B/C/D	Library and Front Desk	Floor	Floor	1x1 Rose Floor Tile with Black Dots	High	No	Yes	No	Good		Bulk	A-005	5-Jun-17														
Included	M	102 A/B/C/D	Library and Front Desk	Floor	Floor	1x1 Dark Green Floor Tile with Black Dots	High	No	Yes	No	Good		Bulk	A-006	5-Jun-17														
Included	M	102 A/B/C/D	Library and Front Desk	Ceiling	Ceiling	2x2 Ceiling Tile with Circular Patterned Fissures	High	No	Yes	No	Good	Date coded to a time period in which asbestos use was not widespread.																	
Included	M	102 A/B/C/D	Library and Front Desk	Ceiling	Ceiling	Drywall Joint Compound	High	No	Yes	No	Good		Bulk	A-012	5-Jun-17														
Included	M	102 A/B/C/D	Library and Front Desk	Windows	Windows	Rubber Window Caulking	High	No	No	No	Good																		
Included	M	102 A/B/C/D	Library and Front Desk	Walls	Walls	Grey Building Caulking	High	No	Yes	No	Good			VS A-003															
Included	M	102 A/B/C/D	Library and Front Desk	Mechanical	Duct Work	Red/Brown Duct Mastic	High	No	Yes	No	Good		Bulk	A-013	5-Jun-17														
Included	M	103	Hallway	Walls	Walls	Drywall Joint Compound	High	No	Yes	No	Good			VS A-007															
Included	M	103	Hallway	Floor	Floor	1x1 Rose Floor Tile with Black Dots	High	No	Yes	No	Good			VS A-005															
Included	M	103	Hallway	Ceiling	Ceiling	2x2 Ceiling Tile with Circular Patterned Fissures	High	No	Yes	No	Good	Date coded to a time period in which asbestos use was not widespread.																	
Included	M	103	Hallway	Ceiling	Ceiling	Drywall Joint Compound	High	No	Yes	No	Good			VS A-007															
Included	M	103	Hallway	Windows	Windows	Black Window Caulking	High	Yes	Yes	Yes	Good		Bulk	A-014	5-Jun-17	Chrysotile	Window Caulking	1.8% Chrysotile	No	No	No	Manually	5	Moderate	Manage in place.	20 ft	Photograph 2	Door Jamb	
Included	M	WR Vestibule	Vestibule	Walls	Walls	Drywall Joint Compound	High	No	Yes	No	Good			VS A-007															
Included	M	WR Vestibule	Vestibule	Floor	Floor	1x1 Rose Floor Tile with Black Dots	High	No	Yes	No	Good			VS A-005															
Included	M	WR Vestibule	Vestibule	Ceiling	Ceiling	2x2 Ceiling Tile with Circular Patterned Fissures	High	No	No	No	Good	Date coded to a time period in which asbestos use was not widespread.																	
Included	M	WR Vestibule	Vestibule	Ceiling	Ceiling	Drywall Joint Compound	High	No	Yes	No	Good		Bulk	A-010	5-Jun-17														
Included	M	WR Vestibule	Vestibule	Windows	Windows	Black Window Caulking	High	Yes	Yes	Yes	Good		Bulk	A-009	5-Jun-17	Chrysotile	Window Caulking	1.9% Chrysotile	No	No	No	Manually	5	Moderate	Manage in place.	20 ft	Photograph 1	Door Jamb	
Included	M	104	Washroom	Walls	Walls	Drywall Joint Compound	High	No	Yes	No	Good		Bulk	A-011	5-Jun-17														
Included	M	104	Washroom	Floor	Floor	1x1 Light Green Floor Tile with Black Dots	High	No	Yes	No	Good			VS A-004															
Included	M	104	Washroom	Ceiling	Ceiling	Drywall Joint Compound	High	No	Yes	No	Good			VS A-007															
Included	M	105	Washroom	Walls	Walls	Drywall Joint Compound	High	No	Yes	No	Good			VS A-007															
Included	M	105	Washroom	Floor	Floor	1x1 Light Green Floor Tile with Black Dots	High	No	Yes	No	Good			VS A-004															
Included	M	105	Washroom	Ceiling	Ceiling	Drywall Joint Compound	High	No	Yes	No	Good			VS A-007															
Included	M	106	Mechanical Room	Walls	Walls	Drywall Joint Compound	High	No	Yes	No	Good			VS A-007															
Included	M	106	Mechanical Room	Floor	Floor	Concrete	High	No	No	No	Good																		
Included	M	106	Mechanical Room	Ceiling	Ceiling	Drywall Joint Compound	High	No	Yes	No	Good		Bulk	A-018 and A-	5-Jun-17														
Included	M	106	Mechanical Room	Mechanical	Duct Work	Grey Duct Mastic	High	No	Yes	No	Good		Bulk	A-017	5-Jun-17														
Included	M	106	Mechanical Room	Mechanical	Firestop	White Firestop	High	No	Yes	No	Good		Bulk	A-018	5-Jun-17														
Included	M	106	Mechanical Room	Mechanical	Piping	Pipe Insulation	High	No	No	No	Good	Observed to be insulated with fibreglass and PVC.																	
Included	M	106	Mechanical Room	Supplies	Floor	Loose Floor Tiles	High	No	No	No	Good	Visually similar to non-asbestos-containing floor tiles observed in Room 102.		VS A-004, A-005, and A-006															
Included	M	107	Janitor Room	Walls	Walls	Drywall Joint Compound	High	No	Yes	No	Good			VS A-007															
Included	M	107	Janitor Room	Floor	Floor	Concrete	High	No	No	No	Good																		
Included	M	107	Janitor Room	Ceiling	Ceiling	Drywall Joint Compound	High	No	Yes	No	Good		Bulk	A-016	5-Jun-17														
Included	M	107	Janitor Room	Attic	Attic	Loose Fill Insulation	Low	No	Yes	No	Good		Bulk	A-015	5-Jun-17														
Included	M	107	Janitor Room	Mechanical	Piping	Pipe Insulation	High	No	No	No	Good	Observed to be insulated with fibreglass and PVC.																	
Included	M	107	Janitor Room	Electrical Panels and Components	Electrical Panels and Components	Electrical Panels and Components	High	Yes	No	Potential	Good	Not sampled due to safety concerns.							No	No		Annually		Low	Inspect and sample if scheduled for removal.				
Included	M	108	Community Room	Walls	Walls	Drywall Joint Compound	High	No	Yes	No	Good			VS A-007															
Included	M	108	Community Room	Floor	Floor	Carpet	High	No	No	No	Good																		
Included	M	108	Community Room	Floor	Floor	1x1 Rose Floor Tile with Black Dots	High	No	Yes	No	Good			VS A-005															
Included	M	108	Community Room	Ceiling	Ceiling	2x2 Ceiling Tile with Circular Patterned Fissures	High	No	No	No	Good	Date coded to a time period in which asbestos use was not widespread.																	
Included	M	109	Work Room	Walls	Walls	Drywall Joint Compound	High	No	Yes	No	Good			VS A-007															
Included	M	109	Work Room	Floor	Floor	Carpet	High	No	No	No	Good																		
Included	M	109	Work Room	Ceiling	Ceiling	2x2 Ceiling Tile with Circular Patterned Fissures	High	No	No	No	Good	Date coded to a time period in which asbestos use was not widespread.																	
Included	M	109	Work Room	Plumbing	Sink	White Sink Undercoat	High	No	Yes	No	Good		Bulk	A-008	5-Jun-17														
Included	M	110	Office	Walls	Walls	Drywall Joint Compound	High	No	Yes	No	Good			VS A-007															
Included	M	110	Office	Floor	Floor	Carpet	High	No	No	No	Good																		
Included	M	110	Office	Ceiling	Ceiling	2x2 Ceiling Tile with Circular Patterned Fissures	High	No	No	No	Good	Date coded to a time period in which asbestos use was not widespread.																	
Included	M	110	Office	Walls	Walls	Grey Building Caulking	High	No	Yes	No	Good			VS A-003															
Included	E	Exterior	Exterior	Walls	Walls	Brick Mortar	High	No	Yes	No	Good		Bulk	A-021, A-022, A-023, and A-	5-Jun-17														
Included	E	Exterior	Exterior	Walls	Walls	Grey Building Caulking	High	No	Yes	No	Good		Bulk	A-025	5-Jun-17														
Included	E	Exterior	Exterior	Walls	Walls	Black Window Caulking	High	No	Yes	No	Good		Bulk	A-026	5-Jun-17														
Included	E	Exterior	Exterior	Walls	Walls	Black Construction Paper	High	No	Yes	No	Good		Bulk	A-027	5-Jun-17														



# **APPENDIX D**

## **Floor Plans**



**NOTE(S)**

1. ASBESTOS IS A CARCINOGEN. DO NOT BREATHE ASBESTOS DUST.
2. SAMPLES A-021 TO A-027 WERE COLLECTED ALONG THE EXTERIOR OF THE BUILDING.
3. NON-ASBESTOS-CONTAINING LOOSE FILL INSULATION IS LOCATED WITHIN THE CEILING SPACE THROUGHOUT THE BUILDING.

**LEGEND**

- ASBESTOS SAMPLE LOCATION
- ASBESTOS - CONTAINING WINDOW CAULKING
- NO ACCESS

**REFERENCE(S)**  
 PLAN OBTAINED FROM INFRASTRUCTURE SERVICES DEPARTMENT CITY OF SASKATOON. DATED: 11/07/2001.

CLIENT  
**CITY OF SASKATOON**

CONSULTANT



YYYY-MM-DD 2017-07-12  
 DESIGNED KH  
 PREPARED YAW  
 REVIEWED KH  
 APPROVED AG

PROJECT  
**ASBESTOS ASSESSMENT  
 MAYFAIR LIBRARY  
 602 - 33RD STREET WEST**

TITLE  
**MAIN FLOOR**

PROJECT NO. 1667963 CONTROL 1000-HM-0001 REV. 0 FIGURE 1

SCHEMATIC ONLY, NOT TO SCALE

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

26 mm

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

For more information, visit [golder.com](http://golder.com)

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 56 2 2616 2000

[solutions@golder.com](mailto:solutions@golder.com)  
[www.golder.com](http://www.golder.com)

**Golder Associates Ltd.**  
**16820 107 Avenue**  
**Edmonton, Alberta, T5P 4C3**  
**Canada**  
**T: +1 (780) 483 3499**

