Stantec

Anzac Community Centre

Building Envelope & Mould Remediation Report; Addendum 1

May 17, 2018

Prepared for:

Regional Municipality of Wood Buffalo
(R.M.W.B.)
9816 Hardin Street
For McMurray AB, T9H 4K3

Prepared by:

Stantec Architecture Ltd.
10160 – 112 Street
Edmonton AB, T5K 2L6

Dawna Moen, Senior Associate

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Appendices

Executive Summary

The following report is an addendum to the Building Envelope & Mould Remediation Report conducted by Stantec Architecture and Read Jones Christoffersen on March 23, 2018 for the Anzac Community Centre.

On January 23, 2018 the Contractor discovered mould on the walls and ceiling of the Rink Hall. The Contractor performed remediation following the Alberta Health and Safety Standards. Additional mould was identified in other parts of the building so the original scope of work stopped until the extent of the problem could be identified. Alberta Safety & Environmental Services was hired to conduct air testing inside the building (see Appendix E). Multiple areas were highlighted with traces of mould. Stantec and RJC traveled to site to perform an onsite assessment of the building envelope (see Appendix D). The building envelope was failing in multiple areas and concerns regarding the site drainage and deterioration of the floor slab support was noted. This concern needs to be investigated further by a geotechnical engineer to understand the magnitude of costs and repairs. Destructive testing was recommended to be performed by a professional hazardous testing company. On May 4th, 2018 Environmental Monitoring Solutions performed destructive testing on site and multiple species of mould was discovered throughout the building (see Appendix B+C). The Contractor gathered budget price estimates to determine the cost (see Appendix A) to remediate the problems highlighted in the Stantec, RJC, and ASE's report. The prices were as follows:

Remediation Cost Estimate

Project Initial Cost -	$ 945,270.25
Remediation Rough Order of Magnitude Cost (ROM) - (this estimate includes site drainage)	$ 1,300,000.00
Consultant Fees -	$130,000.00
ROM Total Cost -	**$ 2,375,270.25 + GST**

The building replacement cost for a new building would be approximately:

8400 sq ft +/- x $350.00 sq ft = $2,940,000.00 +/-

The cost to demolish the original building is approximately $325,000.00.

Typically, when the renovation and restoration costs exceed 50% of the costs of new construction the Owner must analyze and review fiscally.

Project History

During demolition, Contractors on site discovered mould in the existing Rink Hall change rooms. Over several years the existing oriented strand board (OSB) applied over the gypsum board walls and ceilings was highly contaminated with mould. These walls and ceilings were subjected to moisture during freezing and thaw cycles and high humidity while being used for outdoor rink change areas. The unprotected OSB is known to be a vehicle for mould. Based on the previously provided hazardous material there was no concern identified for air quality or contamination. With the discovery of mould it was determined the mould was likely contained within the rink hall change areas. The Contractor was then instructed to remove the contaminated materials and open additional wall areas to expose the interior of studs and ceilings. The exterior of the building was left protected at this time due to winter temperatures. Air quality tests were taken, and the consultant team visited the site to review the conditions exposed. From the site review many concerns were identified with respect to:

- Building envelope deficiencies
- Leaks in the mechanical systems located in roof, walls, and below grade.
- Site grading and drainage concerns.
- Additional fungal evidence was identified, and certified destructive testing was requested by the consultant team.
- Further investigation was requested to determine the depth of the roof truss at the eave and understand venting deficiencies in the attic space.

On May 4th, 2018 Environmental Monitoring Solutions visited the site of Anzac Community Centre to perform destructive testing for hazardous materials, fungus, and water damage. The hazardous material testing determined no asbestos was found in the ceilings, floors, drywall, duct/attic insulation, brick mortar, or floor leveling compound. There was mercury found in florescent bulbs and thermostats. Polychlorinated biphenyl or lead paint was not present. Emergency lighting contained lead acid batteries. The Fungal Assessment Report was received on May 14, 2018 and identified extensive mould throughout. Of the 10 samples taken, 7 samples tested at moderate to heavy mould growth. The fungal test results confirmed the envelope concerns identified in the original report but provided further evidence to the deterioration of the building structure.

Recommended Repairs

To ensure the building is a safe environment for the community we identify the following remediation and restoration.

- Remove all exterior cladding, OSB sheathing, wall insulation, vapour barrier, and gypsum board. All damaged stud members must be removed and replaced under the direction of a structural engineer to ensure the stability of the building structure. Any electrical wiring, piping, or gas lines located in the exterior walls need to be removed and replaced.

- All the interior walls to the height of two feet require replacement. Based on the fungal report (see Appendix C), selective demolition of the interior ceilings is also required.

- Remove all attic insulation.

- Remove all roofing including OSB to expose wood trusses. Build up the top chord of the roof trusses by scissoring the existing top chord with new members to allow for a higher heel height at the eave and provide proper ventilation.

- Lintels supporting the roof require to be upgraded as indicated in RJC's building envelope report.

- Remove all existing HVAC ducting and insulation. Underground existing mechanical ducts required to be filled and sealed.

- Visual inspection through the underground vent indicates the ground supporting the floor slab has fallen away. This could be due to water infiltration or movement of the structure through freeze / thaw cycles. It is unclear what is supporting the floor slab as it has pulled away from the grade beam. Further investigation, including a geotechnical review is recommended to determine the extent of the repairs and ground water issues (see Appendix D).

- Once all the mould identified in EMS Fungal Report is fully remediated, an inspection is required to confirm the work is completed to Canadian Standards. Following approval, air scrubbing and testing must commence to confirm no airborne spores remain.

- All removed construction materials must be replaced with new to meet Alberta Building Code 2014 for energy efficiency and life safety.

- Exterior grade beams will require protection for heat loss and moisture infiltration.

- The site will be regraded to ensure proper drainage away from the foundation, eavestrough and splash pads will be provided to carry water away from the foundation.

- The new roof system will include soffit ventilation, roof fans, and ridge vents to comply with the Canadian Standards.

APPENDIX A

Budgetary Prices

May 16th, 2018

Attn: Ralph Abbott
RE: Anzac Community Centre

Mr. Abbott

Below are budget prices as per your request for the restoration of the centre. I have calculated the prices based on recommended repairs, including all remediation requirements that came from Environmental Monitoring Solution hazardous material investigation, and all items requested by Stantec & RMWB.

These prices are budgetary prices only and would require a more defined scope of work or drawings to establish a contract pricing.

Item # 1.	Metal roof system.	$ 251,000.00
Item # 2.	Exterior foundation protection.	$ 67,000.00
Item # 3	Exterior wall stud and bottom plate replacement	$ 140,000.00
Item # 4.	Regrade perimeter of building for positive drainage.	$ 125,000.00
Item # 5.	Interior Lintels to code.	$ 2,500.00
Item # 6.	Insulate glulam beams. *(Included in item # 3)*	
Item # 7.	Floor slab/concrete beam joint fill/seal *(included in item # 3)*	
Item # 8.	Electrical	$ 57,000.00
Item # 9.	Insulation and Vapour Barrier Perimeter wall $ 36,000.00	
Item # 10.	Remove and replace interior & exterior drywall	$ 74,000.00
Item # 11.	Attic Insulation	$ 58,000.00
Item # 12.	Ceiling drywall	$ 48,000.00
Item # 13.	Miscellaneous Expenses	$ 70,000.00
	Sub-Total	**$ 928,500.00**
Contingency @ 5%		$**48,000.00**

TOTAL $ 974,500.00

Dave Piercey
Project Manager
Corgan Industrial Ltd
780-838-3201
dpiercey@corgan.ca

ANZAC COMMINITY CENTRE RENOVATION

ITEM # 1. **METAL ROOF SYSTEM** 251000

SOW: remove, supply and install metal roofing

INCLUDES: *removing and reinstalling / existing roofing, metal and sheeting*
seals, flanges, valley, wall flashing, ice/water sheild
drip edges, venting,
36" Tuff-Rib metal

ITEM # 2. **EXTERIOR FOUNDATION PROTECTION** 67000

SOW: excavate 4ft down and 4ft out from foundation

INCLUDES: *excavation, rigid insulation over membrane*
bottom plate protection, flashing over new board

ITEM # 3 **EXTERIOR PERIMETER WALL STUD AND BOTTOM PLATE REPLACEMENT** 140000

SOW: remove and reinstall perimeter wall studs and bottom plate beam

INCLUDES: *removal of sheeting*
removal of all studs and bottom plate beam , seal between slab and beam
hoarding and shoring
rigid insulation fastened with Z-bars
electrical included in ITEM# 8

ITEM # 4 **REGRADE PERIMETER FOR POSITIVE DRAINAGE** 125000

SOW: regrade and install concrete around complete building

INCLUDES: *weeping tile and drainage rock*
remove old sidewalk, prep and place new one
concrete around perimeter sloped and out 4ft from building
landscaping

ITEM # 5 **INTERIOR LINTEL TO CODE** 2500

SOW: replace or repair all lintel to bring to code (foyer/hall)

INCLUDES: *shoring, replacement or additions to as required*
any remedial work as required

ITEM # 6 **INSULATE GLULAM BEAMS**
this will be part of ITEM # 3

ITEM # 7 **FLOOR SLAB / CONCRETE BEAM JOINT FILL**

this will be part of ITEM # 3

ITEM # 8 **ELECTRICAL** 57000

SOW: remove and replace electrical on perimeter wall

INCLUDES: *supply temporary power*
remove and install all wiring, upgade where required
remove and salvage all wire,coil up where required, switches and outlets
remove and re-install main power panels

ITEM # 9 **INSULATION & VAPOUR BARRIER PERIMETER WALL** 36000

SOW: remove and re-install insulation & vapour barrier

INCLUDES: *all insulation and vapour barrier to code*
complete exterior perimeter wall and gables

ITEM # 10 **REMOVE AND REPLACE EXT & INT DRYWALL** 74000

SOW: remove and replace drywall

INCLUDES: *removal and disposal*
install new drywall perimeter walls
interior walls where required
painting

ITEM # 11 **ATTIC INSULATION** 58000

SOW: remove and replace insulation

INCLUDES: *remove and disposal insulation*
blow in new insulation R-60

ITEM # 12 **CEILING DRYWALL** 48000

SOW: remove and replace ceiling drywall complete building

INCLUDES: *removal and disposal of ceiling*
re-install drywall
textured or knockdown
painting

ITEM # 13 **MISCULANIOUS EXPENSES** 70000

INCLUDES: *permits, surveying, engineering, dumpsters and landfill, office trailer etc.*

APPENDIX B

Environmental Monitoring Solutions

Hazardous Materials Assessment Report

ENVIRONMENTAL MONITORING SOLUTIONS

HAZARDOUS MATERIALS ASSESSMENT REPORT

Anzac Community Centre
105B-4 Christina Drive
Anzac, AB

Submitted to:

Corgan Industrial Ltd
Bay 7, 266 MacKay Crescent
Fort McMurray, AB. T9H 5C6

Date: May 11th 2018

Project #: Corgan.01.1

www.emsconsulting.ca

Environmental Monitoring Solutions & Consulting Inc.
12671A – 125th Street NW, Edmonton, AB T5L 0T6
Tel: (780) 953-9046 or (780) 757-9460
emsconsultingedmonton@gmail.com

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ENVIRONMENTAL MONITORING SOLUTIONS

May 11th 2018

Corgan Industrial Ltd
Bay 7, 266 MacKay Crescent
Fort McMurray, AB. T9H 5C6

Attention: Mr. Dave Piercey, Project Manager

Re: Hazardous Materials Assessment, Anzac Community Centre, 105B-4 Christina Drive, Anzac, AB.

1. INTRODUCTION

Environmental Monitoring Solutions were retained by Corgan Industrial Ltd. (the Client) to conduct a hazardous materials (HAZMAT) assessment at the Anzac Community Centre located at 105B-4 Christina Drive in Anzac, AB. The assessment was requested to assist in the identification of Asbestos Containing Materials (ACMs) in various building finishes, and to identify any general hazardous materials that would need to be addressed prior to restoration/renovation/demolition of the structure. Recommendations for the removal and handling of these materials in accordance with provincial and/or federal regulations and guidelines are provided in the body of this report. This report documents all findings noted during our assessment conducted May 4th 2018 by Simon Fallon B.Sc. ROHT and Mike Roberts B.Sc., and provides conclusions and suggested actions based on these findings.

In summary:

Asbestos-Containing Materials (ACMs)

No asbestos-containing materials were identified in the building structure. All samples of drywall joint compound, floor tiles, floor levelling compound, attic insulation & mechanical insulation collected during our assessment were all non-asbestos.

Lead and Lead Based Paints

No dispersible lead paint issues noted. Lead acid batteries are present in the emergency lighting system and could be present in security system components and exit signs.

Other Hazardous Materials

Mercury thermostat switches, fluorescent light fixture ballasts & tubes, energy saving fluorescent bulbs, a fire suppression system, mould, and miscellaneous household chemicals were identified during the assessment.

1.1 Site Description

The areas covered by this assessment included all accessible interior and exterior areas at the Anzac Community Hall. The building structure was presently under renovation and some of the interior walls, ceilings and floor goods had been removed or disturbed. The building consisted of a wood frame structure on a concrete slab. The exterior walls consisted of wooden studs, block and mortar, oriented strand board (OSB) sheeting and finished with plastic siding, brick cladding. The interior finishes consisted of drywall walls and ceilings (some ceilings were textured) and the floor goods consisted of vinyl tiles and sheet flooring. The roof consisted of a sheet metal style roof.

1.2 Scope of Work

Environmental Monitoring Solutions were retained to provide the following services:

- HAZMAT Assessment twenty-four (24) samples for asbestos content analysis
- Data collection and/or sampling for other hazardous materials, as needed
- Reporting and Recommendations

The scope of work involved conducting an assessment to assist in the identification of hazardous materials within the facility. The assessment was conducted to assist in the identification of the following materials:

- Asbestos-Containing Materials (ACMs)
- Lead-Containing Materials
- Mercury
- Polychlorinated Biphenyls (PCBs)
- Ozone Depleting Substances (ODS)
- Radioactive Materials
- Other Hazardous Materials

During our assessment, destructive sampling techniques were used to inspect for concealed conditions. The identification of equipment or materials present underground and inspection of electrical equipment is outside the scope of this assessment.

2. ASSESSMENT METHODOLOGY

Visual observations, sampling and other surveying techniques were used to assist in the identification of hazardous materials present within the facility. The collection of bulk samples for asbestos content analysis was conducted in accordance with the current regulations outlined in the *Alberta Occupational Health and Safety Code* (2009) and Section 5.6.4 of the *Alberta Asbestos Abatement Manual* (AAAM) (October 2012).

2.1 Asbestos-Containing Materials (ACMs)

The scope of this assessment included an examination of structural components, mechanical and drainage systems and architectural building finishes. Any available information pertaining to the building age, history, type of structure, renovation history and details associated with the building mechanical systems were collected.

Structural Components: The exterior walls, insulation, roofing materials and other structural components where suspected ACMs may have been used were visually inspected.

Mechanical/Drainage Systems: The heating and ventilation systems were assessed for suspected ACMs. Materials examined included insulation on ducts, pipe runs and pipefittings, and other mechanical applications. The drainage system was examined for the presence of asbestos-cement piping, insulating materials on roof drains, and cast iron drain waste and vent piping.

Architectural Finishes: The presence of asbestos was assessed in building finishes such as drywall walls and ceilings, textured interior finishes, light fixtures and floor goods.

Bulk samples of suspected ACMs were collected, were labeled with the sample number, description and location and were submitted under chain of custody to Environmental Monitoring Solutions in Edmonton for asbestos-content analysis in accordance with NIOSH 9002 Methodology (4th Edition) using polarized light microscopy and dispersion staining techniques.

2.2 Polychlorinated Biphenyls (PCBs)

Suspected PCB-containing electrical equipment was documented through visual inspections and knowledge of historical applications. Inspection and sampling of materials such as (but not limited to hydraulic fluids, cables, paints, plastics etc.) is beyond the scope of this assessment. A representative quantity of light fixtures was inspected to determine if the ballasts were PCB-containing. The ballast covers were removed to help locate information pertaining to the make, model number, serial number and date code of the ballasts to facilitate comparison with the Environment Canada document entitled *"Identification of Lamp Ballasts Containing PCB's"* (EPS Report 2/CC/2, August 1991). Ballasts that do not display information pertaining to PCB content should presumed to be PCB-containing. Light fixtures that were still energized were not inspected. No material sampling was conducted to confirm/negate the presence of PCBs. Inspection and sampling of other materials such as (but not limited to) hydraulic fluids, cables, paints, plastics etc., is beyond the scope of this assessment.

2.3 Mercury

Mercury-containing equipment within the facility was determined based on age, using visual inspection techniques, appearance and knowledge of historical applications, and any such equipment was documented.

2.4 Lead-Containing Materials

Visual identification of dispersible suspected lead-containing materials was conducted as part of this assessment. No dispersible paint issues were noted and as such, no sampling was required. Visual observations were made for all other known or suspected lead-containing materials (i.e. batteries for emergency lighting and security systems, roof flashings, joint packing on the bell and spigots of drain waste and vent piping, etc.)

2.5 Radioactive Materials

The presence of radioactive materials was identified through visual inspections, based on knowledge of historical applications. Sampling for radioactive materials was not conducted.

2.6 Ozone Depleting Substances (ODS)

The presence of equipment suspected of containing ODS was identified through visual inspections and knowledge of historical applications. Equipment such as chillers, air conditioning units, refrigerators and fire extinguishers where chlorofluorocarbons (CFC's), hydrofluorocarbons (HFC's) and halons could be present were identified. Our inspection was limited to equipment within the assessment area and did not include quantification of portable appliances and equipment such as fire extinguishers, water coolers, freezers or refrigerators.

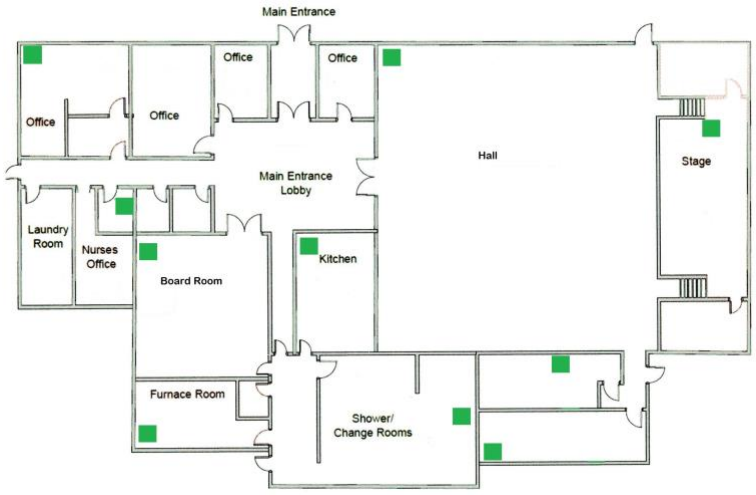
3. HAZARDOUS MATERIALS INVENTORY

3.1 ASBESTOS-CONTAINING MATERIALS

Twenty-four (24) bulk samples of suspected ACMs were collected during the assessment and were submitted to the laboratory for asbestos content analysis. **None of the samples contained asbestos.**

3.1.1 Drywall Joint Compound

Figure 1. Drywall Joint Compound Sampling Locations



Eleven (11) samples of drywall joint compound were collected (including the mechanical room by the stage). Sample locations are shown in **GREEN.**

None of the drywall joint compound samples contained asbestos.

(See EMS report AS.01.Corgan.01, samples 1, 4, 6, 10, 12, 13, 14, 15, 18, 21 & 23).

3.1.2 Ceiling Texture

Figure 2. Ceiling Texture Sampling Locations

Five (5) samples of ceiling texture were collected during the assessment.

Sample locations are shown in YELLOW

None of the ceiling texture samples contained asbestos.

(See EMS report AS.01.Corgan.01, samples 3, 5, 6, 17, 19 & 22).

3.1.3 Floor Goods

The floor goods (tiles and sheet vinyl flooring) had already been removed from the building, samples were collected from the debris that had been left behind and tested for asbestos content. Three (3) samples of floor tiles were collected from the stage, washrooms and the janitor's closet, and one (1) sample of sheet flooring was collected from the changing rooms. All (4) samples did not contain asbestos (See EMS report AS.01.Corgan, Samples 2, 8, 11, 20).

3.1.4 Mechanical Insulation

The insulation present on the pipes, flues & air ducts in the stage mechanical room and southwest mechanical rooms were checked for asbestos.

All of the insulation on the pipes, flues and air ducts had been insulated with non-asbestos products.

(See EMS report AS.01.Corgan.01, sample 16).

3.1.5 Attic Insulation

The insulation that had been used in the attic was non-asbestos (See EMS report AS.01.Corgan.01, sample 7).

3.1.6 Floor Levelling Compound

One (1) sample of the floor levelling compound was collected during our assessment. The sample did not contain asbestos. (See EMS report AS.01.Corgan.01, sample 09).

3.1.7 Exterior Brick Mortar

One (1) sample of the exterior brick mortar was collected and did not contain asbestos.

(See EMS report AS.01.Corgan.01, sample 24).

3.2 MERCURY

A typical 4-foot long fluorescent light tube is known to contain up to 50 mg of Mercury. There were approximately 350 tubes onsite (approximately 1400 Ln feet).

Approximately four (4) fluorescent energy saving bulbs were noted.

Approximately six (6) mercury filled thermostat switches are present within the assessment area.

3.3 POLYCHLORINATED BIPHENYLS (PCBs)

No suspected PCB containing ballasts or oil filled ballasts were observed during our assessment. The fluorescent light fixtures all contained electronic ballasts and should be recycled if they are to be removed.

3.4 LEAD-CONTAINING MATERIALS

3.4.1 Lead Paint

No dispersible lead paint issues were noted.

3.4.2 Other Lead Containing Materials

Lead acid batteries were identified in the emergency lighting system. No lead roof flashings or other suspected lead-containing materials were noted.

3.5 RADIOACTIVE MATERIALS

No radioactive materials were noted during our assessment.

3.6 OTHER HAZARDOUS MATERIALS

A kitchen fire suppression system, fire extinguishers, refrigerators, common household chemicals were present. Mould growth was noted throughout the facility. Refer to our Fungal Assessment Report, Corgan.01.2 for details.

4. RECOMMENDATIONS

4.1 ASBESTOS REMOVAL PROCEDURES

No asbestos containing materials were noted during our assessment. No further actions are required.

4.2 OTHER HAZARDOUS MATERIALS

In the event of demolition, all other hazardous materials identified in this report that would require removal including mercury switches, mercury fluorescent light tubes/bulbs, lead acid batteries, fire extinguishers, refrigerators, common household chemicals and miscellaneous items should to be collected, sorted on site and disposed of and/or recycled in accordance with methods acceptable to the Regional Municipality of Wood Buffalo, The Province of Alberta and the Government of Canada. **Note:** Quantities provided are estimated and should be confirmed by a contractor if removal of these materials is scheduled.

5. WARRANTY

Environmental Monitoring Solutions & Consulting Inc warrants to the company, organization or individual to whom this report is addressed that the work of this report was conducted by trained and competent professional and technical personnel in accordance with generally accepted environmental health and industrial hygiene practices and protocol. The warranty is subject to the following:

- The assessment outlined in this report was limited to accessible areas of the facility. Due to the possibility of impacting asbestos-containing materials, no extensive destructive techniques were used to examine for concealed conditions. Sampling and analysis of materials on site are limited to those materials outlined in our scope of work. Other compounds and materials not sampled for could be present on site.
- The assessment detailed in this report was conducted in accordance with current government regulations. Recommendations provided in the body of this report have been developed in accordance with industry standard guidelines and work practices.
- All sample collection was conducted in accordance with the scope of work described in our initial proposal using generally accepted occupational and industrial hygiene practices. The results of bulk sampling conducted as part of this assessment are limited to the conditions on site at the time of sample collection. Building materials not highlighted within the body or appendices of this report due to inaccessibility at the time the assessment was conducted and/or discovered during abatement/demolition work should be submitted for asbestos content analysis. The quantities of asbestos-containing materials provided in this are estimated. Exact quantities are to be verified and confirmed by the contractor at the time of bidding.
- Environmental Monitoring Solutions & Consulting Inc. relied on information supplied by others including, but not limited to, information on the history of the site provided by our client including, site maps and reports and information generated by other consultants and testing services.

Environmental Monitoring Solutions & Consulting Inc. are not liable for any reduction in property value or sale ability resulting from the information outlined in the body of this report. Our reports provide professional opinions and observations of a technical and scientific nature. This report is not intended to offer a legal opinion regarding any requirements of environmental law or federal, provincial or local legislation. This report is intended for exclusive use of the company, organization or individual to whom it is addressed. It may not to be used or relied upon by any other party whatsoever. We trust this meets your current requirements. Should you require additional information or have any questions, please contact the undersigned at your earliest convenience.

Environmental Monitoring Solutions

Simon Fallon

Simon Fallon B.Sc. ROHT.

ENVIRONMENTAL MONITORING SOLUTIONS

APPENDIX A

LABORATORY CERTIFICATE OF ANALYSIS

ENVIRONMENTAL MONITORING SOLUTIONS

ENVIRONMENTAL MONITORING SOLUTIONS
12671A -125th Street NW
Edmonton, AB. T5L 0T6
780 953 9046

LABORATORY CERTIFICATE OF ANALYSIS (COA)

Bulk Asbestos by Polarized Light Microscopy & Dispersion Staining
NIOSH 9002 Methodology

Client: Corgan Industrial Ltd.
Date Submitted: May 7th 2018

Project #: Corgan.01
Date Analyzed: May 9th 2018

Location: Anzac Community Hall, Christina Drive, Anzac, AB.
Turnaround: Regular (1-3 days)

Analysis Type: Asbestos Bulk Identification
Lab ID #: AS.01.Corgan.01

Anzac Community Hall, Christina Drive, Anzac, AB.

Sample ID	Description and Location of Sample	Presence of Asbestos	Asbestos Type and Percentage	Non Asbestos Components
01	Drywall Joint Compound (North side) Stage Area	ND	-	Aggregate CaSO
02	12" Floor Tile Debris Stage Area	ND	-	Aggregate Vinyl
03	Ceiling Texture Stage Area	ND	-	Aggregate CaSO Polymer
04	Drywall Joint Compound 2nd Floor Mechanical Room (Stage Area)	ND	-	Aggregate CaSO
05	Ceiling Texture Main Hall	ND	-	Aggregate CaSO Polymer
06	Drywall Joint Compound Main Hall	ND	-	Aggregate CaSO
07	Attic Insulation Main Hall	ND	-	Aggregate Cellulose
08	Sheet Flooring (Brown) Changing Rooms	ND	-	Vinyl
09	Floor Levelling Compound Main Hall	ND	-	Aggregate CaSO

Sample ID	Description and Location of Sample	Presence of Asbestos	Asbestos Type and Percentage	Non Asbestos Components
10	Drywall Joint Compound Changing Rooms	ND	-	Aggregate CaSO
11	Vinyl Floor Tile Changing Rooms	ND	-	Aggregate Vinyl
12	Drywall Joint Compound Women's Washrooms	ND	-	Aggregate CaSO
13	Drywall Joint Compound Men's Washrooms	ND	-	Aggregate CaSO
14	Drywall Joint Compound Kitchen Area	ND	-	Aggregate CaSO
15	Drywall Joint Compound West Mechanical Room	ND	-	Aggregate CaSO
16	Pipe Insulation West Mechanical Room	ND	-	MMVF
17	Ceiling Texture Washroom by West Mechanical Room	ND	-	Aggregate CaSO Polymer
18	Drywall Joint Compound Board Room	ND	-	Aggregate CaSO
19	Ceiling Texture Board Room	ND	-	Aggregate CaSO Polymer
20	Floor Tile Janitor Room	ND	-	Aggregate Vinyl

Sample ID	Description and Location of Sample	Presence of Asbestos	Asbestos Type and Percentage	Non Asbestos Components
21	Drywall Joint Compound Health Centre Washrooms	ND	-	Aggregate CaSO
22	Ceiling Texture Health Centre Office	ND	-	Aggregate CaSO Polymer
23	Drywall Joint Compound Health Centre Office	ND	-	Aggregate CaSO
24	Exterior Brick Mortar	ND	-	Aggregate CaSO

Notes:

MMVF - Man Made Vitreous Fibre
CaSO - Calcium Sulphates or Carbonates
ND - No Asbestos Detected

Analysis in accordance with NIOSH 9002 Methodology using Polarized Light Microscopy (PLM) and dispersion staining.

Percentage of asbestos determined by visual approximation.

Samples will be stored for 15 days after which time the samples will be disposed of

Analyzed by:

M. R. Roberts

Mike Roberts B.Sc.

ENVIRONMENTAL MONITORING SOLUTIONS

APPENDIX C

Environmental Monitoring Solutions

Fungal and Water Damage Assessment Report

ENVIRONMENTAL MONITORING SOLUTIONS

FUNGAL AND WATER DAMAGE ASSESSMENT REPORT

Anzac Community Centre
105B-4 Christina Drive
Anzac, AB

Submitted to:

Corgan Industrial Ltd
Bay 7, 266 MacKay Crescent
Fort McMurray, AB. T9H 5C6

Date: May 14th 2018

Project #: Corgan.01.2

www.emsconsulting.ca

Environmental Monitoring Solutions & Consulting Inc.
12671A – 125th Street NW, Edmonton, AB T5L 0T6
Tel: (780) 953-9046 or (780) 757-9460
emsconsultingedmonton@gmail.com

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APPENDICES

ENVIRONMENTAL MONITORING SOLUTIONS

May 14th 2018

Corgan Industrial Ltd
Bay 7, 266 MacKay Crescent
Fort McMurray, AB. T9H 5C6

Attention: Mr. Dave Piercey, Project Manager

Re: Fungal and Water Damage Assessment, Anzac Community Centre, 105B-4 Christina Drive, Anzac, AB.

1. INTRODUCTION

Environmental Monitoring Solutions & Consulting Inc. were retained by Corgan Industrial Ltd. (the client) to conduct a comprehensive fungal and water damage assessment within the Anzac Community Centre located at 105B-4 Christina Drive in Anzac, AB. The purpose of the assessment was to delineate the extent of water damage and fungal amplification within the facility and assist in the development of a scope of work for the remediation and restoration of affected building materials. The assessment was conducted on May 4th 2018 by Simon Fallon, B.Sc. ROHT. and Mike Roberts B.Sc. This report documents all findings and observations noted during our assessment and provides recommendations based on these findings.

Note: No asbestos was detected in any building materials likely to be impacted during the remediation/restoration process and future renovation work. Refer to our HAZMAT Assessment report, Corgan 01.1, dated May 10th 2018 for further details.

1.1 Scope of Work

Environmental Monitoring Solutions were retained provided the following services:

- Fungal Assessment (Destructive)
- Final Report and Scope of Work Development

1.2 Site Description and Background Information

The areas covered by this assessment included all accessible interior and exterior areas at the Anzac Community Centre. According to documentation provided by the Client, the facility was constructed in 1984. The building structure was presently under renovation and some of the interior walls, ceilings and floor goods had been removed or disturbed prior to our assessment.

The building consisted of a wood frame structure on a concrete slab. The exterior walls consisted of fiberglass batt insulation, polyethylene vapor barrier, non-pressure treated studs and baseplates, block and mortar (west side only), OSB sheeting, building paper, and finished with vinyl siding and brick cladding. The interior finishes consisted of drywall walls and ceilings (some ceilings were textured) and the floor goods consisted of vinyl tiles and sheet flooring. The roof consisted of a sloped metal roof. The exterior ambient weather conditions at the time of our assessment are provided in Table 1 below.

Table 1: Exterior Ambient Weather Conditions	
Date:	May 4th 2018
Time:	09:35
Exterior Temperature	6.3°C
Exterior Conditions	Overcast
Relative Humidity	42%
Wind	15km/h, East
Barometric Pressure	96.97 Kpa

2. GUIDELINES AND REGULATIONS

The following guidelines and regulations were used for the purpose of this assessment:

- "*Mould Guidelines for the Canadian Construction Industry*" (Canadian Construction Association CCA Standard Document 82-2004)
- *"Fungal Air Testing, Investigation and Reporting Requirements for Extensively Mould-Contaminated Buildings*." (Alberta Health Services, October 2007)

3. ASSESSMENT METHODOLOGY

Our assessment involved visual observations and destructive inspection techniques, the collection of analytical data and the use of specialized instrumentation to assist in determining the extent of fungal amplification and the specific location(s) where water damage and mould growth is present within the facility. Due to the visual presence of extensive fungal amplification within the facility, and the fact that it had been previously conducted, no baseline fungal indoor air quality assessment was conducted as part of this scope of work.

3.1 Fungal Surface Sampling

Ten (10) fungal surface tape lift samples were collected during our assessment to determine the genera of fungi currently amplifying on building materials within facility. The samples were submitted under Chain of Custody (COC) for genus identification under light microscopy at Environmental Monitoring Solutions' Laboratories in Edmonton, AB. We are proficient members of the AIHA Environmental Microbiology Proficiency Analytical Testing (EMPAT) program (Laboratory ID# 219139).

3.2 Specialized Assessment Instrumentation

Relative humidity measurements were collected using a TSI 7545 Pro Indoor Air Quality (IAQ) Monitor. This instrument uses a thin film capacitive sensor to collect relative humidity measurements within a range of 5% - 95% RH with an accuracy of +/- 3.0% RH at a resolution of 0.1% RH.

4. SITE OBSERVATIONS

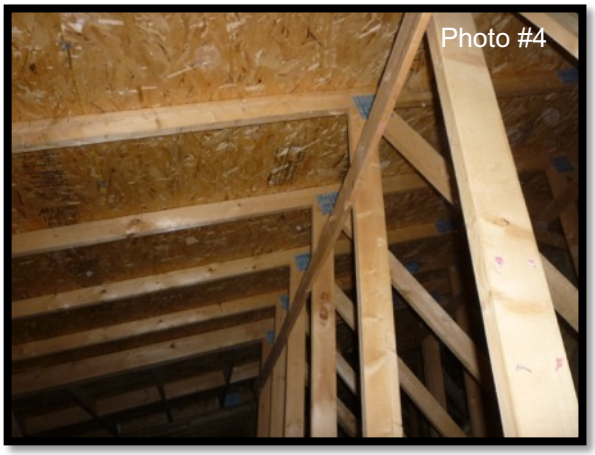
- The interior relative humidity ranged varied from 31% to 34% during our assessment
- Extensive mould growth and water damage was noted on the exterior OSB sheeting and framing
- The exterior perimeter baseplates and framing have been affected
- Stained fiberglass batt insulation was noted throughout the exterior perimeter wall cavities
- Water damage was noted on the drywall throughout the Tower/Skylight area above the attic.
- Mould growth and water staining was noted on some of the wood structure within the attic.
- The OSB roof sheeting was damaged in localized areas where roof leaks had previously occurred. Several areas had been marked in black ink with "Leak" during previous assessments
- Water staining was noted on the blow in cellulose attic insulation below roof leakage points
- Water stained drywall was observed in the attic adjacent to the attic hatch in the Janitor's Room 118
- Mould growth and water staining was observed on the bottom of several interior walls within the facility
- Water staining/damage was noted on the ceiling finishes in several areas (Mezzanine Mechanical Room 202, Men's Washroom 107, Women's Washroom 108 and Office 124)
- Extensive mould growth was noted on the interior wall separating Men's Washroom 107, Women's Washroom 108.
- A roof drain above Men's Washroom 107 and Women's Washroom 108 is currently disconnected and is causing damage to the adjacent building finishes and water pooling on the floor
- Mould growth was observed on a door header outside Mechanical Room 114
- Water stained insulation covering was noted inside Mechanical Room 114
- Mould growth was noted on the underside of the sump access hatch in Mechanical Room 114
- Water pooling/debris was noted in the basin underneath the combustion air duct in Mechanical Room 114

5. PHOTOGRAPHIC LIBRARY OF FINDINGS

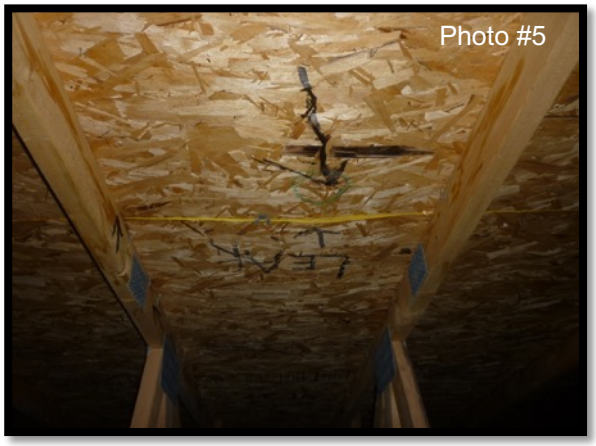
5.1 TOWER/SKYLIGHT AREA

Water damage was observed on the drywall within the access area for the tower/skylight situated in the attic

5.2 ATTIC SPACE



In most areas the trusses and underside of the roof sheeting appear to be in generally good structural condition



Areas where water infiltration had caused damage to the attic sheeting had been previously labeled

Localized areas of water staining and suspected fungal amplification are present where leakage was labeled

Additional photo showing a localized water stain on the underside of the roof sheeting

Mould growth was observed on a glulam beam adjacent to the skylight/tower

Mould growth was noted on several cross members above the hall area

Water damage on the roof sheeting around a plumbing stack situated above the hall area batthrooms

Leakage from around the plumbing stacks had caused water damage and compaction of the attic insulation

Water stained insulation and drywall within the attic adjacent to the access hatch in Janitor's Room 118

5.3 EXTERIOR PERIMETER WALLS

Staining was noted on the exterior wall insulation throughout the facility

Mould growth was confirmed on the exterior OSB sheeting throughout the perimeter of the facility

In several areas, the exterior OSB sheeting was heavily damaged

Additional photo showing mould growth and damage on the exterior OSB sheeting

The exterior baseplates had visible water staining and mould growth in several areas

Additional photo showing water stains on a vertical wall stud and fungal amplification on the OSB sheeting

5.4 INTERIOR WALLS AND CEILINGS

Water staining was observed on the ceiling in the lobby area. Trace amounts of mould growth were confirmed

Water staining was also noted on the ceiling in Office RM 124

Mould growth was noted on the bottom of the walls in the janitors room (RM 115)

Mould growth was also evident on the bottom of interior walls within the health room, the office batthrooms, and the boardroom

Mould growth on the backside of the drywall within the Men's washroom in the Hall Area

Mould growth and water damage were evident on the ceiling in the mezzanine of Mechanical Room 122

Water staining was observed on a beam in the ceiling cavity above the mezzanine of Mechanical Room 122

Mould growth on a door header outside Rink Hall Mechanical Room 114

5.5 MECHANICAL/HVAC

Water pooling and debris were noted in the basin underneath the combustion air duct in Mech. Rm. 114

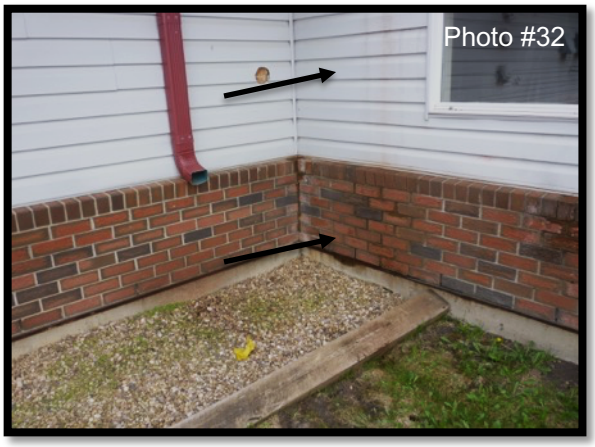
Water staining was noted on the pipe insulation covering in several areas

Debris was observed in the in ground supply air ducts. Water pooling inside the ducts is a known concern

Water staining was noted on stored items within Mech. Rm. 114

5.6 EXTERIOR

Multiple unsealed penetrations in the exterior siding were noted



Heavy water staining was noted on the exterior siding and brick cladding in several areas.

Additional photo showing an unsealed penetration in the exterior siding

Additional photo showing water staining on the exterior brick cladding

6. SUMMARY OF ANALYTICAL RESULTS

A summary of the analytical results of fungal surface samples collected during our assessment is provided in **Table 2** below. A copy of the laboratory certificate of analysis (COA) is provided in **Appendix A.**

Table 2: Summary of Fungal Surface Sample Results

Sample #	Location/Description	Genus Identified	Loading
01	Suspect Mould Growth Exterior OSB Sheeting, Storage RM 103	Unidentified Ascomycete Aspergillus sp. Cladosporium sp.	Moderate Trace Low
02	Suspect Mould Growth Exterior OSB Sheeting, Office RM 103	Cladosporium Penicillium sp. Ulocladium sp.	Trace Moderate Trace

Table 2 (Continued): Summary of Fungal Surface Sample Results			
Sample #	**Location/Description**	**Genus Identified**	**Loading**
03	Suspect Mould Growth Exterior OSB Sheeting Office RM 127	Unidentified Ascomycete Alternaria sp. Aureobasidium sp. Cladosporium sp.	Trace Low Trace Low
04	Suspect Mould Growth Bottom of Drywall Janitors RM 118	Stachybotrys sp.	Heavy
05	Suspect Mould Growth, Bottom of Drywall Boardroom RM 115	Penicillium sp.	Trace
06	Suspect Mould Growth On Header Above Door Outside RM 114	Cladosporium sp. Unidentified Myxomycete	Trace Moderate
07	Suspect Mould Growth Bottom of Drywall Bar Area, RM 109	Chaetomium sp. Stachybotrys sp.	Heavy Heavy
08	Suspect Mould Growth Exterior OSB Sheeting Women's Washroom, RM 108	Unidentified Ascomycete Chaetomium sp.	Heavy Trace
09	Suspect Mould Growth Debris On Ground Stage, Mezzanine Mechanical Rm. 202	Alternaria sp. Chaetomium sp. Penicillium sp. Stachybotrys sp.	Low Moderate Heavy Moderate
10	Suspect Mould Growth On Backside of Water Stained Drywall Lobby Ceiling	Penicillium sp.	Low

7. DISCUSSION OF FINDINGS

The findings of our assessment would suggest that the building deficiencies noted in previous building assessment reports has led to extensive fungal amplification and damage to much of the OSB sheeting on the exterior perimeter of the building. The wood baseplates (non-pressure treated) and some vertical framing have been also affected. Generally, the affected areas appear to be below four (4) feet in height. Staining was also noted on the lower portions of the exterior wall insulation throughout the facility. In some areas, an exterior block and mortar wall is present over the OSB sheeting which may pose challenges to the remediation efforts.

Within the attic space, water damage is present on the drywall surrounding the Tower/Skylight area. Mould growth was identified in localized areas on glulam beams/cross members within the attic space. It is suspected

that this condition has resulted from the poor attic venting noted during previously conducted building assessments. Some visible water staining and water damage was present on the underside of the attic sheeting in areas where leaks had been identified and labeled during previous assessments. Water damaged drywall is also present adjacent to the attic access hatch above Janitor's Room 118. Water staining was also visible on the cellulose blow in attic insulation underneath areas where roof leaks have occurred.

Water staining/mould growth was noted on the interior ceiling finishes within in the Foyer Area, Office Room 124, Men's Washroom 108, Woman's Washroom 107 and the Mezzanine Mechanical Room 202. Mould growth was also noted on a door header outside Rink Hall Mechanical Room 114

Mould growth and water damage were present on multiple interior walls throughout the facility (Storage Room 102, Health Room 121, Janitors Room 118, Bar Room 109, Storage Room 110, Men' Washroom 107 and Women's Washroom 108). In most areas, the extent of fungal amplification appears to be limited to the bottom of the walls in the noted locations which may have been exacerbated by repeated janitorial practices. The entire interior wall separating Men's Washroom 107 and Women's Washroom 108 has visible water damage and mould growth affected as a result of a disconnected and currently leaking roof drain above the partially delaminated ceiling.

In Mechanical Room 114, standing water and organic debris was observed in the basin below the combustion air supply duct and on the canvas insulation covering for the domestic water supply lines. Mould growth was also noted on the underside of the sump pit hatch. No evidence of water staining was noted on the ceiling, however the drywall tape joints were bubbled in several areas which may indicate that moisture/humidity related issues have occurred within the area.

The subterranean duct work is currently full of debris. In-slab duct work also represents a potential environmental health concern as this HVAC system configuration is known to be susceptible to water damage and water pooling inside the ducts resulting from fluctuations in the water table or from historical flooding due to poor exterior grading.

8. SUGGESTED ACTIONS

We suggest that our client retain a qualified remediation contractor to devise a site specific scope of work for the remediation and restoration of all affected materials based on the findings provided in this report. The remediation/restoration process is to be conducted in accordance with **Level III** (Large Scale, > 100 ft^2) remediation procedures as described in the Canadian Construction Association (CCA) document "*Mould Guidelines for the Canadian Construction Industry" (2004).*

No asbestos related concerns were identified during our hazardous materials assessment. Refer to our HAZMAT Assessment Report, Corgan 01.1, dated May 11th 2018 for further details. A suggested scope of work for the remediation of affected building materials is as follows:

CONTENTS AND FIXTURES

- Removal and remaining contents currently present within the facility
- The removal and cleaning of all fixtures including but not limited to cabinets, appliances, plumbing, electrical fixtures etc. as needed to facilitate the remediation process
- Hard surfaced and sealed items can be cleaned, sorted and salvaged at the discretion of project stakeholders

TOWER/SKYLIGHT AREA

- Removal of all drywall
- Abrasive cleaning of any water stains/suspect mould growth on framing

ATTIC SPACE

- Removal all blown in cellulose and fiberglass batt insulation
- The scope of work may need to be modified to address any areas of suspect mould growth on the back side of drywall ceiling finishes discovered once the insulation has been removed
- Use of specialized remediation procedures involving (dry ice blasting/chemical treatment etc.) to remove mould growth from all beams/joists/cross members and roof sheeting that is in good condition
- Roof sheeting that is in poor condition around previously noted leakage points should be replaced.
- The condition of the top side of the roof sheeting will need to be inspected once the existing metal roof is removed and the scope of work may need to be modified to include the removal of additional sheeting.
- Removal of the water damaged drywall located adjacent to the attic hatch in Janitor's Room 118

EXTERIOR PERIMETER WALLS

- Removal of all exterior brick cladding, siding, building paper, OSB sheeting, interior drywall on exterior walls (floor to ceiling), batt insulation and vapor barrier.
- Along some areas of the building a block wall is present that will impede removal/replacement of the exterior sheeting. If the block wall cannot be removed or is not scheduled for removal as part of planned renovations, these areas will need to be addressed from the interior
- The affected exterior baseplates should be removed. The vertical studs will also need to be removed to facilitate this. **Note:** Under no circumstance should any framing be removed from the exterior walls without proper shoring of the exterior walls and prior consultation with a structural engineer

INTERIOR WALLS, CEILINGS AND FLOOR GOODS

- Complete removal of the ceiling in Mezzanine Mechanical Rooms 202 and 114, Men's Washroom 107, Women's Washroom 108, and the localized removal of the affected ceiling areas in Office 124.
- Complete removal of all interior walls in Mechanical Room 114
- Due to the presence of mould growth on the interior walls in multiple locations throughout the facility we suggest the removal of all interior walls throughout the facility to a height of two (2) feet
- Abrasive cleaning of the door header outside Rink Hall Mechanical Room 114
- Due to the previous history of flooding, it is suggested that the remaining floor goods be addressed

HVAC SYSTEM

- The existing in floor ducting should be decommissioned and filled with concrete
- Removal of all water stained insulation from the water supply lines
- Removal of the fungal infected sump access hatch
- Cleaning and/or removal of the basin underneath the combustion air supply duct in Mechanical Room 114
- Upon completion of the remediation process, professional cleaning of the entire HVAC system should be conducted. If the HVAC system is to be replaced as part of scheduled renovations, the existing system should be sealed and/or removed prior to post remediation fungal verification and air quality testing.

ADDITIONAL CONSIDERATIONS

- I mould growth or water damage is observed beyond areas identified in this report, the affected materials should be removed two (2) feet past the last sign of damage or mould growth
- Once all affected building materials have been removed and addressed, a complete horizontal and vertical cleaning of all surfaces within the facility should be conducted using industry approved solvents
- Once the interior walls are removed, framing that is in good condition with evidence of surface mould growth and/or water staining can be cleaned using abrasive cleaning techniques and botanical disinfectants. Damaged wood framing is to be removed and replaced as deemed necessary
- Mould inhibiting paint can also be used at the discretion of the remediation contractor on structural materials that are in acceptable condition, but only after the materials have been cleaned abrasively.
- A botanical disinfectant can be used during and upon completion of the remediation process at the discretion of the remediation contractor

8.1 CONTAMINATION CONTROL, PPE AND PREPARATORY REQUIREMENTS

- The entire facility is to be contained and access restricted to qualified personnel donning appropriate PPE
- Warning signage must be installed at all containment entrances
- Several HEPA filtered negative air units should be installed inside the containment and vented to the exterior
- One complete air exchange should occur every 15 minutes and a minimum of 0.02 in/H_2O of negative air pressure differential must be maintained at all times for the duration of the remediation process
- Sufficient makeup airflow must be provided for the negative air units to draw from
- The HVAC systems should be locked out and sealed. If this is not feasible, auxiliary makeup air may need to be provided to the hot water tanks and furnaces etc. to prevent combustion gasses from being drawn out by the negative air units.
- 6 mil polyethylene sheeting is to be used in the construction of the containment structure where needed
- A two (2) stage decontamination facility consisting of a clean room and dirty room equipped with a wash station should be installed at the entrance to the containment(s). A shower can be installed at the discretion of the remediation contractor for worker comfort.
- It is advisable that a waste transfer unit be installed at a separate entrance to facilitate waste disposal
- Workers must wear Tyvek coveralls, nitrile gloves and full face respirators equipped with P100/active charcoal filters at all times while inside the work area
- Any HVAC system components inside the containment must be isolated
- All energized equipment must be plugged into Ground Fault Circuit Interrupters (GFCIs)

9. ENVIRONMENTAL CONSULTING REQUIREMENTS

Upon completion of the remediation process, a final visual inspection should be conducted to visually confirm that the remediation work has been completed to an acceptable standard. This visual inspection should also include surface sampling within selected areas to confirm that no residual fungal amplification remains on the affected building substrates.

Following successful completion of the final visual inspection and prior to conducting follow up fungal air clearance sampling, the negative air units are to be operated in “scrub mode” for a period of 48 hours to help remove any remaining suspended particulate generated by the remediation process.

Follow up non-viable fungal air sampling will be conducted in accordance with the guidelines outlined in the AHS technical document entitled “*Fungal Air Testing, Investigation and Reporting Requirements for Extensively Mould-Contaminated Buildings*.” Environmental Monitoring Solutions can provide this service.

If the suggested actions provided in this report have been satisfied and airborne fungal particulate concentrations upon completion of the remediation process are within acceptable levels pursuant to AHS Acceptable Fungal Indoor Air Quality Criteria, the remediation work will be deemed to have been completed to an acceptable standard.

10. CLOSURE

Environmental Monitoring Solutions & Consulting Inc. (EMSC) warrants to the company, organization or individual to whom this report is addressed that the work of this report was conducted by trained and competent professional and technical personnel in accordance with generally accepted environmental health and industrial hygiene practices.

Analytical results and site observations apply only to the conditions at the time the assessment was conducted and may not be used to assess varying conditions on other days.

Environmental Monitoring Solutions & Consulting Inc. are not liable for any reduction in property value or sale ability resulting from the information outlined in the body of this report.

Our reports provide professional opinions and observations of a technical and scientific nature. This report is not intended to offer a legal opinion regarding any requirements of environmental law or federal, provincial or local legislation. This report is intended for exclusive use of the company, organization or individual to whom it is addressed. It may not to be used or relied upon by any other party whatsoever.

We trust this meets your current requirements. Should you require any additional information or have any questions or concerns, please contact the undersigned at your earliest convenience.

Environmental Monitoring Solutions

Simon Fallon B.Sc. ROHT.

APPENDIX A

LABORATORY CERTIFICATE OF ANALYSIS

ENVIRONMENTAL MONITORING SOLUTIONS
12671A -125th Street NW
Edmonton, AB. T5L 0T6
780 953 9046

LABORATORY CERTIFICATE OF ANALYSIS
FUNGAL GENUS IDENTIFICATION

Client: Corgan Industries Ltd
Date Sampled: May 4th 2018

Project #: Corgan.01
Date Analyzed: May 5th 2018

Location: Anzac Community Centre, Anzac, AB.
Lab Id#: TL.01.Corgan.01

Analysis: Non cultured genus identification
Sample Type: Surface Tape Lift

Sample #	Description	Genus Identified	Concentration
01	Suspect Mould Growth Exterior OSB Sheeting, Storage RM 103	Unidentified Ascomycete Aspergillus sp. Cladosporium sp.	3 1 2
02	Suspect Mould Growth Exterior OSB Sheeting, Office RM 103	Cladosporium Penicillium sp. Ulocladium sp.	1 3 1
03	Suspect Mould Growth Exterior OSB Sheeting Office RM 127	Unidentified Ascomycete Alternaria sp. Aureobasidium sp. Cladosporium sp.	1 2 1 2
04	Suspect Mould Growth Bottom of Drywall, Janitors RM 118	Stachybotrys sp.	4
05	Suspect Mould Growth, Bottom of Drywall, Boardroom RM 115	Penicillium sp.	1
06	Suspect Mould Growth On Header Above Door, Outside RM 114	Cladosporium sp. Unidentified Myxomycete	1 3
07	Suspect Mould Growth Bottom of Drywall, Bar Area, RM 109	Chaetomium sp. Stachybotrys sp.	4 4
08	Suspect Mould Growth Exterior Sheeting, Washroom, RM 108	Unidentified Ascomycete Chaetomium sp.	4 1
09	Suspect Mould Growth On Drywall Ceiling Stage, Mezzanine Mechanical Rm. 202	Alternaria sp. Chaetomium sp. Penicillium sp. Stachybotrys sp.	2 3 4 3
10	Suspect Mould Growth Back of Stained Drywall, Lobby Ceiling	Penicillium sp.	1

Spore concentrations area reported subjectively using the following classification

1) Trace Amount
2) Small Amounts
3) Moderate Growth
4) Heavy Growth

Samples will be kept for 10 days from the date of collection at which time they will be disposed of

Analyzed by:

Simon Fallon B.Sc. ROHT.

Environmental Monitoring Solutions are participants in the American Industrial Hygiene Association, Environmental Microbiology Proficiency Analytical Testing (EMPAT) Program for Fungal Identification (Laboratory ID#: 219139)

APPENDIX B

FLOOR PLANS

Summary of Fungal Surface Sample Locations

ENVIRONMENTAL MONITORING SOLUTIONS

Project #: Corgan.01

Anzac Community Centre
Anzac, AB.

Legend

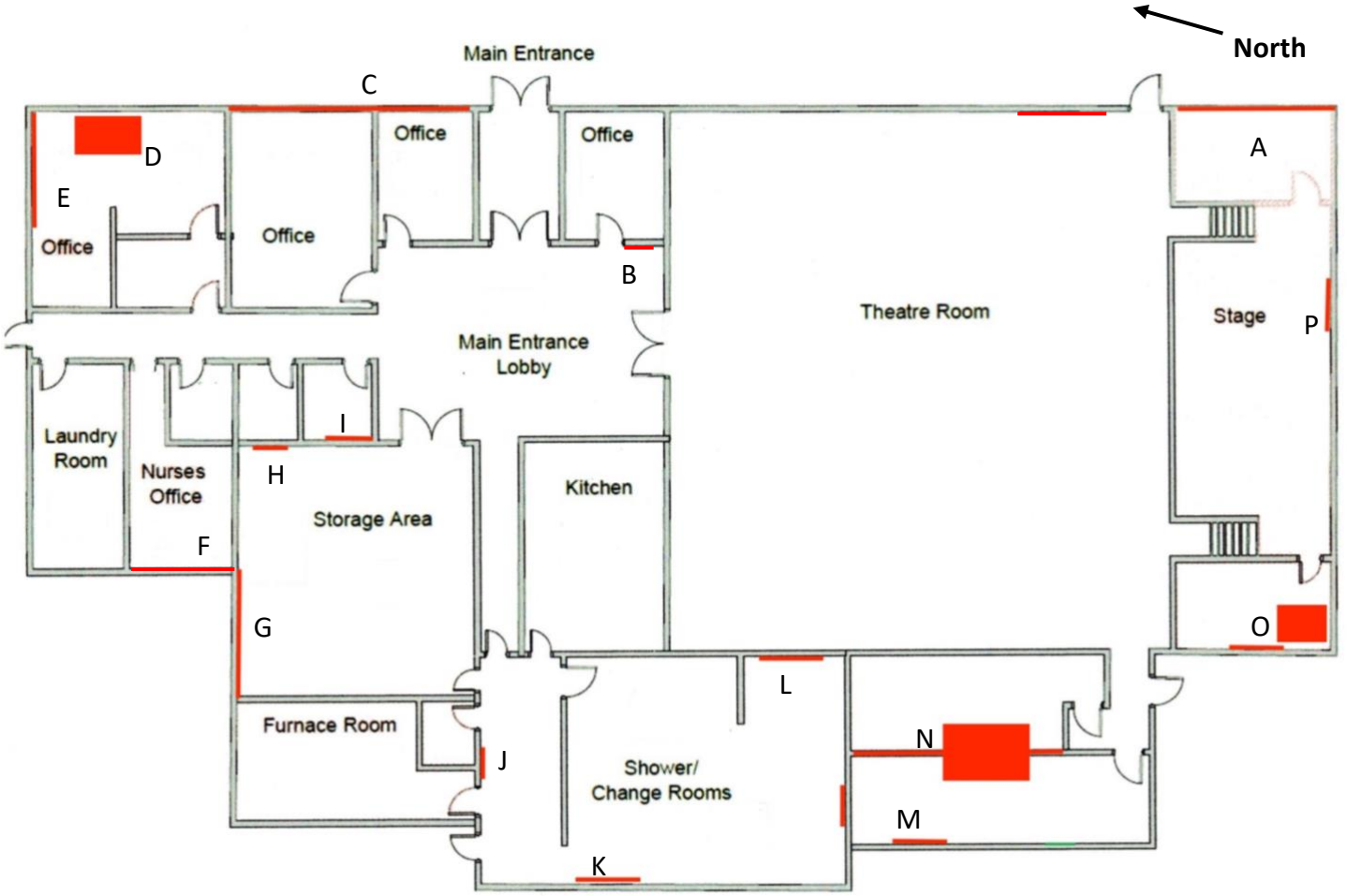
Sampling Location

Fungal Growth Confirmed in Sample

Notes:

Floor plan is not to scale

Summary of Noted Water Damage and Fungal Amplification Sites (Interior Occupied Spaces)



ENVIRONMENTAL MONITORING SOLUTIONS

Project #: Corgan.01

Anzac Community Centre
Anzac, AB. (Main Floor)

Legend

Inspection location where mould growth and/or water damage observed

A) stains on baseplate/sheeting
B) stains on lobby ceiling
C) mould on exterior sheeting
D) water stains on ceiling
E) mould on sheeting
F) mould on sheeting
G) mould on sheeting
H) mould on bottom of drywall
I) mould on bottom of drywall
J) mould above door header
K) mould on baseplate/sheeting
L) mould on bottom of drywall
M) mould on exterior sheeting
N) mould on drywall/ceiling
O) mould on sheeting/ceiling
P) mould on exterior sheeting

Notes:

Floor plan is not to scale
Findings presented here limited to observed areas on main floor only
Additional areas of growth may be present in interstitial spaces

APPENDIX D

Stantec & RJC

Building Envelope & Mould Remediation Report

Stantec

Anzac Community Centre

Building Envelope & Mould Remediation Report

March 23, 2018

Prepared for:

Ralph Abbott, Project Management Associate
R.M.W.B.
9816 Hardin Street
For McMurray AB, T9H 4K3

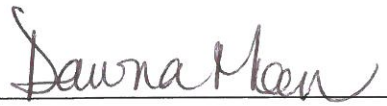
Prepared by:

Stantec Architecture Ltd.
10160 – 112 Street
Edmonton AB, T5K 2L6

Dawna Moen, Senior Associate

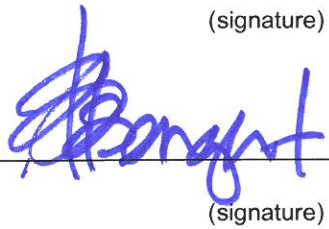
Sign-off Sheet

This document entitled Anzac Community Centre - Building Envelope & Mould Remediation Report was prepared by Stantec Architecture Ltd. for the account of Regional Municipality of Wood Buffalo. Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Reviewed by 

(signature)

Dawna Moen

Approved by 

(signature)

Brian Bengert

Table of Contents

Executive Summary

The Regional Municipality of Wood Buffalo engaged Stantec Architecture to provide a review and report of the found conditions in the Anzac Community Centre.

Following the startup of demolition for the Renovation of the Anzac Community Centre the Contractor discovered mould behind wall protection board in the rink hall for the outdoor skating rink. Other areas were further investigated and isolated locations of mould were discovered. The contractor was instructed to abate the contaminated areas using safe work practices for mould removal and scrub the air to remove any airborne mould. Following these procedures, Alberta Safety & Environmental Services completed an air quality testing report. Stantec and consulting engineers RJC visited the site to investigate the existing conditions of the building structure and envelope. The site review discovered several concerns which require to be addressed. The following concerns are noted below:

- Three load bearing lintels along interior walls do not meet structural requirements for the Alberta Building Code.
- Moisture damaged ceiling and ice damming due to discontinuities in vapour barrier, heat loss, air leakage at mechanical and electrical services, minimal roof vents, absence of snow guards and damaged metal roof.
- Thermal bridging around uninsulated perimeter grade beam, slab edge and glulam beams supporting canopies.
- Staining of perimeter wall insulation indicating moisture in the exterior wall assembly.
- Insufficient venting of roof at eaves due to low heel height of trusses.
- The Alberta Safety & Environmental services air quality report conducted after mould removal and air scrubbing identifies high levels in areas outside the found conditions. These areas as described in our report include Stage, Mechanical rooms, Nurses Office, and the north-west Office.

Based on these findings Stantec recommends destructive testing to be undertaking to clearly identify all hazards. Followed by abatement and air testing. Once all hazards have been removed the building can be repaired with proper exterior assemblies to protect the interior environment.

The overall opinion of the costs for the above-mentioned scope of work would be approximately $450,000.00. These opinions are based solely on visually inspecting the site and experience of the consulting team. Stantec is not a cost consultant and we make no claim of the accuracy of these costs.

1.0 INTRODUCTION

1.1 BACKGROUND

Anzac Community Centre was built in 1984 on the property located at 105B-4 Christina Drive, Anzac Alberta. It is located on the south side of Christina Drive, approximately 75 meters west of Township Road 862. It is a 1-storey building with no basement, approximately 789 m² gross floor area. The Regional Municipality of Wood Buffalo retained Golder Associates in October of 2012 to perform a facility assessment report. Included in that report was a sub header titled Evidence of Mould Presence. The section stated:

"Golder did not visually observe any mould growth within the areas of the building accessed. The site representative advised the he was not aware of any ongoing mould problems or building system problems (i.e., roof, wall, recent floods or mechanical leaks) that would be reasonably expected to cause excessive mould proliferation."

In November 2015 DF Technical & Consulting Services Ltd. was engaged to do a hazardous material assessment during the design phase of the future renovation to Anzac Community Hall. The report stated:

"Visual inspections throughout accessible areas in the building were conducted. Visible presence of mould on building materials was not identified."

"Fungal activity was not identified in any portion of the building."

In 2017 the Regional Municipality of Wood Buffalo retained Stantec to produce a set of construction documents for the proposed renovation of Anzac Community Hall.

Construction began on January 11, 2018 for the renovation of the Anzac Community Centre. Following the demolition of interior wall sheathing in the Rink Hall, black mould was discovered. The area was sealed with plastic to isolate the mould to prevent further contamination in the building. Additional investigation was executed by the Contractor in various areas in the building. More mould was discovered in isolated locations and construction was put to a stop. The contractor was instructed to remediate all the visible mould discovered following the Occupational Health and Safety Regulations and scrub the air to prepare the area for a series of air quality tests. Alberta Safety and Environmental Services preformed air quality tests to ensure all the mould had been remediated. Mould spores were found in the air in multiple areas mentioned in the Alberta Safety and Environmental Services report and visible in the ceiling of the Mechanical room south of the stage. RJC and Stantec traveled to site to do an on-site assessment of the building envelope as the building was deemed safe to occupy with a silicone half mask with NIOSH-approved P100 filter cartridges. Visual tests and thermal scans were done to see where the building envelope was failing.

1.1.1 Scope of On-site Assessment

RJC and Stantec preformed a series of on-site tests to examine the condition of the building envelope. A visual review of the exterior and interior of the building was performed. This included the attic spaces where accessible and the existing wood structure and building envelope. Thermal scans were conducted to identify any heat loss and potential building envelope concerns. An on-site contractor was present to assist with removing interior gypsum wall

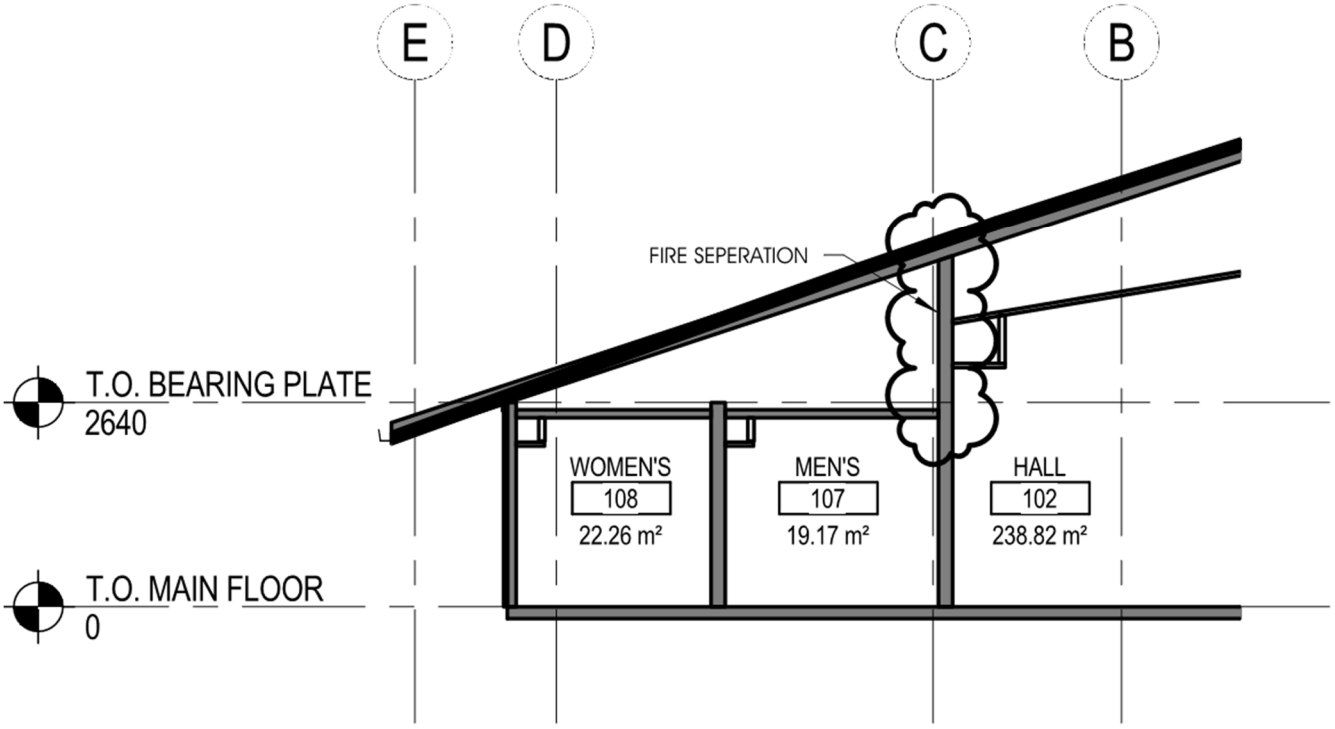
board to review the state of the wall and ceiling assemblies. For detailed information please refer to appended Building Envelope and Structural Review by RJC Engineers.

2.0 OBSERVATIONS

2.1 EXTERIOR WALLS & ROOF

The roof assembly appears to be improperly ventilated due to a significant amount of ice damming on the roof. Proper ventilation of the roof is recommended to prevent further damaged. Due to the size of the building and it being of combustible construction the Alberta Building Code requires the building to be separated into different fire compartments. These separations appear to block air flow through the attic space preventing sufficient ventilation (Sketch 1). A ridge vent needs to be added to the roof as well as convection roof vents along where the air is unable to pass through the fire rated wall to ensure adequate circulation.

An alternate approach would be to install louvers in the fire rated wall of the attic space complete with fire dampers allowing the air to freely pass yet still provide fire protection in the event of a fire. This may be more costly but would minimize roof penetrations.



Sketch 1: Fire Separation in Attic Space

The addition of snow guards and heat trace is recommended to help prevent ice damming.

The existing configuration of the truss heel is unknown and therefore it is unclear if the truss provides sufficient height for proper insulation cover and venting of the attic space. Further investigation is required to determine if the soffit and roof eave can be modified to provide better venting of the cold attic space.

Water damage was identified in the rink hall and public washrooms ceilings. Multiple exterior areas of the roof appear to be damaged and patched in the roof valleys. This could be generating leaks into the attic space causing interior damage to the building.

Thermal scans of the exterior grade beam show a noticeable amount of heat loss through the exposed concrete foundation (See Image 3, Photo 11 on RJCs Building Envelope and Structure Review). Installation of an exterior foundation protection, consisting of cementitious finished board over rigid insulation and membrane around the entire exterior of the building is recommended to prevent heat loss from the building.

2.2 MOULD REMEDIATION

The Mould Spore Trap Sampling prepared by Alberta Safety and Environmental Services indicated there were serval areas that still needed to be remediated. These areas included:

- Stage
- Storage Room to the north of the Stage
- Mechanical & Janitor Room to the south of the Stage
- Office in the north-west corner
- Nurses Office
- Mechanical Room in the south-west corner

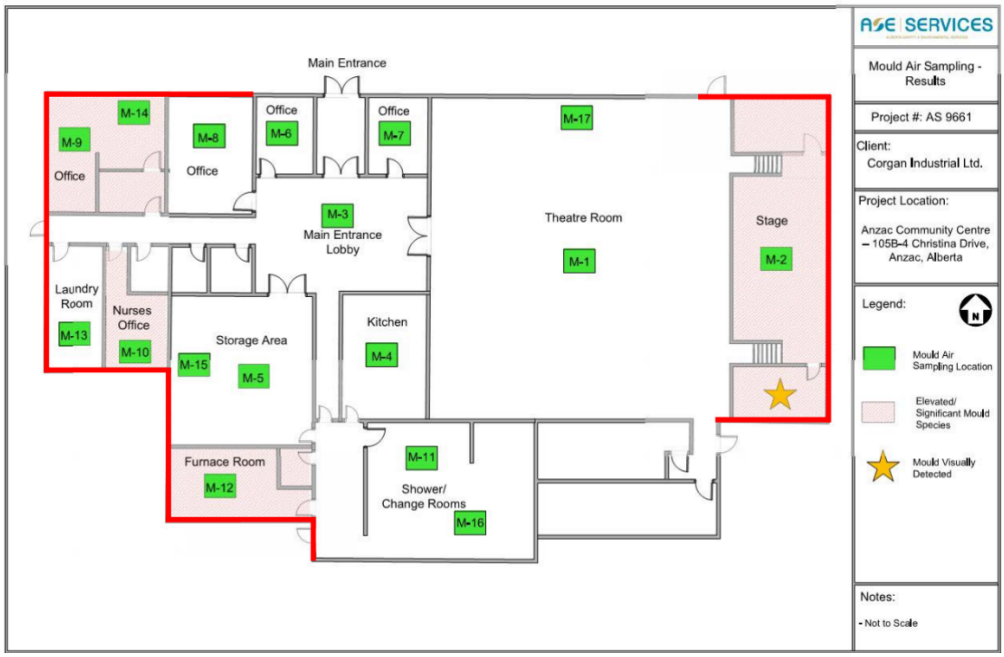


Image 1: Alberta Safety and Environmental Services Mould Locations

Stantec agrees with Alberta Safety and Environmental Services recommendation that these areas will need to be inspected and properly remediated. For proper identification of hazardous materials, it is recommended a qualified testing agency is hired to do destructive analysis and testing. Once the scope of the hazardous materials is determined a professional abatement contractor should be engaged to remove all the hazards. All potential and confirmed mould and water damaged materials should be properly remediated following the appropriate high, moderate, or low risk procedures as outlined in Government of Alberta – Best Practices Mould at the Work Site. Following the removal of all hazardous materials, final air sampling should be conducted to ensure the building is safe for re-occupancy.

Further to the Alberta Safety and Environmental Services Report; the RJC Report identifies stained batt insulation throughout the exterior walls. Destructive testing and abatement must follow if any mould is found. Remediation of these areas should include the replacement of all stained insulation and re-sealing of the polyethylene sheet vapour barrier.

The walls highlighted in red in Image 1 above are required to have their gypsum board, insulation and poly vapour barrier repaired or replaced. If additional areas are found with stained insulation or mould the same process noted above must take place.

3.0 RECOMMENDATIONS

3.1 SUMMARY

Based on the information gathered from the site review conducted on March 1st, 2018 and the information obtained from the Mould Spore Trap Air Sampling report by Alberta Safety and Environmental Services we have compiled the following recommendations and the associated opinions on budget costs for the work. Please note that all costs associated with this report are based on the Hanscomb Yardsticks for Costing 2016. Costing for some items was unavailable and prices could vary based on the scope of work required for the project. Below is a recommendation of the repairs that are required for the building and the rough order of magnitude cost:

- Mould identification, destructive testing and samples by a qualified specialist for extent of hazardous materials *
- Mould remediation in ceiling and walls of the selected areas (identified in image 1) *
- Air scrubbing to remediate any remaining airborne mould spores
- Mould Spore Trap Air Sampling
- Reinstallation and repairs of all studs, insulation and polyethylene vapour barrier of the selected areas (identified in image 1)
- Additional framing, insulation and polyethylene vapour barrier to maintain the envelope system at solid structural stud walls supporting the glulam beams at the canopies. (4 locations)
- For proper ventilation and to eliminate leaks on the roof; a new metal roof assembly is recommended with snow guards, roof vents and ridge vents.

- To prevent further heat loss escaping from the foundation we recommend a foundation protection system around the perimeter of the building consisting of cementitious board fastened to rigid insulation over membrane.
- The site has a history of being flooded and water flowing into the direction of the building possibly causing water damage. We recommend re-grading the site at perimeter of building for proper drainage.

*Prices do not include any travel expenses

Opinion of Probable Cost for Repairs: $340,000.00

Any additional mould is discovered outside of areas identified in Alberta Safety & Environmental Services report, Stantec's report (image1) or RJCs review is not included in this estimate.

Additional recommended scope of work as identified in RJC review

Opinion of Probable Cost for Repairs: $110,000.00

4.0 REFERENCES

- Facility Assessment Report – Golder Associates
- Hazardous Materials Assessment – DF Technical & Consulting Services
- Mould Spore Trap Air Sampling – Alberta Safety & Environmental Services
- Anzac Community Centre Building Envelope and Structure Review – Read Jones Christofferson

5.0 APPENDIX A

- Mould Spore Trap Air Sampling – Alberta Safety & Environmental Services

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ALBERTA SAFETY & ENVIRONMENTAL SERVICES

March 7, 2018

Dave Piercey
Corgan Industrial Ltd.
Bay 7, 266 MacKay Crescent
Fort McMurray, Alberta T9H 5C6

Dear Mr. Piercey,

Re: Mould Spore Trap Air Sampling
Anzac Community Centre - 105B-4 Christina Drive, Anzac, Alberta
Project #: AS 9661

INTRODUCTION

As per your request, Jesse Macri with Alberta Safety & Environmental Services Ltd. (ASE Services) conducted mould spore trap sampling in various locations in the Anzac Community Centre building located at 105B-4 Christina Drive, Anzac Alberta on February 22, 2018. During the time of sampling 10:20 the outdoor temperature was approximately -5^{0}C with a mix of sun and cloud, with a slight wind. Control samples are generally taken in locations that will provide a baseline of mould concentrations and types that exist naturally within the building environment. Ideally outdoor control samples provide the best baseline, but if weather conditions do not allow for proper sampling, indoor samples are taken inside the building. As temperatures were below freezing, an indoor control sample was taken for comparison.

METHODOLOGY

Under the direction from the client, the assessment included a visual inspection and walk-through of all accessible areas of the building. Observations were made for visible mould and water damage. The methodology used for each parameter of the assessment is outlined below.

Samples for fungal spores were collected by drawing 75 litres of air through an Allergenco-D Disposable Indoor Air Quality Air Monitoring Cassettes using a Buck BioAire sampling pump. All samples were analyzed by certified ASE Services analysts using ASTM D7391 - 09 Standard Test Method for Categorization and Quantification of Airborne Fungal Structures in an Inertial Impaction Sample by Optical Microscopy.

RESULTS

Results of the air samples indicate that there **are** significant levels of mould spores, including *Aspergillus/Penicillium*-like, and *Stachybotrys*, detected in the Theatre Storage Room (Sample #2), NW Corner Office (Sample #9), Nurses Office (Sample #10) and SW Furnace Room (Sample #12) and that all other spores detected were comparable to expected ambient indoor conditions. Please see Table 1, ***Appendix I***: Laboratory Report and ***Appendix II***: Floor Plan for further details.

Table 1: Mould Spore Trap Sampling Results dated February 28, 2018

Sample #:	1	**2**	3	4	5	6	7	8	9	10
Location:	Theatre Room - Middle of Room	**Theatre Room Stage**	Main Entrance Lobby	Kitchen	Storage Area	Room West of Front Entrance	Room East of Front Entrance	Office West of Front Entrance	**NW Corner Office**	**Nurses Office**
Unit:	counts/m³	**counts/m³**	counts/m³	counts/m³	counts/m³	counts/m³	counts/m³	counts/m³	**counts/m³**	**counts/m³**
Ascospores	28	**28**	-	56	56	28	56	56	**-**	**28**
Aspergillus/Penicillium sp.-like	-	**-**	56	-	28	-	28	56	**28**	**362**
Cladosporium sp.	-	**-**	-	-	28	28	-	-	**-**	**56**
Smuts/Periconia/Myxomycetes	-	**-**	-	28	56	-	-	-	**-**	**-**
Stachybotrys sp.	-	**56**	-	-	-	-	-	-	**56**	**-**
Total spores/m³	28	**83**	56	83	167	56	83	111	**83**	**445**

Sample #:	11	**12**	13	14	15	16	17
Location:	Shower/ Change Rooms	**SW Furnace Room**	Laundry Room	Zone 1 Furnace Ducting	Zone 2 Furnace Ducting	Zone 3 Furnace Ducting	Zone 4 Furnace Ducting
Unit:	counts/m³	**counts/m³**	counts/m³	counts/m³	counts/m³	counts/m³	counts/m³
Ascospores	56	**56**	83	83	111	83	56
Aspergillus/Penicillium sp.-like	-	**28**	-	-	28	28	111
Chaetomium sp.	-	**-**	-	-	-	111	-
Cladosporium sp.	-	**56**	-	-	-	-	-
Smuts/Periconia/Myxomycetes	-	**83**	56	-	-	83	56
Stachybotrys sp.	-	**362**	-	-	-	-	-
Total spores/m³	56	**584**	139	83	139	306	223

Note: **Bold text** indicated an elevation of mould spores in the area sampled.

DISCUSSION / CONCLUSIONS

Mould spore trap samples collected from the Theatre Storage Room, NW Corner Office, Nurses Office and SW Furnace Room indicate that there are elevated concentrations of mould spores present in the areas sampled. All other spores detected were comparable to expected ambient indoor conditions. Visual discoloration and/or water damage was observed in the storage room to the south of the stage.

Mould sources can potentially cause problems or adverse health symptoms to building occupants during its reproductive stage (active spore germination) or when mouldy materials are being disturbed during repairs/renovation. This is because mould spores and hyphal fragments are very small (generally 3-10 microns) and easily become airborne causing respiratory issues to susceptible individuals. Due to individual subjectivity of humans to mould, it is difficult to legislate defined limits for spore concentrations. It is important to always keep in mind the main objective when dealing with mould, which is to ensure that at least one of the basic needs of growth is controlled in any environment, to ensure mould is not able to reproduce.

Indoor mould genus/species that are commonly found in Alberta include the following: *Aspergillus, Penicillium, Chaetomium, Cladosporium, and Stachybotrys*. Depending on certain variables on the day of the sampling (visual observations, weather, etc), spore levels are used as an indication of mould issues that may exist in the areas of concern. Generally speaking, between 200 to 500 counts per cubic metre above baseline counts (for indicator mould species) indicate that there may be a mould source in the area sampled. Final recommendations are based on the building, ventilation, its occupants and/or other variables that are applicable to the project.

Drywall board gypsum is a relatively porous building product that will absorb moisture. The drywall paper is an organic food source for mould, allowing for ideal growth conditions if adequate temperature and moisture are present. Drywall may be saturated for a relatively short period of time (48 hours) before mould growth can occur, this is why it is key to ensure that building products such as drywall board be protected from moisture at all times. Wood is a food source for mould, but is a relatively dense and porous organic building product which requires longer periods of time to become saturated with water (as opposed to drywall gypsum boards). Visible water discolouration or mould on the surface on wood does not usually indicate that the material requires removal, unless it has caused damage that has compromised the integrity of the product.

Occupants experiencing adverse symptoms related to high airborne particulate exposure (headaches, stuffy nose, sinus issues, itchy/watery eyes, etc.) should be documented and reviewed if they are consistent amongst the entire staff. It is also important to note that individuals will react differently to the same environment, and symptoms may not necessarily be related to poor air quality. Concerned occupants should always consult their health practitioner when experiencing adverse symptoms.

RECOMMENDATIONS

Based on the results and observations on site, ASE Services recommends the following:

1. The areas noted above should be isolated and any Individuals entering the areas noted above should be wearing at minimum a silicone half mask with NIOSH-approved P100 filter cartridges until remediation efforts have been completed.

2. All water damaged and visual discovered areas including the areas of the storage room to the south of the stage, as well as areas in the SW Furnace Room, NW Corner Office and Nurses Office will need to be inspected and properly remediated.
3. ASE Services recommends that all potential and confirmed mould and water damaged materials, be properly remediated. The affected building materials in this area should be remediated following the appropriate high, moderate or low risk procedures as outlined in Government of Alberta – Best Practices Mould at the Work Site.
4. Once all materials have been properly remediated, final mould air sampling should be conducted in these areas to ensure remediation is complete and that the areas are safe for re-occupancy by unprotected occupants.

In all occurrences, the underlying cause of water accumulation must be rectified or fungal growth will likely reoccur. Emphasis should be placed on ensuring proper repairs of the appropriate portions of the building infrastructure, so that water damage and moisture buildup do not persist.

CLOSURE

This report was prepared exclusively for the client. This report cannot be utilized by any other person or entity without consent of Alberta Safety & Environmental Services Ltd. This report reflects the findings at the time of the sample collection.

If you have any questions or require any additional information please feel free to contact our project management team at (780) 760-6917.

Sincerely,

Alberta Safety & Environmental Services Ltd.

Reviewed By:

Kalie Couture, B. Sc.
Project Manager

Drafted by: Robbie Carrozza, B.Sc., Project Manager

ATTACHMENTS

- *Appendix* I: ASE Services Laboratory Mould Spore Trap Air Sample Results dated February 28, 2018
- *Appendix II:* Floor Plan

APPENDIX IV

LABORATORY REPORTS

ASE | SERVICES
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SPORE TRAP ANALYSIS REPORT

Client: Corgan Industrial Ltd.
Project #: AS 9661
Description: Anzac Community Centre - 105B-4 Christina Drive, Anzac, Alberta

Sample Date: February 22, 2018
Analysis Date: February 28, 2018
% Trace Analyzed: 47.92

Sample #	Lab #	Sample Description	Mould Type	Raw Count	Counts/ m^3	Total Counts/ m^3	Sample Volume (m^3)	LOD (counts/m^3)
1	B18-1096	Theatre Room - Middle of Room	Ascospores	1	28	28	0.075	28
					Background debris: Low			
2	B18-1097	Theatre Room Stage	Ascospores	1	28	83	0.075	28
			Stachybotrys	2	56			
					Background debris: Low			
3	B18-1098	Main Entrance Lobby	Aspergillus/Penicillium-like	2	56	56	0.075	28
					Background debris: Moderate			
4	B18-1099	Kitchen	Ascospores	2	56	83	0.075	28
			Smuts/Periconia/Myxomycetes	1	28			
					Background debris: High			
5	B18-1100	Storage Area	Ascospores	2	56	167	0.075	28
			Aspergillus/Penicillium-like	1	28			
			Cladosporium	1	28			
			Smuts/Periconia/Myxomycetes	2	56			
					Background debris: Moderate			
6	B18-1101	Room West of Front Entrance	Ascospores	1	28	56	0.075	28
			Cladosporium	1	28			
					Background debris: Moderate			

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Sample #	Lab #	Sample Description	Mould Type	Raw Count	Counts/ m^3	Total Counts/ m^3	Sample Volume (m^3)	LOD (counts/m^3)
7	B18-1102	Room East of Front Entrance	Ascospores	2	56	83	0.075	28
			Aspergillus/Penicillium-like	1	28			
					Background debris:	*High*		
8	B18-1103	Office West of Front Entrance	Ascospores	2	56	111	0.075	28
			Aspergillus/Penicillium-like	2	56			
					Background debris:	*High*		
9	B18-1104	NW Corner Office	Aspergillus/Penicillium-like	1	28	83	0.075	28
			Stachybotrys	2	56			
					Background debris:	*High*		
10	B18-1105	Nurses Office	Ascospores	1	28	445	0.075	28
			Aspergillus/Penicillium-like	13	362			
			Cladosporium	2	56			
					Background debris:	*Moderate*		

Note: Limit of Detection (LOD) is based on single spore detection within the quantified area (% Trace).

Results Reviewed by: Robbie Carrozza Date: February 28, 2018

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www.aseservices.ca

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ALBERTA SAFETY & ENVIRONMENTAL SERVICES

SPORE TRAP ANALYSIS REPORT

Client: Corgan Industrial Ltd.
Project #: AS 9661
Description: Anzac Community Centre - 105B-4 Christina Drive, Anzac, Alberta

Sample Date: February 22, 2018
Analysis Date: February 28, 2018
% Trace Analyzed: 47.92

Sample #	Lab #	Sample Description	Mould Type	Raw Count	Counts/ m^3	Total Counts/ m^3	Sample Volume (m^3)	LOD (counts/m^3)
11	B18-1106	Shower/Change Rooms	Ascospores	2	56	56	0.075	28
					Background debris:	*High*		
12	B18-1107	SW Furnace Room	Ascospores	2	56	584	0.075	28
			Aspergillus/Penicillium-like	1	28			
			Cladosporium	2	56			
			Smuts/Periconia/Myxomycetes	3	83			
			Stachybotrys	13	362			
					Background debris:	*High*		
13	B18-1108	Laundry Room	Ascospores	3	83	139	0.075	28
			Smuts/Periconia/Myxomycetes	2	56			
					Background debris:	*High*		
14	B18-1109	Zone 1 Furnace Ducting	Ascospores	3	83	83	0.075	28
					Background debris:	*High*		
15	B18-1110	Zone 2 Furnace Ducting	Ascospores	4	111	139	0.075	28
			Aspergillus/Penicillium-like	1	28			
					Background debris:	*High*		
16	B18-1111	Zone 3 Furnace Ducting	Ascospores	3	83	306	0.075	28
			Aspergillus/Penicillium-like	1	28			
			Chaetomium	4	111			
			Smuts/Periconia/Myxomycetes	3	83			
					Background debris:	*High*		
17	B18-1112	Zone 4 Furnace Ducting	Ascospores	2	56	223	0.075	28
			Aspergillus/Penicillium-like	4	111			
			Smuts/Periconia/Myxomycetes	2	56			
					Background debris:	*High*		

Note: Limit of Detection (LOD) is based on single spore detection within the quantified area (% Trace).

Results Reviewed by: Robbie Carrozza Date: February 28, 2018

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APPENDIX III

FLOOR PLANS

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Mould Air Sampling - Results

Project #: AS 9661

Client:
Corgan Industrial Ltd.

Project Location:

Anzac Community Centre – 105B-4 Christina Drive, Anzac, Alberta

Legend:

N

- Mould Air Sampling Location
- Elevated/ Significant Mould Species
- Mould Visually Detected

Notes:

- Not to Scale

6.0 APPENDIX B

- Anzac Community Centre Building Envelope and Structure Review – Read Jones Christofferson

rjc
Engineers

Anzac Community Centre

Building Envelope and Structure Review

Anzac, Alberta

March 2018
RJC No. EDM.118486.0002

Prepared for:

Dawna Moen, Senior Associate
Stantec
10160 – 112 Street NW
Edmonton AB T5K 2L6

Prepared by:

Read Jones Christoffersen Ltd.
17415 - 102 Avenue NW, Suite 100
Edmonton AB T5S 1J8

Bob Korneluk, BSc, P.Eng.
Associate

Reviewed by:

Nick Trovato, MEng, P.Eng., FEC, FGC(Hon)
Managing Principal

Table of Contents

1.0 TERMS OF REFERENCE

As requested, RJC performed a visual review on March 1, 2018 of the above referenced property located at 105B-4 Christina Drive in Anzac, Alberta (Photos 1 and 2). The primary purpose of this review was to investigate moisture ingress issues related to ice damming and visible moisture damage found inside the building during recent renovations, and to assess the lintels in interior load bearing walls.

Photo 1 and 2: Southwest and southeast view of Building

The scope of work for our investigation was as follows:

- A review of available drawings to confirm construction details.
- A review of previous reports prepared by others.
- A visual review of the building exterior, interior, and accessible attic spaces to review existing wood structure and building envelope.
- A thermal scan of the building including accessible attic spaces.

The following reports were referred to during our review:

- March 7, 2018 report regarding Mould Spore Trap Air Sampling prepared by Alberta Safety and Environmental Services.

A review of the seismic aspects, mechanical, electrical, and fire safety systems, means of egress, and identification of mould-like substances were beyond RJC's scope of work.

To aid our review of the building envelope and structure, an on-site contractor removed interior and exterior finishes at select locations (Figure 1).

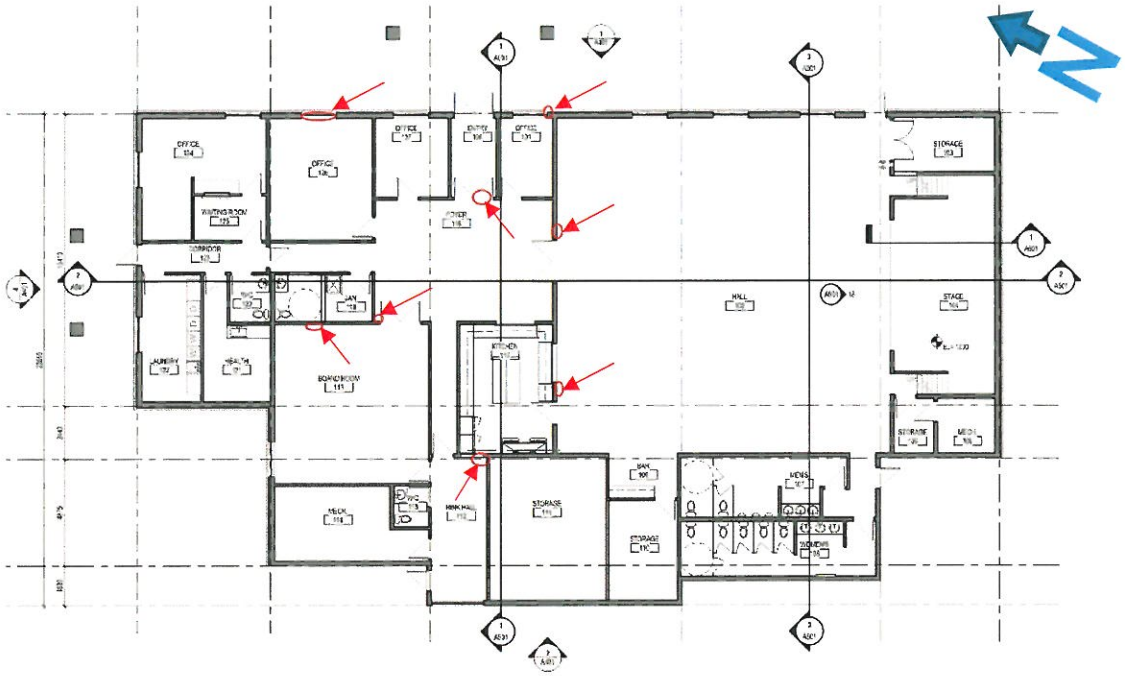


Figure 1: Main Floor Plan – Circled areas denotes locations of test holes

Our observations were made primarily from the ground level and attic space and were visual in nature with no attempt to assess every element of the building envelope or to review areas hidden from view except as noted herein. Any conclusions, recommendations, or opinions presented in this report must be viewed in light of the limited information available from such a visual review. Inspections of other portions of the building were not included within the scope of this review.

2.0 HISTORY AND DESCRIPTION OF THE BUILDING

The Anzac Community Centre was constructed in approximately 1984. The complex consists of a single-storey wood framed building supported by a concrete foundation. The exterior cladding primarily consists of vinyl siding with concrete masonry on the west elevation and wainscot height brick cladding on all other elevations. Based on our visual review of the building and our knowledge of current building practices, we have assumed the exterior envelope assemblies consist of the following:

EXTERIOR WALL ASSEMBLY

- Exterior cladding (brick, vinyl)
- Building paper
- Exterior wood sheathing
- 2x6 wood framing
- Batt insulation
- Polyethylene sheet vapour retarder
- Interior gypsum board sheathing

ROOF/CEILING ASSEMBLY

- Sloped metal roof
- Underlay
- Wood roof sheathing
- Wood roof trusses
- Blown-in cellulose fiber and fiberglass batt insulation
- Polyethylene sheet vapour retarder
- Interior ceiling finishes (suspended gypsum board ceiling)

It is our understanding moisture damage was uncovered in the ceiling near the public washrooms and on the north wall of the rink hall. Interior finishes had been removed at these locations prior to our site visit, as well as other areas. Interior finishes were also removed at a number of locations during our site visit (Figure 1).

3.0 COMMENTS AND OBSERVATIONS

A site review consisting of visual inspection, thermal scans, and test openings was conducted on March 1, 2018. A summary of the ambient weather conditions at the time of our review is provided below in Table 1.

Table 1: Ambient Weather Conditions at time of Thermographic Scan

Date	March 1, 2018
Time	10:00 a.m.
Weather Conditions at time of Review	Exterior Air Temperature: -15°C Exterior Conditions: Clear Relative Humidity: 75% Barometric Pressure: 103 kPa Wind: West 5 km/hr

3.1 Exterior Walls and Roof

- Significant ice damming was observed on roof areas above the main washrooms (Photo 3), the rink hall entrance (Photo 4), and the nurse's office (Photo 5). Ice damming occurs when the underside of the snow cover melts as a result of exposure to a heat source. Heat sources can be from heat loss in the attic space or the surface of the metal roof due solar heat gain. When the melted water flows over colder sections of the roof and eavestrough, ice formations occur. Ice damming can be minimized by keeping the attic space cold, but this can be impeded by leakage of warm air into the attic, heat loss from uninsulated ducts and pipes, heat loss through the attic insulation and insufficient ventilation in the attic. Comments and observations from our review of the attic are included in Section 3.3 of this report. Attic ventilation is achieved through vented soffits and roof vents; however, no roof vents were visible on the roof at the time of our review. We also could not confirm if there were any ridge vents at the peaks of the metal roof. We recommend further review to assess how the roof is vented.

Photo 3: Ice damming above southwest washrooms

Photo 4: Ice damming above rink hall entrance

Photo 5: Ice damming above nurse's office

- As a result of ice damming, visible damage has occurred to the eavestroughs (Photos 3 to 5). Snow guards can help reduce the risk of this damage by preventing snow and ice from sliding off the roof. The roof also appears to have been patched above the nurse's office (Photo 5). Roof repairs including new snow guards and eavestroughs are recommended. Heat tracing eavestroughs and downspouts could also be considered.

- Roof canopies above the main building entrances are supported by exposed glulam beams, which are supported by exterior columns and the exterior wall (Photo 6). Thermal scans of the exterior walls at the beam connections found noticeable heat loss due to thermal bridging through the wood framing (Image 1, Photo 7). Air leakage was also detected at some of these locations (Image 2, Photo 8). In addition to air vapour barrier repairs, we recommend adding insulation to either the beams or exterior walls to reduce the amount of heat loss at the beam connections.

Photo 6: Exposed end of typical glulam beam

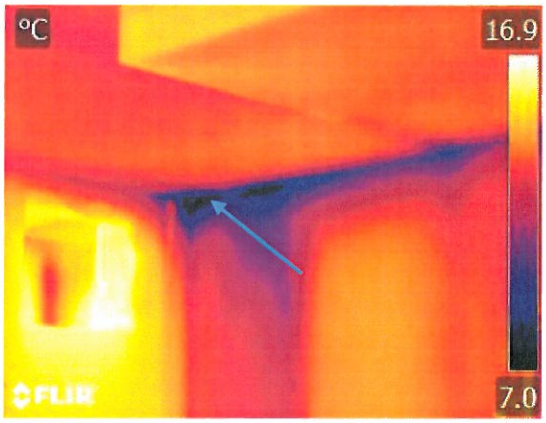


Image 1: Heat loss at typical beam connection

Photo 7: Location of thermal image and cold spot

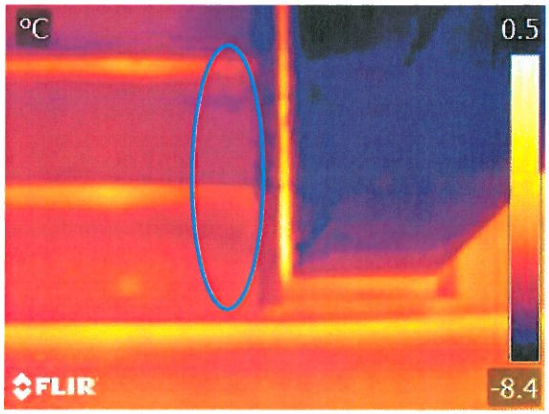


Image 2: Air leakage at typical beam connection

Photo 8: Location of thermal image

- Wall-mounted exhaust vents appear to be poorly detailed, with top flanges reverse lapped over cladding and fascia (Photos 9 and 10). It is our understanding the exterior walls will be re-clad as part of the renovation project, at which time we anticipate the vents will be re-detailed.

Photos 9 and 10: Reverse lapped vent covers

- Thermal scans of the exterior walls found noticeable heat loss through the exposed concrete foundation (Image 3, Photo 11). This appears to be due to thermal bridging through the uninsulated concrete. We recommend adding exterior insulation to reduce the thermal bridging at these locations.

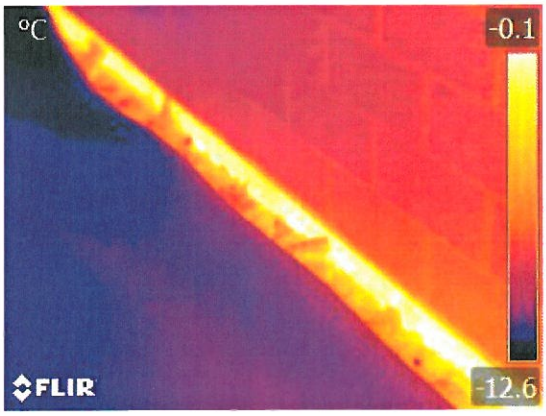


Image 3: Heat loss through exposed concrete

Photo 11: Location of thermal image

3.2 Interior

- Stained batt insulation was noted along the base of most exterior wall locations where interior gypsum board finishes had been previously removed by the on-site contractor (Photos 12 and 13 as provided by Stantec). These stains could be the result of condensation from warm air leakage through the polyethylene sheet vapour barrier, which appears to have been poorly sealed at penetrations and along the base of the exterior walls, or exterior air or water leakage. The adjacent wood framing and interior gypsum board finishes near these locations appeared to in good condition; however, recent air quality tests found high levels of mould at some of these locations. Refer to March 7, 2018 report prepared Alberta Safety and Environmental Services for more details.

  As previously noted, we understand that the exterior will be re-clad. This will address potential water leakage from the exterior.

We recommend testing of interior finishes for mould growth and subsequent remedial work as required including, but not limited to replacement of interior gypsum board and stained batt insulation, and resealing of the polyethylene sheet vapour barrier at penetrations and wall-to-floor junctions with acoustical sealant. Alternatively, the polyethylene sheet vapour barrier and batt insulation could be replaced with closed cell spray-applied air barrier/vapour retarder insulating urethane foam, or it could be completely removed if an exterior air vapour barrier and insulation is provided when the building is re-clad.

Photo 12: Stained insulation in north office

Photo 13: Stained insulation in nurse's office

- A joint was observed between the interior floor slab and concrete grade beam (Photo 14 by Stantec). This appears to be a construction joint and it is likely separated due to movement of the slab. It is our understanding the site experiences periodic flooding, which can cause underlying soils to swell and push up on the slab. We anticipate that there is no reinforcement between the slab and grade beam, likely to allow for movement of the slab caused by movement of the soil. The joint could be filled with a sealant or grout to fill the void, however, on-going movement may still occur, which could lead to further separation of the joint.

Photo 14: Joint between interior slab and grade beam under typical exterior wall

- The cause of the flooding is not known at this time; however, during the renovations, the perimeter grade on the exterior of the building should be sloped to provide drainage of surface water away from the building. Geotechnical review would be required to determine if there is a groundwater issue.
- The interior slab is also penetrated by heating ducts, which are located below the slab. It is our understanding these ducts are being abandoned. The abandoned ducts can be filled with concrete to provide a continuous concrete slab surface.

Photo 15: Separated duct at slab penetration

- Thermal scans of the interior found numerous cold spots in wall areas adjacent to unconditioned attic spaces (Images 4 to 9). At most locations, the cold spots were found to be locations of missing or fallen batt insulation. At one location between the kitchen and rink hall, a draft was also detected (Image 9, Photo 20). This was found to be due to a discontinuity in the vapour barrier between the kitchen ceiling and rink hall ceiling, which are located at different elevations (Photo 22). This air leakage may have also contributed to the previously noted moisture damage, which had occurred near Grid D11 (Photo 23).

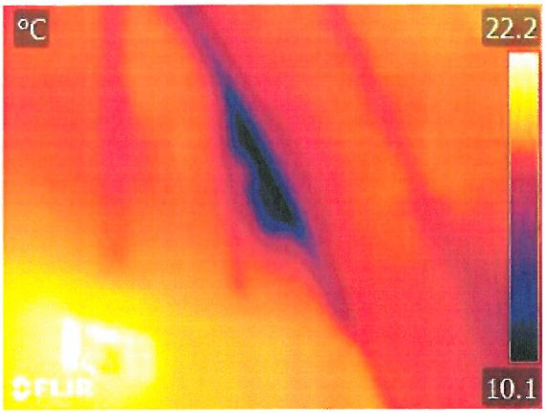


Image 4: Cold spot in foyer/boardroom wall

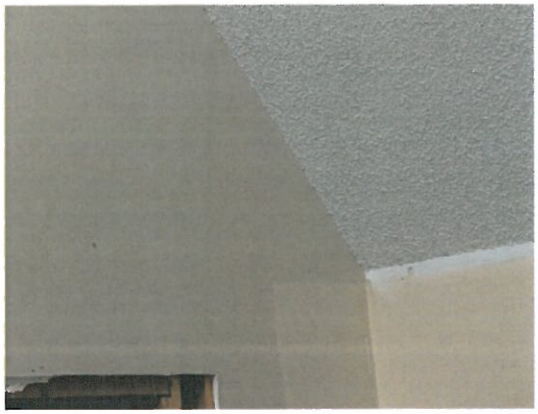


Photo 16: Location of thermal image

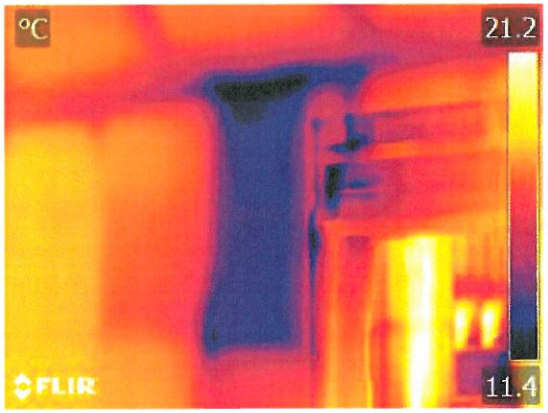


Image 5: Cold spot in foyer/hall wall

Photo 17: Location of thermal image

Image 6: Cold spots in north hall wall

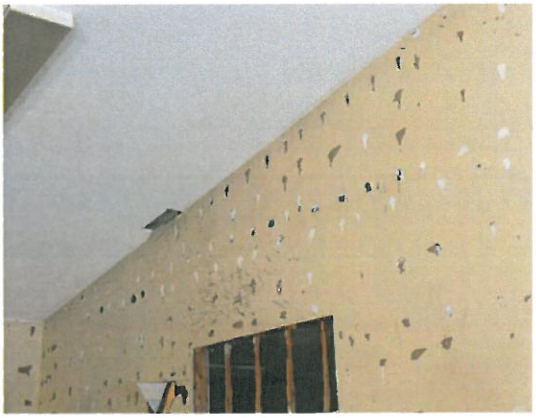


Photo 18: Location of thermal image

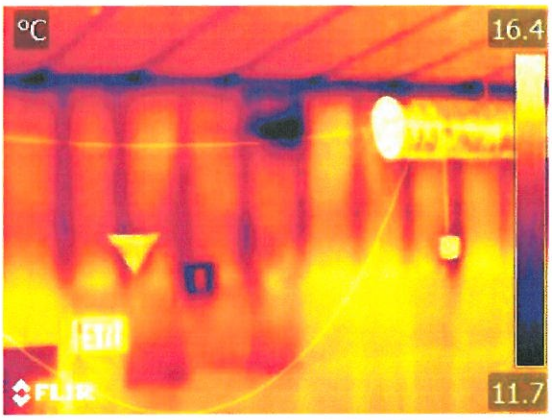


Image 7: Cold spot in west hall wall

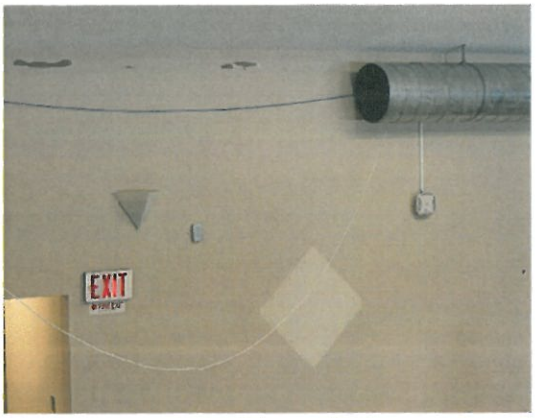


Photo 19: Location of thermal image

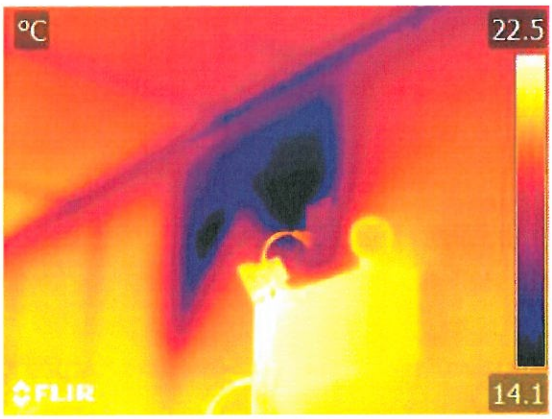


Image 8: Cold spot in board room

Photo 20: Location of thermal image

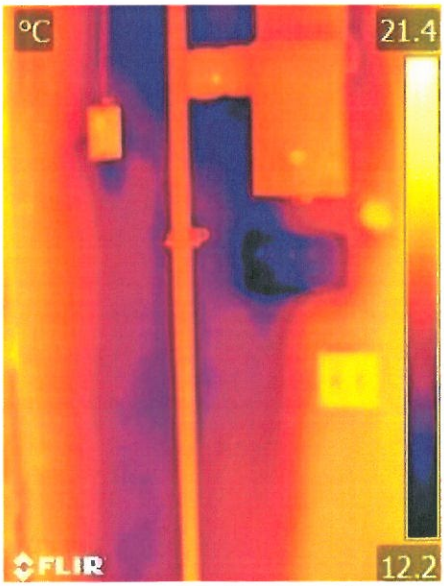


Image 9: Cold wall cavity in kitchen

Photo 21: Location of thermal image

Photo 22: Top of cold wall cavity in Image 8

Photo 23: Location of moisture damaged ceiling near Grid D11 per A201

- Thermal scans of the upper walls and ceiling in the foyer identified several locations of increased heat loss (Images 10 and 11). There was no access to this ceiling space to confirm the cause of these thermal anomalies; however, we suspect it is similar to the thermal anomalies observed near the lower ceilings.

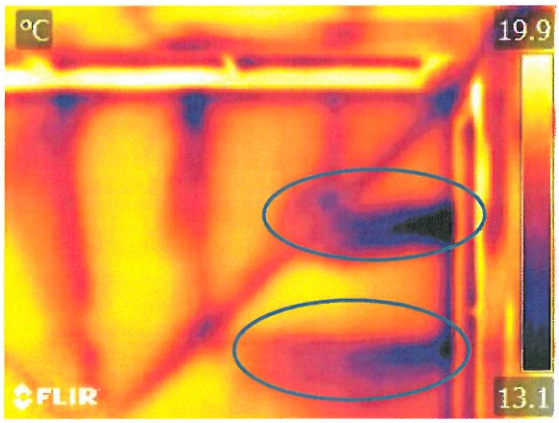


Image 10: Thermal anomalies in foyer ceiling

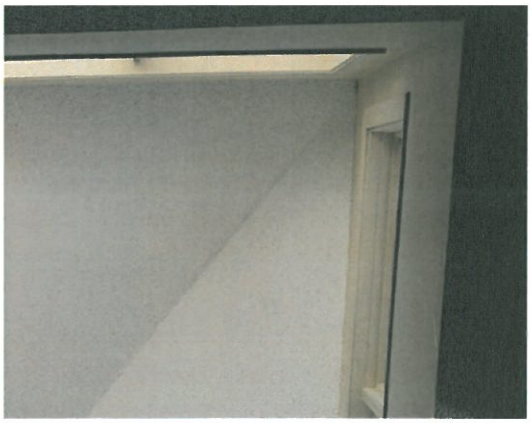


Photo 24: Location of thermal image

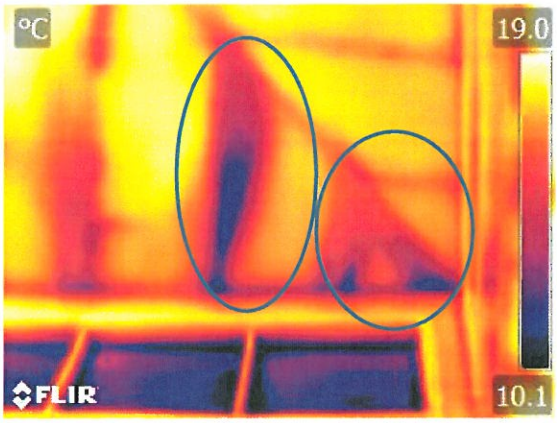


Image 11: Thermal anomalies in foyer ceiling

Photo 25: Location of thermal image

3.3 Attic Spaces

- The attic space above the lower ceiling levels is accessed by two access hatches located in the janitor's room and bar area (Figure 2). The attic hatches consist of an opening framed between the bottom chords of the roof trusses with an insulated wood box serving as the hatch cover. No access hatches are provided to access the ceiling spaces above the main hall and mezzanine (Area 2 in Figure 2); however, a previously made opening the hall ceiling (circled in Figure 2) indicated that this attic space was filled with approximately 6" of loose cellulose insulation with a large air space between the top of the insulate the roof. With the exception of the rink hall and the foyer ceiling/walls in Area 1, which are insulated with batt, all ceiling spaces appeared to be insulated with loose blown-in cellulose insulation. The thickness of this insulation was found to be between 6" and 8". It is difficult to determine what the original thickness would have been since it has been disturbed and has compressed over time from moisture accumulation in the attic (Photos 26 and 27).

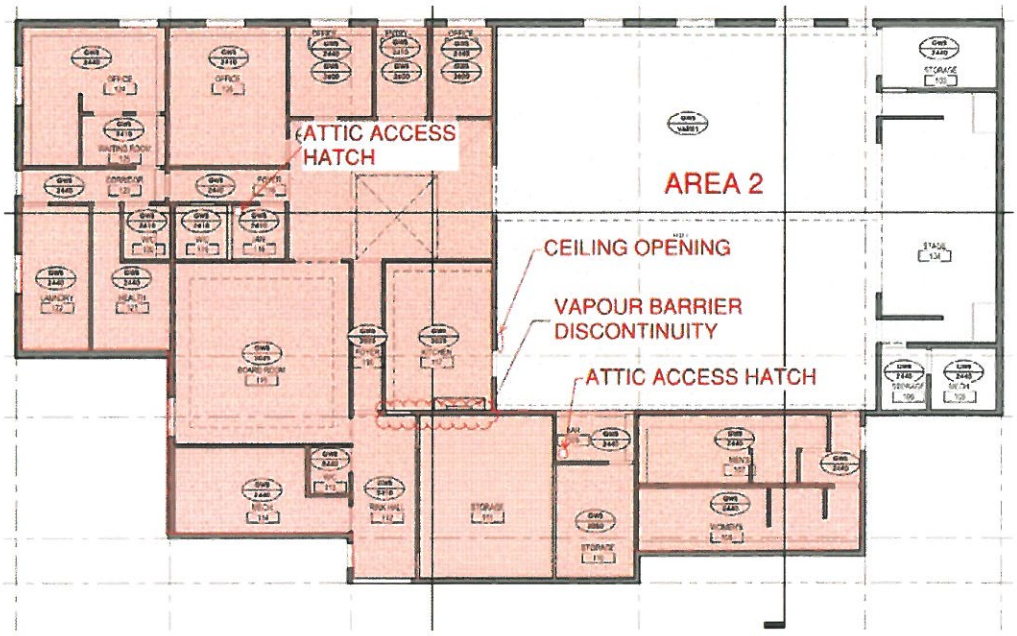


Figure 2: Ceiling plan. Shaded area denotes Area 1

Photo 26: Typical attic insulation cover where insulation appears to have been disturbed

Photo 27: Compressed attic insulation

- Flexible insulated exhaust ducts are routed through the attic space to rooftop and wall-mounted vents (Photos 9 and 28). It is not good practice to route multiple ducts to one roof vent. It is also not good practice to run exhaust ducts horizontally through the attic space, as noted above the main washrooms (Photo 29). There is a risk of condensation and ice forming along these ducts where they sag, have excessive runs, or have bends or kinks that result in a reduction in the duct diameter. Ideally, these ducts should be routed directly up from the ceiling penetration to a roof vent.

Photo 28: Exhaust ducts terminating at roof vent

Photo 29: Duct running under insulation across attic floor

- The fans attached to these ducts were found to be uninsulated and unsealed (Image 12, Photo 30). Air leakage around the main washroom fans likely contributed to the moisture damage previously found in the in the ceiling near Grid D11. Heat loss through the uninsulated fan enclosures can also contribute to ice damming by increasing the air temperature in the attic. We therefore recommend that all exhaust fans be sealed and insulated. This usually involves installing a poly boot over the fan, and sealing it to the polyethylene vapour barrier and duct wrap.

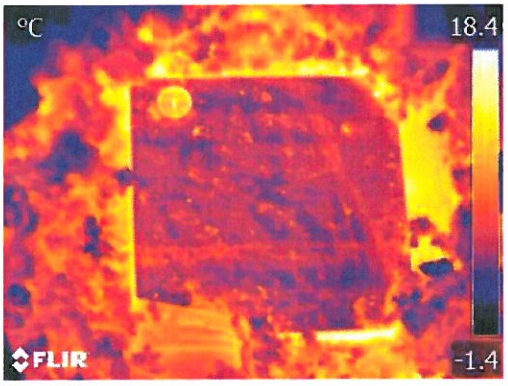


Image 12: Thermal image of typical exhaust fan

Photo 30: Location of thermal image

- Pipe vents are not insulated (Image 13, Photo 31). Heat loss from these pipes can also contribute to ice damming. We therefore recommend insulating them.

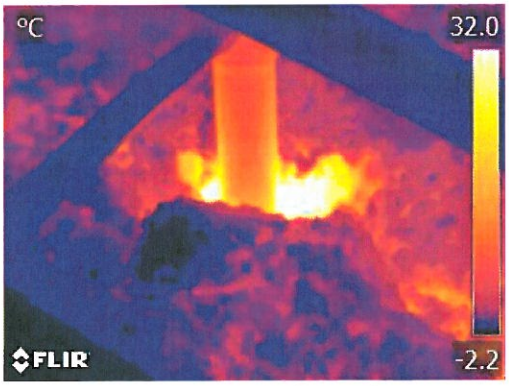


Image 13: Thermal image of an exhaust pipe

Photo 31: Location of thermal image

- Return air ducts from the foyer do not appear to be insulated (Image 14, Photo 32). Air leakage also appears to be occurring through the top of the duct penetration (see arrow on Image 14). Further review is recommended to determine if these ducts could be removed, or insulated and sealed.

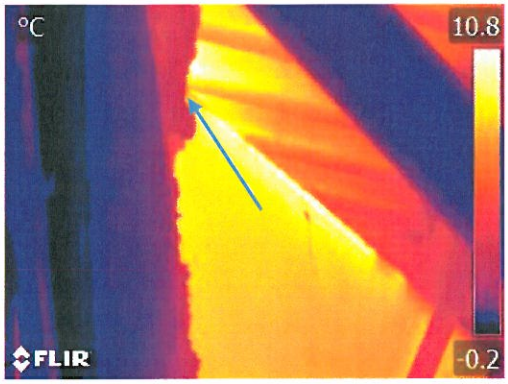


Image 14: Thermal image of return air duct

Photo 32: Location of thermal image

- Thermal scans also found numerous hot spots in the attic at low spots in the insulation, at transitions between interior walls and ceilings, and at electrical penetrations (Images 15 to 17). Most of the heat loss at these locations is due to insufficient insulation or thermal bridging; however, there may also be discontinuities in the vapour barrier, such as between the kitchen and rink hall. Further review would be required to confirm.

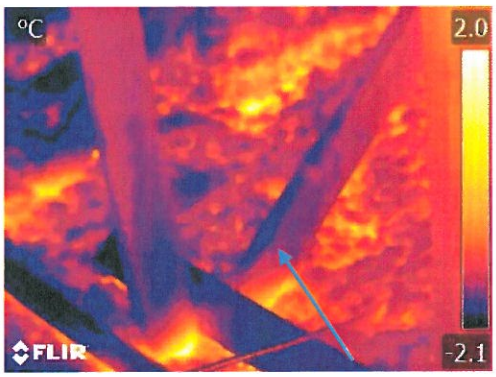


Image 15: Heat loss at lows spots in insulation

Photo 33: Location of thermal image

Image 16: Heat loss at top of boardroom wall

Photo 34: Location of thermal image

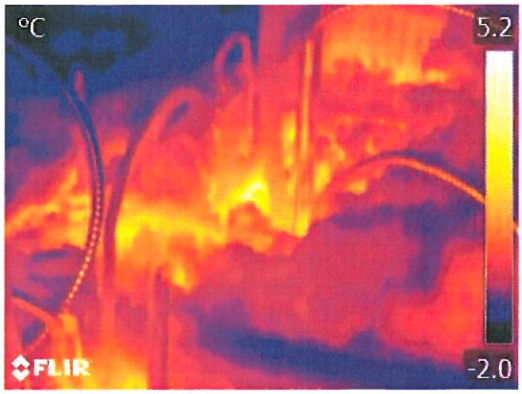


Image 17: Heat loss at electrical penetrations

Photo 35: Location of thermal image

3.4 Structure Review

To address concerns with wood framing above interior door openings, interior finishes were removed above several door and window openings, and roof framing was reviewed from the attic to determine which interior walls are load bearing. This included the areas highlighted in Figure 2. The attic space above the stage was not reviewed since it was not accessible. A summary of our findings on site is presented below in Table 2 and Figure 3.

Table 2: Lintel Review Summary

Lintel Location	Lintel Assembly
1	3 – 2 x 10
2	3 – 2 x 10
3	3 – 2 x 10
4	3 – 2 x 10
5	3 – 2 x 10

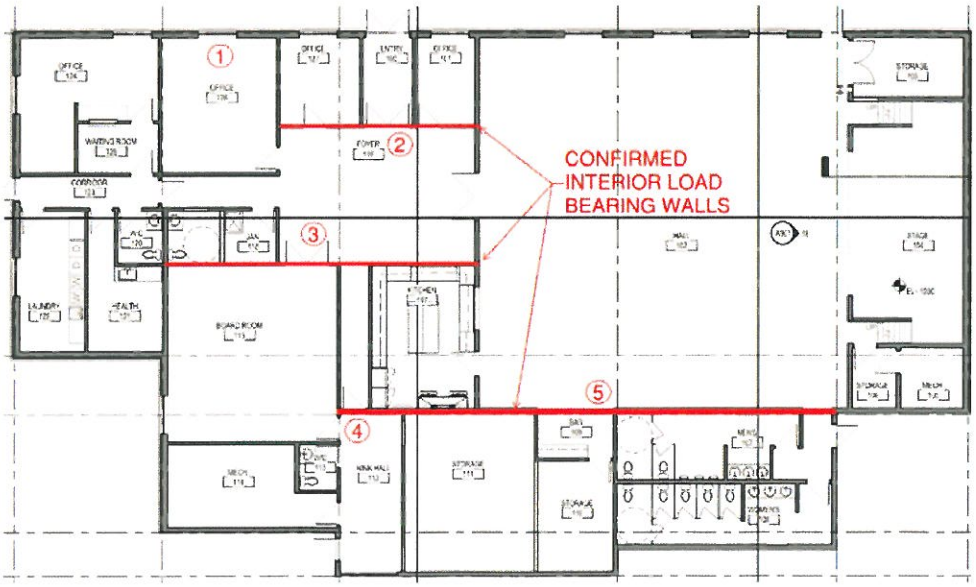


Figure 3: Reviewed lintels and noted load bearing walls

The roof is a cross-gabled shape with a higher clerestory above the foyer area, as shown in the rendering below provided by Stantec. Since drawings from the original design and construction are not available, the exact framing of the roof structure is not known. The roof trusses are therefore assumed to span between the identified load-bearing walls.

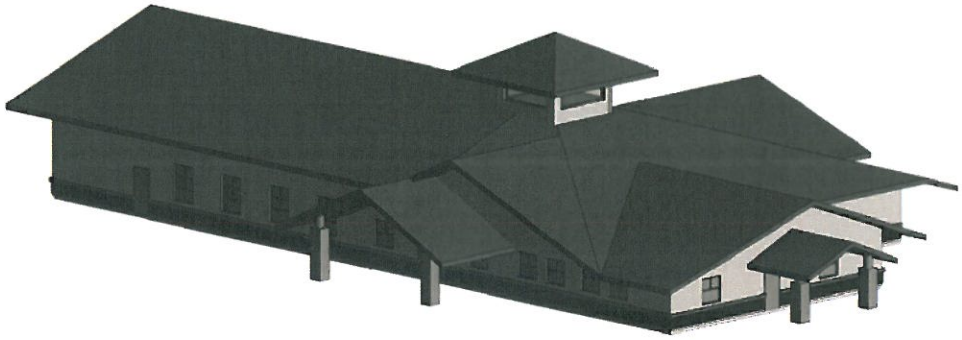


Figure 4: Roof Shape (rendering provided by Stantec)

The roof trusses over the hall and over the boardroom appear to be larger span members while the remaining trusses are assumed to be shorter spans. Due to these larger spans, Lintels #3 and #5 will carry more load than the other three noted above. The loads carried include the self-weight of the structure, the superimposed dead loads (i.e. the metal roofing, insulation, gypsum ceiling, etc.), and the snow load.

A load capacity check on these five identified lintels was completed for the assumed design loads described below.

The ground snow load for Anzac is 1.5 kPa in the 2014 Alberta Building Code. An importance factor of 1.15 would also be used with the 2014 Alberta Building Code since the community centre would be classified as High importance. The exact date of construction is unknown and the original drawings are not available; therefore, it is unclear which building code was used for the design of the structure. The 1977 Alberta Building Code specified a 1.8 kPa ground snow load but the importance factors had not yet been introduced. The resulting design snow load in 1977 was slightly smaller than the equivalent value today (see Table 3 below). The 1977 value was used for this load capacity check.

Table 3: Service Design Snow Loads in 1977 and 2014

Alberta Building Code	Ground Snow Load (kPa)	Importance Factor	Service Design Snow Load (kPa)
1977	1.8	NA	1.25
2014	1.5	1.15	1.50

The shape of the roof creates valleys between the gables at the west end of the building. These valleys accumulate snowdrift, and the clerestory roof also creates the opportunity for snow sliding. An average of 2.68 kPa was used as the snowdrift value in these areas.

The self-weight and superimposed dead load of the roof was assumed to be 0.75 kPa, based on the roof and ceiling assembly described in Section 2.0.

A summary of the design information for the lintel load check is provided in Table 4 below along with the design results.

Table 4: Lintel Design Information and Results

	Design Information				Design Results		
Lintel #	Lintel Clear Span (m)	Service Dead Load (kN/m)	Service Snow Load (kN/m)	Total Factored Design Load (kN/m)	Factored Shear Force (kN)	Factored Bending Moment (kN·m)	Required Bearing Length (mm)
1	1.6	3.6	12.8	23.7	13.5	8.4	38
2	1.9	3.6	13.0	24.0	17.3	11.8	38
3	1.9	6.3	18.4	35.5	25.5	17.4	57
4	1.0	4.8	12.7	25.1	6.7	3.7	38
5	1.7	8.5	18.8	40.6	24.0	15.4	56

The species of wood that forms the existing lintels is unknown, but typically either Douglas Fir-Larch or Spruce-Pine-Fir No. 1/No. 2 grades are used as structural members. Douglas Fir-Larch is the weaker of the two. Based on the 2017 Wood Design Manual, Douglas Fir-Larch in a 3-ply 2 x 10 (38 x 235) lintel has a shear capacity of 37.0 kN and bending moment capacity of 11.4 kN·m. All five lintels are adequate in shear but #2, #3, and #5 appear to be under-capacity in bending.

Since renovation work will be occurring around these lintels, our recommendation is to remove the lintels identified above and replace them with an 89 x 235 2.0E LVL lintel with 76 mm of bearing on each end. This stronger lintel will also be adequate for the increased snow loads from the 2014 Alberta Building Code.

The assumptions described in this section are based on the information available to us during this review and the limited knowledge of the existing roof framing. Should any of these assumptions be found to be incorrect, our conclusions and recommendations will need to be reviewed and updated. Additionally, if the span of any of the new lintels change as part of the renovation, the size of the new lintel may need to be adjusted accordingly.

4.0 SUMMARY AND RECOMMENDATIONS

4.1 Attic Spaces

Based on our initial findings from our review of Area 1, the moisture damaged ceiling and apparent ice damming appears to be related to several factors:

- Discontinuities in the vapour barrier between the different ceiling heights.
- Heat loss and potential air leakage at electrical and mechanical penetrations including return air ducts and pipe vents located in the attic space and solar heat gain.
- No vapour barrier or insulation above ceiling mounted exhaust fans.
- Minimal roof vents to encourage air flow through the attic space.

Combined, these factors can cause condensation in the attic, which can have adverse effects on thermal insulation, gypsum board, and wood framing, and contributed to ice damming during prolonged cold spells. We therefore recommend the following repairs to the attic spaces in Area 1:

- Remove all attic insulation and repair polyethylene sheet vapour barrier as required. This includes sealing damaged areas, laps, junctions, and penetrations as well as sealing exhaust fans and electrical junction boxes and conduit. We anticipate this work would be completed from within the attic space, which does not affect existing ceiling finishes. Once vapour barrier repairs are completed new attic insulation may be installed. Additional measures should also be taken to hold the batt insulation in place at vertical and sloped ceiling locations. Closed cell spray applied urethane foam may be considered at these locations.
- Re-seal and insulate all ducts and pipe vents. Attempts should be made to keep duct runs as short as possible and have them run straight up. The flexible plastic ducts are also not considered a good substitute for traditional insulated metal ducting. Consideration should be given to replace the flexible plastic ducts with insulated metal ducts.
- Ensure insulation stops are properly supported at the eaves and are properly restraining loose insulation from drifting onto the soffit locations. It is our understanding the soffits will be replaced as part of the exterior work, so this work could be completed when the existing soffits are removed.
- Modify attic ventilation as required including additional roof vents. This may require further review of the air flow through the attic spaces using a smoke generator. Supplementary ventilation or the addition of fans might also be required to address ventilation at isolated areas.

Opinion of Probable Cost for Attic Repairs: $100,000.

Please note this does not include new attic insulation in Area 2, interior drywall repairs, nor spray foam insulation which is more costly than batt insulation. These repairs will help reduce ice damming but not necessarily eliminate ice damming caused by solar heat gain.

Based on our limited review of the roof and attic space above Area 2, we did not note any issues with the attic insulation, and there appears to be minimal mechanical equipment in this area to contribute to ice damming; however, there may be moisture in the attic space located above the stage area, which was found to have high levels of mould. Attic ventilation may also be impeded in this area and between the hall and kitchen and washrooms. We therefore recommend further review of the attic insulation and attic ventilation in this area. We also recommend checking insulation stops to ensure they are properly supported at the eaves and properly restraining loose insulation from drifting onto the soffit locations.

4.2 Exterior Walls and Roof

Based on our initial findings from our review of the exterior walls and roof, we noted the following issues:

- Ice damming has resulted in considerable damage to the eavestroughs. A portion of the roof above the nurse's office also appear to have been previously patched.
- Stained batt insulation was noted along the base of the exterior walls and at penetrations.
- Thermal bridging is occurring through the uninsulated concrete foundation and exterior wall locations where exterior glulam beams penetrate building envelope.

Recommendations to address these issues are as follows:

- Complete selective roof repairs including installation of new snow guards, eaves, and downspouts. Heat tracing could also be considered to prevent ice build-up.
- Removal of all moisture damaged interior wall finishes including stained batt insulation, interior gypsum board, wood sheathing, and wood framing, and repair polyethylene sheet vapour barrier as required, including re-sealing the polyethylene at all penetrations and wall-to-floor junctions with acoustical sealant. Mould remediation may also be required at locations with higher levels of mould growth. Refer to March 7 report prepared by Alberta Safety and Environmental Services for locations. We also recommend retaining an environmental consultant to conduct further testing at these locations and to provide direction to complete the required remediation work.
- Insulate exposed concrete foundation and exterior walls at glulam connections. Consideration could also be given to provide exterior insulation to all of the above grade walls as part of the recladding work.

Opinion of Probable Cost: To be determined once a scope of work has been established.

4.3 Structure

Based on our initial review of the interior load-bearing walls, three lintels require replacement. This work is anticipated to include the following:

- Temporary shoring of the interior load bearing walls.
- Replacement of existing built-up wood lintels with 89 x 235 2.0E LVL lintels with minimum 76 mm of bearing at each end.

Opinion of Probable Cost: $10,000.

5.0 LIMITS OF LIABILITY

This report documents the current condition of the building envelope and has been prepared in accordance with generally accepted engineering practices. Our review was conducted on a random basis with no attempt to review or inspect every element or portion of the building. No examination of wall cavities or review for moulds or similar growths was performed. Our comments are not a guarantee or warranty of any aspect of the condition of the building whatsoever, nor that the building has been built in accordance with the drawings and specifications.

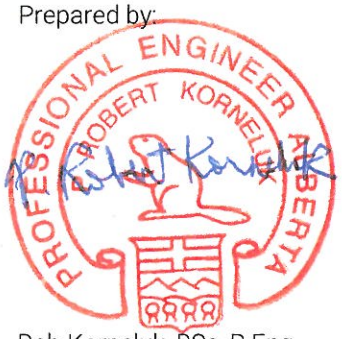
This report was prepared for Stantec and the Regional Municipality of Wood Buffalo. It is not for the use or benefit of, nor may it be relied upon, by any other person or entity, without written permission of RJC.

We trust the information contained within this report satisfies your current requirements. Should you have any questions or comments or if we may be of further service, please contact the undersigned.

Yours truly,

READ JONES CHRISTOFFERSEN LTD.

Prepared by:



Bob Korneluk, BSc, P.Eng.
Associate

Reviewed by:

Nick Trovato, MEng, P.Eng., FEC, FGC(Hon)
Managing Principal

APEGA PERMIT NUMBER: P152

APPENDIX E

Alberta Safety & Environmental Services

Air Quality & Testing Report

ASE | SERVICES
ALBERTA SAFETY & ENVIRONMENTAL SERVICES

March 7, 2018

Dave Piercey
Corgan Industrial Ltd.
Bay 7, 266 MacKay Crescent
Fort McMurray, Alberta T9H 5C6

Dear Mr. Piercey,

Re: Mould Spore Trap Air Sampling
Anzac Community Centre - 105B-4 Christina Drive, Anzac, Alberta
Project #: AS 9661

INTRODUCTION

As per your request, Jesse Macri with Alberta Safety & Environmental Services Ltd. (ASE Services) conducted mould spore trap sampling in various locations in the Anzac Community Centre building located at 105B-4 Christina Drive, Anzac Alberta on February 22, 2018. During the time of sampling 10:20 the outdoor temperature was approximately -5^{0}C with a mix of sun and cloud, with a slight wind. Control samples are generally taken in locations that will provide a baseline of mould concentrations and types that exist naturally within the building environment. Ideally outdoor control samples provide the best baseline, but if weather conditions do not allow for proper sampling, indoor samples are taken inside the building. As temperatures were below freezing, an indoor control sample was taken for comparison.

METHODOLOGY

Under the direction from the client, the assessment included a visual inspection and walk-through of all accessible areas of the building. Observations were made for visible mould and water damage. The methodology used for each parameter of the assessment is outlined below.

Samples for fungal spores were collected by drawing 75 litres of air through an Allergenco-D Disposable Indoor Air Quality Air Monitoring Cassettes using a Buck BioAire sampling pump. All samples were analyzed by certified ASE Services analysts using ASTM D7391 - 09 Standard Test Method for Categorization and Quantification of Airborne Fungal Structures in an Inertial Impaction Sample by Optical Microscopy.

RESULTS

Results of the air samples indicate that there **are** significant levels of mould spores, including *Aspergillus/Penicillium*-like, and *Stachybotrys*, detected in the Theatre Storage Room (Sample #2), NW Corner Office (Sample #9), Nurses Office (Sample #10) and SW Furnace Room (Sample #12) and that all other spores detected were comparable to expected ambient indoor conditions. Please see Table 1, ***Appendix I***: Laboratory Report and ***Appendix II***: Floor Plan for further details.

Table 1: Mould Spore Trap Sampling Results dated February 28, 2018

Sample #:	1	**2**	3	4	5	6	7	8	9	10
Location:	Theatre Room - Middle of Room	**Theatre Room Stage**	Main Entrance Lobby	Kitchen	Storage Area	Room West of Front Entrance	Room East of Front Entrance	Office West of Front Entrance	**NW Corner Office**	**Nurses Office**
Unit:	counts/m³	**counts/m³**	counts/m³	counts/m³	counts/m³	counts/m³	counts/m³	counts/m³	**counts/m³**	**counts/m³**
Ascospores	28	**28**	-	56	56	28	56	56	**-**	**28**
Aspergillus/Penicillium sp.-like	-	**-**	56	-	28	-	28	56	**28**	**362**
Cladosporium sp.	-	**-**	-	-	28	28	-	-	**-**	**56**
Smuts/Periconia/Myxomycetes	-	**-**	-	28	56	-	-	-	**-**	**-**
Stachybotrys sp.	-	**56**	-	-	-	-	-	-	**56**	**-**
Total spores/m³	28	**83**	56	83	167	56	83	111	**83**	**445**

Sample #:	11	**12**	13	14	15	16	17
Location:	Shower/ Change Rooms	**SW Furnace Room**	Laundry Room	Zone 1 Furnace Ducting	Zone 2 Furnace Ducting	Zone 3 Furnace Ducting	Zone 4 Furnace Ducting
Unit:	counts/m³	**counts/m³**	counts/m³	counts/m³	counts/m³	counts/m³	counts/m³
Ascospores	56	**56**	83	83	111	83	56
Aspergillus/Penicillium sp.-like	-	**28**	-	-	28	28	111
Chaetomium sp.	-	**-**	-	-	-	111	-
Cladosporium sp.	-	**56**	-	-	-	-	-
Smuts/Periconia/Myxomycetes	-	**83**	56	-	-	83	56
Stachybotrys sp.	-	**362**	-	-	-	-	-
Total spores/m³	56	**584**	139	83	139	306	223

Note: **Bold text** indicated an elevation of mould spores in the area sampled.

DISCUSSION / CONCLUSIONS

Mould spore trap samples collected from the Theatre Storage Room, NW Corner Office, Nurses Office and SW Furnace Room indicate that there are elevated concentrations of mould spores present in the areas sampled. All other spores detected were comparable to expected ambient indoor conditions. Visual discoloration and/or water damage was observed in the storage room to the south of the stage.

Mould sources can potentially cause problems or adverse health symptoms to building occupants during its reproductive stage (active spore germination) or when mouldy materials are being disturbed during repairs/renovation. This is because mould spores and hyphal fragments are very small (generally 3-10 microns) and easily become airborne causing respiratory issues to susceptible individuals. Due to individual subjectivity of humans to mould, it is difficult to legislate defined limits for spore concentrations. It is important to always keep in mind the main objective when dealing with mould, which is to ensure that at least one of the basic needs of growth is controlled in any environment, to ensure mould is not able to reproduce.

Indoor mould genus/species that are commonly found in Alberta include the following: *Aspergillus, Penicillium, Chaetomium, Cladosporium, and Stachybotrys*. Depending on certain variables on the day of the sampling (visual observations, weather, etc), spore levels are used as an indication of mould issues that may exist in the areas of concern. Generally speaking, between 200 to 500 counts per cubic metre above baseline counts (for indicator mould species) indicate that there may be a mould source in the area sampled. Final recommendations are based on the building, ventilation, its occupants and/or other variables that are applicable to the project.

Drywall board gypsum is a relatively porous building product that will absorb moisture. The drywall paper is an organic food source for mould, allowing for ideal growth conditions if adequate temperature and moisture are present. Drywall may be saturated for a relatively short period of time (48 hours) before mould growth can occur, this is why it is key to ensure that building products such as drywall board be protected from moisture at all times. Wood is a food source for mould, but is a relatively dense and porous organic building product which requires longer periods of time to become saturated with water (as opposed to drywall gypsum boards). Visible water discolouration or mould on the surface on wood does not usually indicate that the material requires removal, unless it has caused damage that has compromised the integrity of the product.

Occupants experiencing adverse symptoms related to high airborne particulate exposure (headaches, stuffy nose, sinus issues, itchy/watery eyes, etc.) should be documented and reviewed if they are consistent amongst the entire staff. It is also important to note that individuals will react differently to the same environment, and symptoms may not necessarily be related to poor air quality. Concerned occupants should always consult their health practitioner when experiencing adverse symptoms.

RECOMMENDATIONS

Based on the results and observations on site, ASE Services recommends the following:

1. The areas noted above should be isolated and any Individuals entering the areas noted above should be wearing at minimum a silicone half mask with NIOSH-approved P100 filter cartridges until remediation efforts have been completed.

2. All water damaged and visual discovered areas including the areas of the storage room to the south of the stage, as well as areas in the SW Furnace Room, NW Corner Office and Nurses Office will need to be inspected and properly remediated.
3. ASE Services recommends that all potential and confirmed mould and water damaged materials, be properly remediated. The affected building materials in this area should be remediated following the appropriate high, moderate or low risk procedures as outlined in Government of Alberta – Best Practices Mould at the Work Site.
4. Once all materials have been properly remediated, final mould air sampling should be conducted in these areas to ensure remediation is complete and that the areas are safe for re-occupancy by unprotected occupants.

In all occurrences, the underlying cause of water accumulation must be rectified or fungal growth will likely reoccur. Emphasis should be placed on ensuring proper repairs of the appropriate portions of the building infrastructure, so that water damage and moisture buildup do not persist.

CLOSURE

This report was prepared exclusively for the client. This report cannot be utilized by any other person or entity without consent of Alberta Safety & Environmental Services Ltd. This report reflects the findings at the time of the sample collection.

If you have any questions or require any additional information please feel free to contact our project management team at (780) 760-6917.

Sincerely,

Alberta Safety & Environmental Services Ltd.

Reviewed By:

Kalie Couture, B. Sc.
Project Manager

Drafted by: Robbie Carrozza, B.Sc., Project Manager

ATTACHMENTS

- *Appendix* I: ASE Services Laboratory Mould Spore Trap Air Sample Results dated February 28, 2018
- *Appendix II:* Floor Plan

APPENDIX IV

LABORATORY REPORTS

ASE | SERVICES
ALBERTA SAFETY & ENVIRONMENTAL SERVICES

SPORE TRAP ANALYSIS REPORT

Client: Corgan Industrial Ltd.
Project #: AS 9661
Description: Anzac Community Centre - 105B-4 Christina Drive, Anzac, Alberta

Sample Date: February 22, 2018
Analysis Date: February 28, 2018
% Trace Analyzed: 47.92

Sample #	Lab #	Sample Description	Mould Type	Raw Count	Counts/ m^3	Total Counts/ m^3	Sample Volume (m^3)	LOD (counts/m^3)
1	B18-1096	Theatre Room - Middle of Room	Ascospores	1	28	28	0.075	28
					Background debris: Low			
2	B18-1097	Theatre Room Stage	Ascospores	1	28	83	0.075	28
			Stachybotrys	2	56			
					Background debris: Low			
3	B18-1098	Main Entrance Lobby	Aspergillus/Penicillium-like	2	56	56	0.075	28
					Background debris: Moderate			
4	B18-1099	Kitchen	Ascospores	2	56	83	0.075	28
			Smuts/Periconia/Myxomycetes	1	28			
					Background debris: High			
5	B18-1100	Storage Area	Ascospores	2	56	167	0.075	28
			Aspergillus/Penicillium-like	1	28			
			Cladosporium	1	28			
			Smuts/Periconia/Myxomycetes	2	56			
					Background debris: Moderate			
6	B18-1101	Room West of Front Entrance	Ascospores	1	28	56	0.075	28
			Cladosporium	1	28			
					Background debris: Moderate			

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Sample #	Lab #	Sample Description	Mould Type	Raw Count	Counts/ m^3	Total Counts/ m^3	Sample Volume (m^3)	LOD (counts/m^3)
7	B18-1102	Room East of Front Entrance	Ascospores	2	56	83	0.075	28
			Aspergillus/Penicillium-like	1	28			
					Background debris:	*High*		
8	B18-1103	Office West of Front Entrance	Ascospores	2	56	111	0.075	28
			Aspergillus/Penicillium-like	2	56			
					Background debris:	*High*		
9	B18-1104	NW Corner Office	Aspergillus/Penicillium-like	1	28	83	0.075	28
			Stachybotrys	2	56			
					Background debris:	*High*		
10	B18-1105	Nurses Office	Ascospores	1	28	445	0.075	28
			Aspergillus/Penicillium-like	13	362			
			Cladosporium	2	56			
					Background debris:	*Moderate*		

Note: Limit of Detection (LOD) is based on single spore detection within the quantified area (% Trace).

Results Reviewed by: Robbie Carrozza Date: February 28, 2018

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SPORE TRAP ANALYSIS REPORT

Client: Corgan Industrial Ltd.
Project #: AS 9661
Description: Anzac Community Centre - 105B-4 Christina Drive, Anzac, Alberta

Sample Date: February 22, 2018
Analysis Date: February 28, 2018
% Trace Analyzed: 47.92

Sample #	Lab #	Sample Description	Mould Type	Raw Count	Counts/ m^3	Total Counts/ m^3	Sample Volume (m^3)	LOD (counts/m^3)
11	B18-1106	Shower/Change Rooms	Ascospores	2	56	56	0.075	28
					Background debris:	*High*		
12	B18-1107	SW Furnace Room	Ascospores	2	56	584	0.075	28
			Aspergillus/Penicillium-like	1	28			
			Cladosporium	2	56			
			Smuts/Periconia/Myxomycetes	3	83			
			Stachybotrys	13	362			
					Background debris:	*High*		
13	B18-1108	Laundry Room	Ascospores	3	83	139	0.075	28
			Smuts/Periconia/Myxomycetes	2	56			
					Background debris:	*High*		
14	B18-1109	Zone 1 Furnace Ducting	Ascospores	3	83	83	0.075	28
					Background debris:	*High*		
15	B18-1110	Zone 2 Furnace Ducting	Ascospores	4	111	139	0.075	28
			Aspergillus/Penicillium-like	1	28			
					Background debris:	*High*		
16	B18-1111	Zone 3 Furnace Ducting	Ascospores	3	83	306	0.075	28
			Aspergillus/Penicillium-like	1	28			
			Chaetomium	4	111			
			Smuts/Periconia/Myxomycetes	3	83			
					Background debris:	*High*		
17	B18-1112	Zone 4 Furnace Ducting	Ascospores	2	56	223	0.075	28
			Aspergillus/Penicillium-like	4	111			
			Smuts/Periconia/Myxomycetes	2	56			
					Background debris:	*High*		

Note: Limit of Detection (LOD) is based on single spore detection within the quantified area (% Trace).

Results Reviewed by: Robbie Carrozza Date: February 28, 2018

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APPENDIX III

FLOOR PLANS

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Mould Air Sampling - Results

Project #: AS 9661

Client:
Corgan Industrial Ltd.

Project Location:

Anzac Community Centre – 105B-4 Christina Drive, Anzac, Alberta

Legend:

N

- Mould Air Sampling Location
- Elevated/ Significant Mould Species
- Mould Visually Detected

Notes:

- Not to Scale