MCMURCHY RECREATION CENTRE
CLINIC CHANGEROOM RENOVATION

247 McMurchy Avenue South
Brampton, ON

Architectural | Mechanical | Electrical
Specifications

Issued for Permit and Tender
September 2024

Project No. 2412

CHERIE NG ARCHITECT INC.
Tel: 416-898-1979
cng@cherieng.com

Consulting Engineers

Mechanical and Electrical Consultant
JDX Advance Engineering Services Inc.

.1 Refer to Project Manual, Section 00 01 10 - Table of Contents, for indication of document responsibility (DR). Abbreviations for entity responsible for document preparation are as follows:

.1 A - Denotes documents prepared by Architect.
.2 S - Denotes documents prepared by Structural Engineer (on drawings).
.3 HC – Denotes documents prepare by Hardware Consultant.
.4 M - Denotes documents prepared by Mechanical Engineer.
.5 E - Denotes documents prepared by Electrical Engineer.
.6 R – Denotes documents prepared by Refrigeration Engineer.
.7 O - Denotes documents prepared by Owner.

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

Document	Title	Discipline	Pages
00 01 10	Table of Contents	A	2
00 31 00	Information Available to Bidders	A	1
	- Hazardous Building Materials Survey	O	85
	- Reassessment of Designated Substances and Hazardous Materials	O	27
	- Abatement Inspection Report	O	5

DIVISION 01 - GENERAL REQUIREMENT

Document	Title	Discipline	Pages
01 10 10	General Requirements	A	53

DIVISION 02 - EXISTING CONDITIONS

Document	Title	Discipline	Pages
02 40 00	Demolition and Removals	A	8
02 80 00	Management of Designated Substances	A	3

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

Document	Title	Discipline	Pages
07 91 00	Sealants	A	7

DIVISION 08 - OPENINGS

Document	Title	Discipline	Pages
08 11 13	Metal Doors and Frames	A	8

DIVISION 09 - FINISHES

Document	Title	Discipline	Pages
09 21 16	Gypsum Board	A	10
09 30 00	Tile	A	7
09 65 16	Resilient Sheet Flooring	A	6
09 65 19	Resilient Sheet Flooring Overlay on Existing Porcelain Tile	A	5
09 65 66	Resilient Athletic Flooring	A	9
09 91 00	Painting	A	13

DIVISION 22 – PLUMBING

Document	Title	Discipline	Pages
See attached Mechanical & Electrical Table of Contents.		M	11

DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

Document	Title	Discipline	Pages
See attached Mechanical & Electrical Table of Contents.		M	4

DIVISION 26 – ELECTRICAL

Document	Title	Discipline	Pages
See attached Mechanical & Electrical Table of Contents		E	16

END OF DOCUMENT

REPORT(S)

1.1 A copy of the following report(s) are appended under separate cover:

Hazardous Building Materials Survey
Prepared by OHE Consultants Occupational Hygiene & Environment
Kiwanis Youth Centre for Sports Excellence – 247 McMurchy Avenue South
April, 2021

Reassessment of Designated Substances and Hazardous Materials
Prepared by ECOH Management Inc.
Kiwanis Youth Centre for Sports Excellence – 247 McMurchy Avenue South
Sept 29, 2023

Abatement Inspection Report
Prepared by ECOH Management Inc.
Kiwanis Youth Centre – 247 McMurchy Avenue South
June, 2022

1.2 The report(s), by their nature, cannot reveal all conditions that exist or can occur on the site. Should conditions be found to vary substantially from the report, immediately notify Consultant in writing and await instructions.

1.3 Contractor shall not be entitled to extra payment or extension of Contract Time for work which is required and which is reasonably inferable in the report(s) as being necessary.

END OF SECTION

REPORT(S)

1.1 A copy of the following report(s) are appended under separate cover:

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June, 2022

1.2 The report(s), by their nature, cannot reveal all conditions that exist or can occur on the site. Should conditions be found to vary substantially from the report, immediately notify Consultant in writing and await instructions.

1.3 Contractor shall not be entitled to extra payment or extension of Contract Time for work which is required and which is reasonably inferable in the report(s) as being necessary.

END OF SECTION

OHE CONSULTANTS
Occupational Hygiene & Environment

HAZARDOUS BUILDING MATERIALS SURVEY

Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario
L6T 2W8

Presented to:

City of Brampton
2 Wellington Street West
Brampton, Ontario
L6Y 4R2

April 2021

OHE Project No: 24918-046

Submitted by:

OHE Consultants
Occupational Hygiene & Environment
311 Matheson Blvd. East
Mississauga, Ontario
L4Z 1X8

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APPENDIX B: Site Photographs
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APPENDIX D: Background Information on Hazardous Materials
APPENDIX E: Laboratory Analysis Reports
APPENDIX F: Applicable Regulations and/or Guidelines
APPENDIX G: Survey Methodology
APPENDIX H: Project Limitations
APPENDIX I: Results of Sampling and Testing

OHE Consultants (OHE) was retained by City of Brampton to perform a Hazardous Building Materials Survey in the Kiwanis Youth Centre for Sports Excellence located at 247 McMurphy Avenue South, Brampton, Ontario (herein referred to as the "Subject Location").

The site survey was conducted by Katrina Kuzniar, Senior Project Specialist of OHE on January 28, 2021. The survey consisted of a review of existing environmental reports (where available), visual inspection for the presence of designated substances, and sampling of materials suspected to contain hazardous building materials, particularly asbestos and lead.

It should be noted that the Physio Therapy Clinic located at the Subject Location was not accessible at the time of the survey.

A summary of the hazardous building materials survey findings is as follows:

Asbestos

The following Asbestos-Containing Materials (ACMs) were identified at the Subject Location:

- Black tar around the roof penetrations;
- Vinyl Floor Tiles (VFTs) in Room 2002;
- Grey caulking around the window glazing in Room 2001; and
- Sealant on block walls.

The ACMs identified at the Subject Location were noted to be in good condition. Refer to Appendix C for quantity and location details.

Lead

Lead-containing paint was identified at the Subject Location. A detailed description of the colours and locations is presented in Table I.2 found in Appendix I. It is assumed that the results presented apply to all paint(s) of the same colour.

Lead may be present in wiring connectors and electric cable sheathing.

Lead may be present in solder joints on copper piping.

Lead is often present in ceramic building products such as floor or wall tiles. Workers performing demolition or alterations to these tiles should be informed of the potential for lead to be present.

Mercury

Mercury-containing thermostats were not observed at the Subject Location during the survey.

Mercury is present as a vapour in fluorescent light bulbs.

Mercury may be present as a component in electrical equipment, such as silent, position dependent switches.

Silica

Silica is presumed to be present in materials such as fillers for paints and mastic and in bricks, ceramics, masonry, concrete and mortar.

PCBs

Fluorescent light fixtures were observed throughout the Subject Location during the survey. Ballast associated with fluorescent light fixtures are suspect to contain PCB. One (1) representative ballast associated with fluorescent light fixtures was inspected and it was determined to be an electronic ballast and therefore not suspected to contain PCBs.

Ozone Depleting Substances

Roof-top air handling units suspected to contain ozone depleting substances were observed at the Subject Location during the survey.

Water Damaged and Mould Impacted Building Materials

Water damaged or mould impacted building materials were not observed at the Subject Location.

Man-Made Mineral Fibres

Man-made mineral fibres were observed in the form of thermal insulation at the Subject Location during the survey.

Aboveground/Underground Fuel Storage Tank

Aboveground / underground fuel storage tanks were not observed at the Subject Location during the survey.

Urea Formaldehyde Foam Insulation

Urea formaldehyde foam insulation was not observed at the Subject Location. It is possible that this material would be present in the wall cavities at the Subject Location.

Hazardous building materials may be present in concealed area such as behind solid block walls, drywall and concrete walls; above solid drywall ceilings; under ceramic tiles; under concrete floors; and inside pipe chases. In situations where hazardous building materials extend into a non-accessible

area, the materials were assumed to also be present in those areas and have been reported as such. Contractors and maintenance personnel should be warned of the possibility of undisclosed hazardous building materials in enclosed areas. All suspect building materials discovered in these areas should be treated as hazardous until proven otherwise as per applicable regulations and guidelines.

This executive summary provides a brief overview of the survey findings. It is not intended to substitute for the complete survey report, nor does it discuss specific issues documented in the report. The executive summary should not be used as a substitute to reading the complete report.

1 INTRODUCTION

OHE Consultants (OHE) was retained by City of Brampton to perform a Hazardous Building Materials Survey in the Kiwanis Youth Centre for Sports Excellence located at 247 McMurphy Avenue South, Brampton, Ontario (herein referred to as the "Subject Location").

The site survey was conducted by Katrina Kuzniar, Senior Project Specialist of OHE on January 28, 2021.

1.1 Building Description

Items	Details
Building Use	Recreation
Number of Floors	Three floors and a basement
Total area	38527 ft^2
Date in service	1971
Structure	Masonry
Exterior cladding	Masonry, brick
Flooring	Vinyl floor tiles, vinyl sheet flooring, carpet, concrete, ceramic tiles and wood
Wall	Drywall, masonry and brick
Ceiling	Suspended ceiling tiles, drywall and open deck

1.2 Scope of Work

The following details the scope of work:

- A visual inspection of accessible areas of the Subject Location to identify hazardous building materials;
- Bulk sampling and analysis of materials suspected to contain asbestos and testing for lead in paint;
- Recommendations for removal of hazardous building materials prior to renovation and/or demolition activities; and
- Preparation of a report summarizing the findings and results of the hazardous building materials reassessment survey.

1.3 Appendices Outline

The following is an outline and description of the attached appendices:

- Drawings showing the locations of bulk samples and the locations of ACMs are attached in Appendix A.
- Drawings showing the locations of bulk samples and the locations of ACMs are attached in Appendix A.
- Selected site photographs are attached in Appendix B.
- A summary of hazardous materials is attached in Appendix C.
- Background information on hazardous building materials, including a brief discussion of the properties, uses, and hazards associated with exposure, is attached in Appendix D.
- Laboratory analysis reports are attached in Appendix E.
- A summary of applicable provincial regulations and guidelines pertaining to hazardous building materials is attached in Appendix F.
- The survey methodology including bulk sample analysis methodology and assessment of hazardous building materials methodology is attached in Appendix G.
- Limitations of the project are attached in Appendix H.
- Results of sampling for asbestos and lead and visual assessment for PCBs are attached in Appendix I.

2 SURVEY FINDINGS AND DISCUSSION

The locations of non-friable asbestos-containing materials are shown on Drawings 1.1 to 1.5 presented in Appendix A.

The locations of bulk samples for asbestos are shown on Drawings 2.1 to 2.4 presented in Appendix A.

The locations of bulk samples for lead are shown on Drawings 3.1 to 3.3 presented in Appendix A.

2.1 ACMs

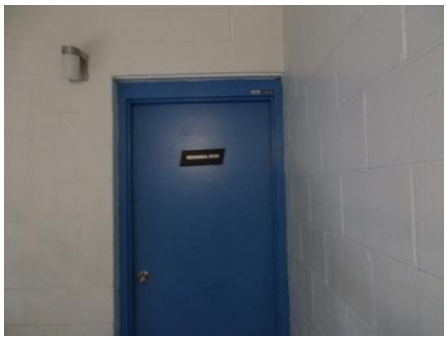
The following Asbestos-Containing Materials (ACMs) were identified at the Subject Location:

- Asbestos-containing black tar around the roof penetrations. The material was identified to be in good condition during the survey.

- Asbestos-containing Vinyl Floor Tiles (VFTs) in Room 2002. The material was identified to be in good condition during the survey.

- Asbestos-containing grey caulking around the window glazing in Room 2001. The material was identified to be in good condition during the survey.

- Asbestos-containing block wall sealant on the walls at the Subject Location. The material was identified to be in good condition during the survey.



Refer to Appendix C for quantity and location details.

Prior to the disturbance of ACMs, the materials should be removed using the appropriate type of asbestos removal operation as per applicable regulations and guidelines.

Where ACMs are in good condition and will remain in place, an Asbestos Management Program is required.

2.2 Lead

Lead-containing paint was identified at the Subject Location. A detailed description of the colours and locations is presented in Table I.2 found in Appendix I. It is assumed that the results presented apply to all paint(s) of the same colour.

Lead may be present in wiring connectors and electric cable sheathing.

Lead may be present in solder joints on copper piping.

Lead is often present in ceramic building products such as floor or wall tiles. Workers performing demolition or alterations to these tiles should be informed of the potential for lead to be present.

Prior to disturbance of lead-containing materials, the materials should be removed using the appropriate type of removal operation as specified in the applicable guidelines and regulations. Where lead has been identified to be in fair or poor condition, the materials should be removed by using the appropriate type of lead removal operation as per applicable regulations and guidelines.

2.3 Mercury

Mercury-containing thermostats were not observed within the Subject Location during the survey.

Mercury is present as a vapour in fluorescent light bulbs.

Mercury may be present as a component in electrical equipment, such as silent, position dependent switches.

Prior to disturbance of mercury-containing materials, the materials should be removed and disposed as specified in the applicable guidelines and regulations. Simple personal hygiene practices will be sufficient to protect workers from possible mercury exposure.

2.4 Silica

Silica is presumed to be present in materials such as fillers for paints and mastic and in brick, concrete and mortar.

Silica-containing materials should be handled using the appropriate type of operation as specified in the applicable guidelines and regulations. No adverse effects from exposure to silica are likely to occur unless silica in the material is reduced to a respirable size and the airborne concentrations exceed the 8-hour time-weighted average.

2.5 Isocyanates

Isocyanates were not identified within the Subject Location and are not expected to be found.

2.6 Vinyl Chloride

Vinyl chloride was not identified within the Subject Location and is not expected to be found.

2.7 Benzene

Benzene was not identified within the Subject Location and is not expected to be found.

2.8 Acrylonitrile

Acrylonitrile was not identified within the Subject Location and is not expected to be found.

2.9 Coke Oven Emissions

Coke oven emissions were not identified within the Subject Location and are not expected to be found.

2.10 Arsenic

Arsenic was not identified within the Subject Location and is not expected to be found.

2.11 Ethylene Oxide

Ethylene oxide was not identified within the Subject Location and is not expected to be found.

2.12 PCBs

Fluorescent light fixtures were observed throughout the Subject Location during the survey. Ballast associated with fluorescent light fixtures are suspect to contain PCB. One (1) representative ballast associated with fluorescent light fixtures was inspected and it was determined to be an electronic ballast and therefore not suspected to contain PCBs.

2.13 Ozone Depleting Substances

Roof-top air handling units suspect to contain ozone depleting substances were observed at the Subject Location during the survey.

2.14 Water and Mould Damaged Building Materials

Water damaged and mould impacted material were not observed at the Subject Location.

2.15 Man-Made Mineral Fibres

Man-made mineral fibres are present in the form of thermal insulation at the Subject Location.

2.16 Aboveground/Underground Fuel Storage Tanks

Aboveground/underground fuel storage tanks were not observed at the Subject Location during the survey.

2.17 Urea Formaldehyde Foam Insulation

Urea formaldehyde foam insulation was not observed at the Subject Location. This material may be present in the wall cavities.

Hazardous building materials may be present in concealed area such as behind solid block walls, drywall and concrete walls; above solid drywall ceilings; under ceramic tiles; under concrete floors; and inside pipe chases. In situations where hazardous building materials extend into a non-accessible area, the materials were assumed to also be present in those areas and have been reported as such. Contractors and maintenance personnel should be warned of the possibility of undisclosed hazardous building materials in enclosed areas. All suspect building materials discovered in these areas should be treated as hazardous until proven otherwise as per applicable regulations and guidelines.

3 RECOMMENDATIONS

OHE's recommendations, based on the findings of the survey, are as follows:

- Remove all ACMs that are likely to be disturbed during planned renovations or demolitions activities.

- Removal of asbestos-containing tar will require operation procedures as specified in O. Reg. 278/05 (Type 1 Operation).

- Removal of asbestos-containing caulking will require operation procedures as specified in O. Reg. 278/05 (Type 1 Operation).

- Removal of asbestos-containing block wall sealant will require operation procedures as specified in O. Reg. 278/05 (Type 1 Operation).

- Removal of asbestos-containing VFTs will require operation procedures as specified in O. Reg. 278/05 (Type 1 Operation).

- Renovations and/or demolition operations that are likely to generate lead-containing dust shall be carried out in accordance with the following requirements:
  - Guideline: Lead on Construction Projects, issued by Ontario Ministry of Labour (Lead Guideline);
  - Ontario Regulation 490/09 "Designated Substances" (O. Reg. 490/09); and
  - Ontario Regulation 213/91 "Construction Projects" (O. Reg. 213/91).

- Renovations and/or demolition operations that are likely to disturb mercury-containing equipment shall be carried out in a manner to minimize the potential for spills in accordance with the following regulations:
  - O. Reg. 490/09; and
  - O. Reg. 213/91.

- Renovations and/or demolition operations that are likely to generate silica-containing dust shall be carried out in accordance with the following requirements:
  - Guideline: Silica on Construction Projects, issued by Ontario Ministry of Labour (Silica Guideline);
  - O. Reg. 490/09; and
  - O. Reg. 213/91.

- Examine all light ballasts after dismantling and prior to disposal to determine their PCB content. PCB-containing light ballasts should be disposed of following procedures specified in applicable regulations.

- Renovations and/or demolition operations that are likely to disturb fibreglass insulation shall be carried out in a manner to minimize the creation and spread of dust and in accordance with the following regulation:
  - O. Reg. 213/91.

- Examine all equipment suspected to contain ozone depleting substances prior to disposal to determine their content. Equipment identified to contain ozone depleting substances should be transported and disposed of following procedures specified in applicable regulations.

- Disposal of hazardous building materials shall be completed as per all applicable regulations.

- Should suspect hazardous building materials be discovered during any demolition or renovation work in the Subject Location, the contractor shall stop all work and immediately notify personnel from both **City of Brampton** and OHE Consultants

4 GENERAL STATEMENT OF LIMITATIONS

The information and opinions rendered in this report are for use exclusively by **City of Brampton**. OHE reserves the right to review and comment on any interpretation of the data or conclusions derived by **City of Brampton.** No other representation, either expressed or implied, is included in this report.

The scope of this report is limited to possible hazardous building materials found within (or part of) the subject spaces included in the survey only. The survey only considered issues of the building structure, mechanical equipment, and their finishes. The survey did not consider current or past use of the property or occupant articles within the building (i.e. furniture, stock items, etc.), nor does it report on possible contaminants in the soil and groundwater of the site, vessels, drums, underground storage tanks, etc. The survey consisted of accessible areas only; samples were not collected if accessibility was restricted.

The field observations and analysis are considered sufficient in detail and scope to form a reasonable basis for the findings presented in this report. OHE warrants that the findings and conclusions contained herein have been made in accordance with generally accepted evaluation methods in the industry and applicable regulations at the time of the performance of the survey.

It is possible, due to the nature of building construction, that conditions may exist which could not be reasonably identified within the scope of the survey or which were not apparent during the site investigation. OHE believes that the information collected during the survey period concerning the property is reliable. No other warranties are implied or expressed.

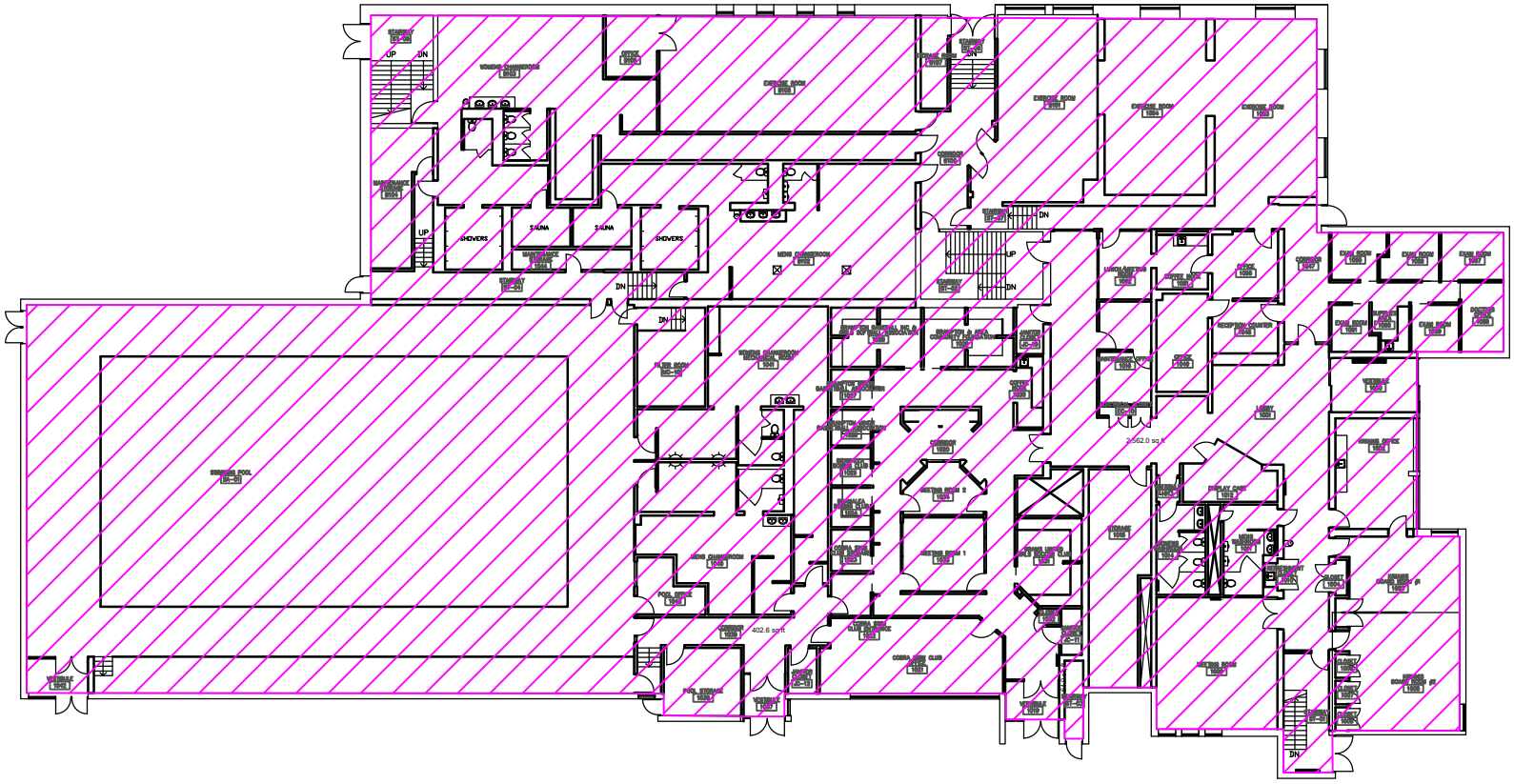
OHE Consultants
Occupational Hygiene & Environment

Prepared by:
Katrina Kuzniar, M.Sc.
Senior Project Specialist

Reviewed by:
Mahtab Ghadakpour, M.A.Sc.
Senior Project Manager

Reviewed by:
Michal Zitnik, M.H.Sc., CIH, ROH
Vice President

DRAWINGS



Legend:

Block Wall Sealant

Notes:
Locations of site features are approximate and may vary from that shown.

Drawing Title:

Non-Friable Asbestos-Containing Materials

Client Address:

City of Brampton
2 Wellington, Street
Brampton, Ontario

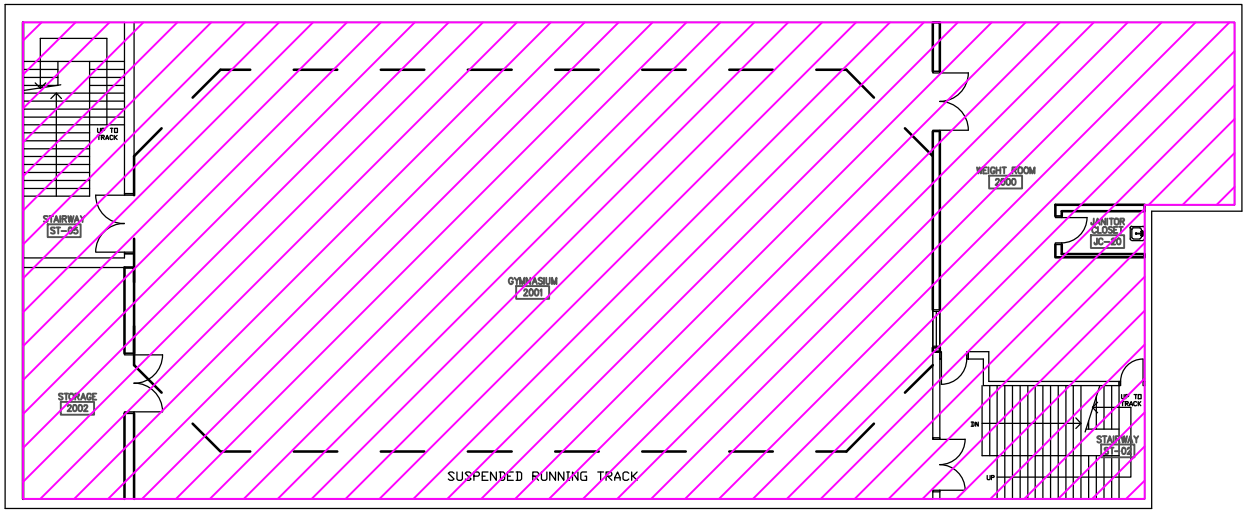
Project Location:
First Floor
Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario

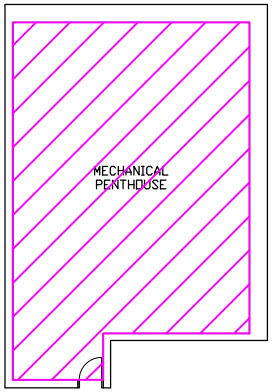
Project No: 24918-046

N

Date: Feb. 2021	Drawing No:
Scale: NTS	1.1
Drawn By: PN	
Approved By: MZ	

MB CONSULTANTS
Occupational Hygiene & Environment





Legend:

Block Wall Sealant

Notes:
Locations of site features are approximate and may vary from that shown.

Drawing Title:

Non-Friable Asbestos-Containing Materials

Client Address:

City of Brampton
2 Wellington, Street
Brampton, Ontario

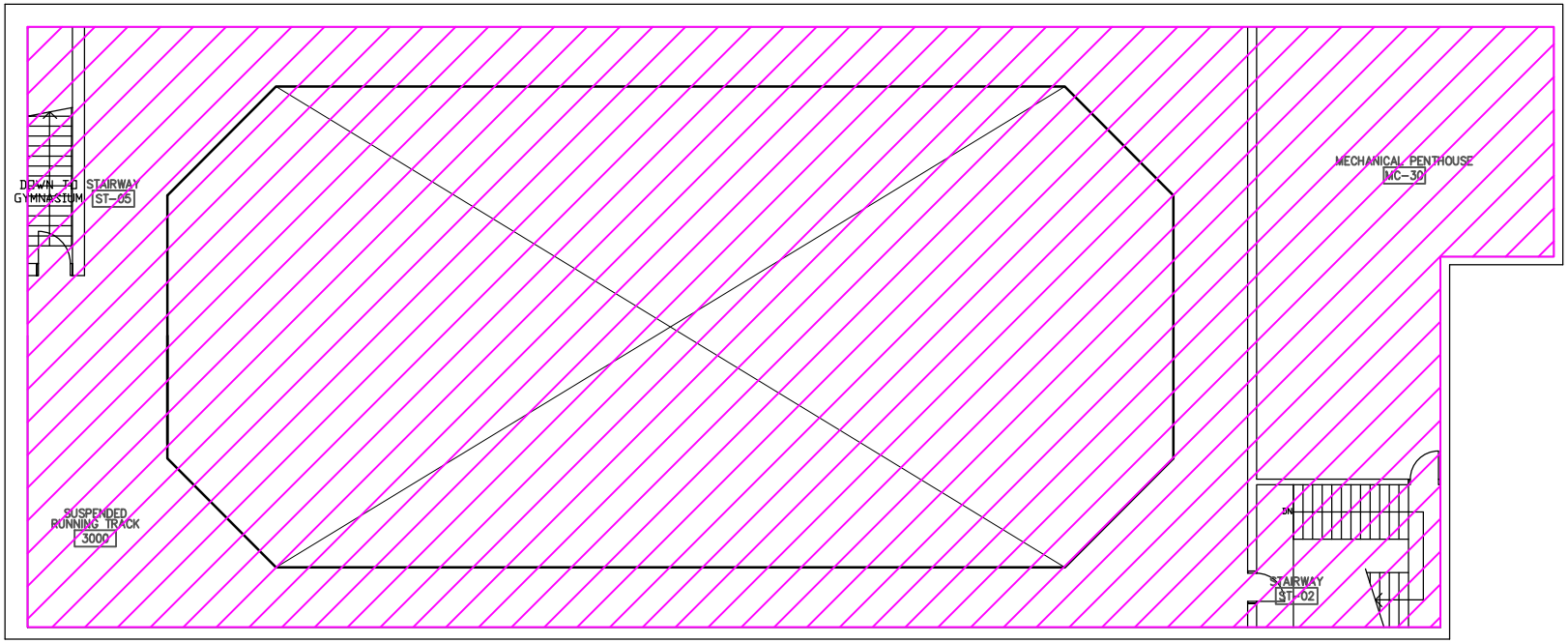
Project Location:
Second Floor & Mechanical Penthouse
Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario

Project No: 24918-046

N

Date: Feb. 2021	Drawing No:
Scale: NTS	1.2
Drawn By: PN	
Approved By: MZ	

MB CONSULTANTS
Occupational Hygiene & Environment



Legend:

Block Wall Sealant

Notes:
Locations of site features are approximate and may vary from that shown.

Drawing Title:

Asbestos Bulk Sample Locations

Client Address:

City of Brampton
2 Wellington, Street
Brampton, Ontario

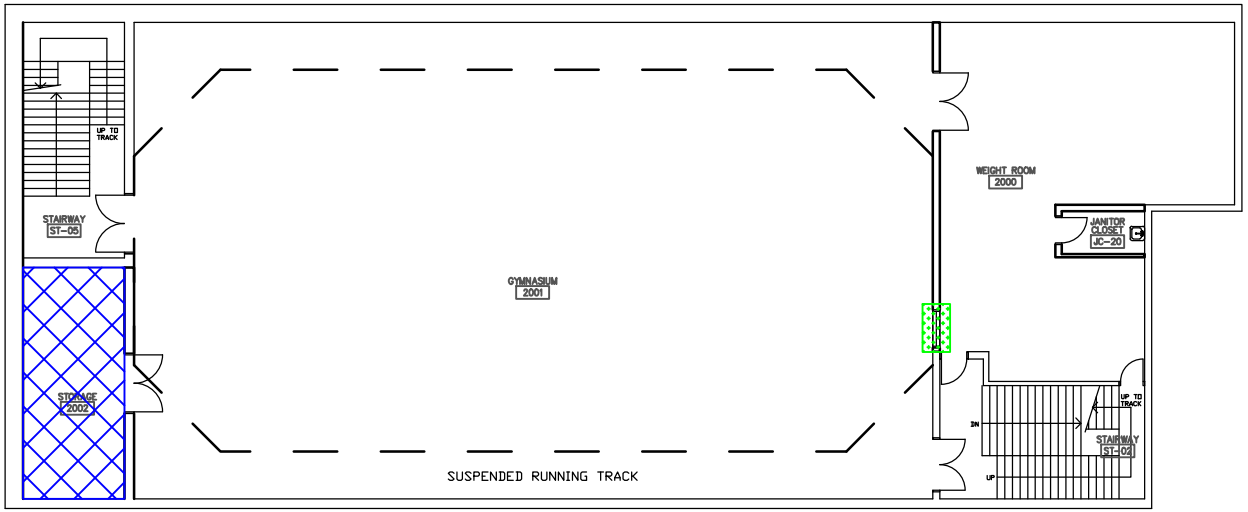
Project Location:
Third Floor
Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario

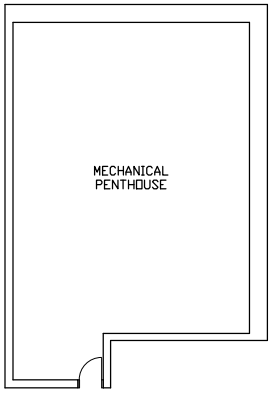
Project No: 24918-046

N

Date: Feb. 2021	Drawing No:
Scale: NTS	1.3
Drawn By: PN	
Approved By: MZ	

MB CONSULTANTS
Occupational Hygiene & Environment





Legend:

Block Wall Sealant

Block Wall Sealant

Notes:
Locations of site features are approximate and may vary from that shown.

Drawing Title:

Non-Friable Asbestos-Containing Materials

Client Address:

City of Brampton
2 Wellington, Street
Brampton, Ontario

Project Location:
Second Floor & Mechanical Penthouse
Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario

Project No: 24918-046

N

Date: Feb. 2021

Scale: NTS

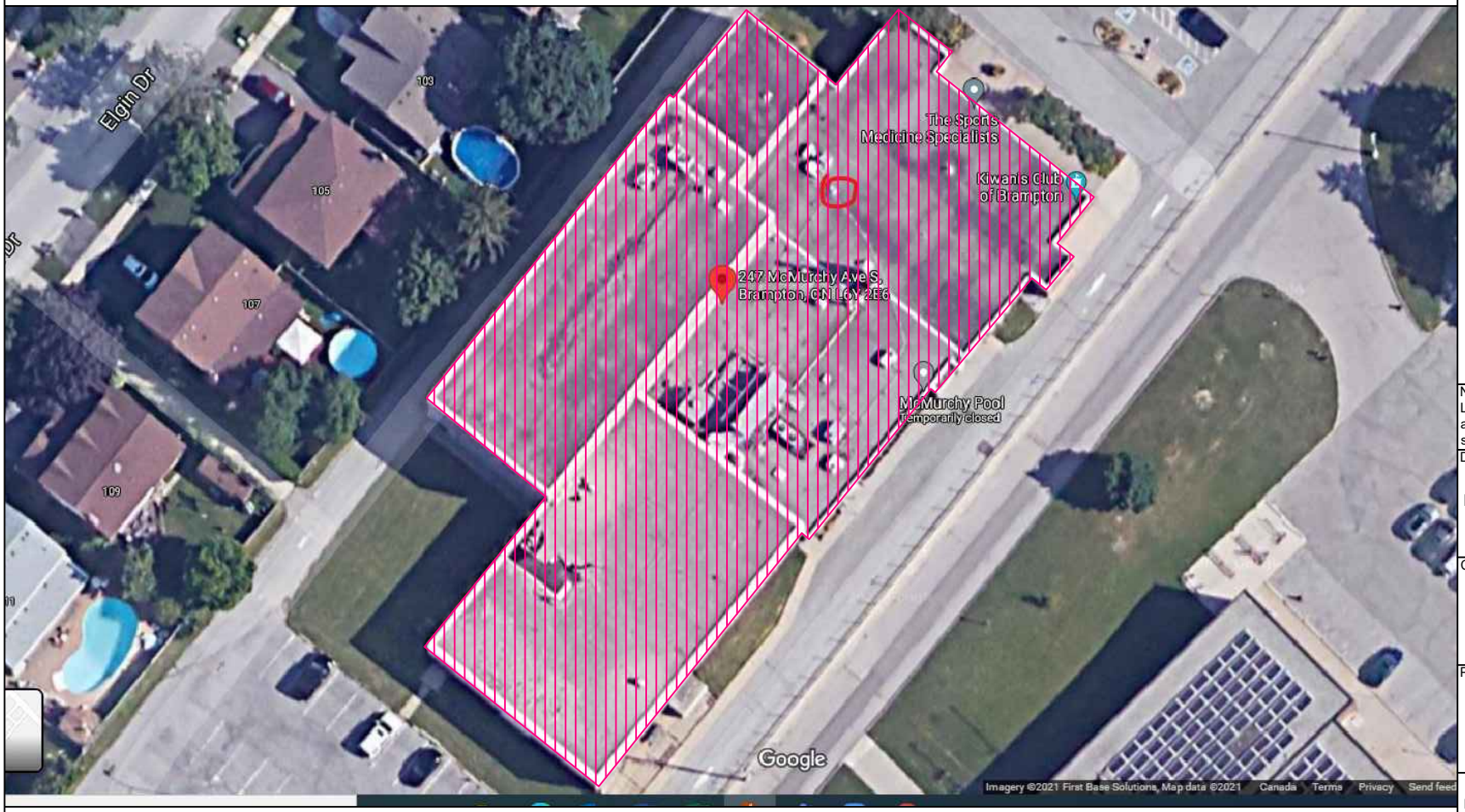
Drawn By: PN

Approved By: MZ

Drawing No:

1.4

MB CONSULTANTS
Occupational Hygiene & Environment



Legend:

Black Tar

Notes:
Locations of site features are approximate and may vary from that shown.

Drawing Title:

Non-Friable Asbestos-Containing Materials

Client Address:

City of Brampton
2 Wellington, Street
Brampton, Ontario

Project Location:
Roof top
Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario

Project No: 24918-046

N

Date: Feb. 2021	Drawing No:
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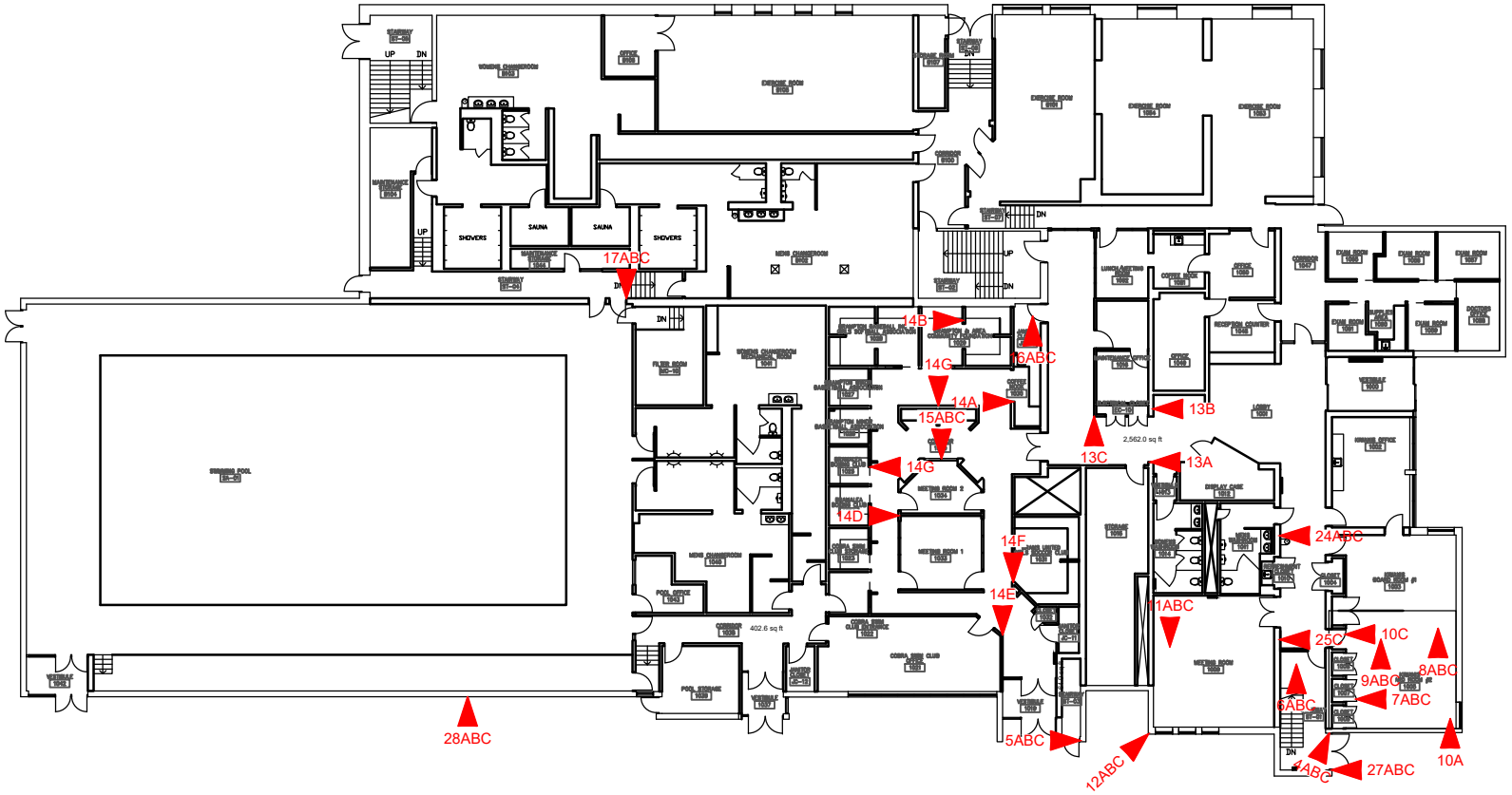
Drawn By: PN	
Approved By: MZ	

MB CONSULTANTS
Occupational Hygiene & Environment



Legend:

xx ► Asbestos Bulk Sample Location

Notes:
Locations of site features are approximate and may vary from that shown.

Drawing Title:

Asbestos Bulk Sample Locations

Client Address:

City of Brampton
2 Wellington, Street
Brampton, Ontario

Project Location:
First Floor
Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario

Project No: 24918-046

N

Date: Feb. 2021	Drawing No:
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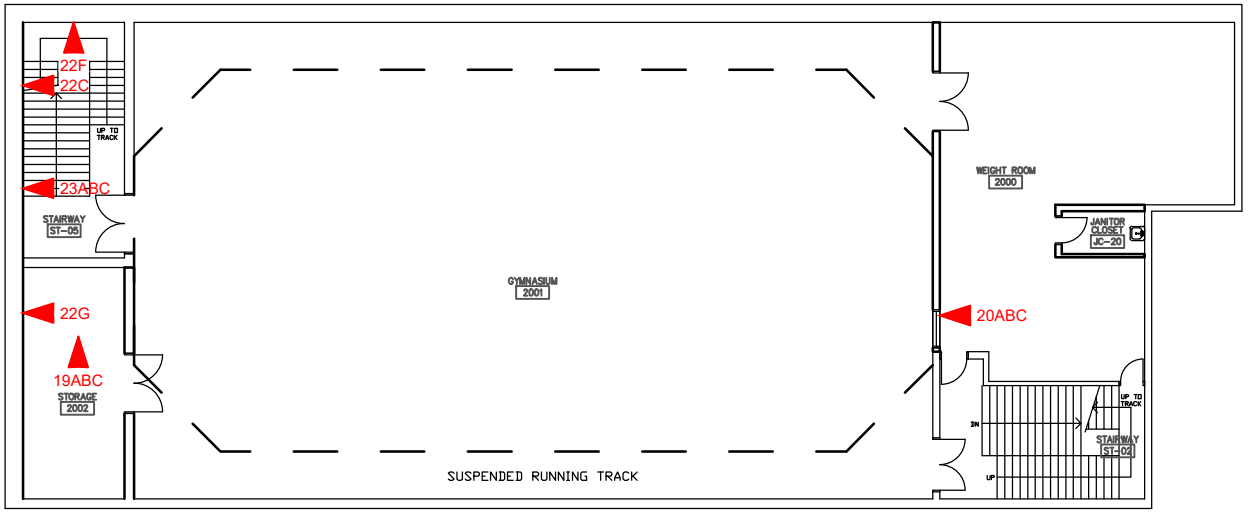
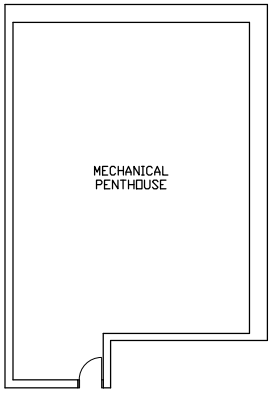
Drawn By: PN	
Approved By: MZ	

MB CONSULTANTS
Occupational Hygiene & Environment





Legend:

xx Asbestos Bulk Sample Location

Notes:
Locations of site features are approximate and may vary from that shown.

Drawing Title:

Asbestos Bulk Sample Locations

Client Address:

City of Brampton
2 Wellington, Street
Brampton, Ontario

Project Location:
Second Floor & Mechanical Penthouse
Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario

Project No: 24918-046

N

Date: Feb. 2021

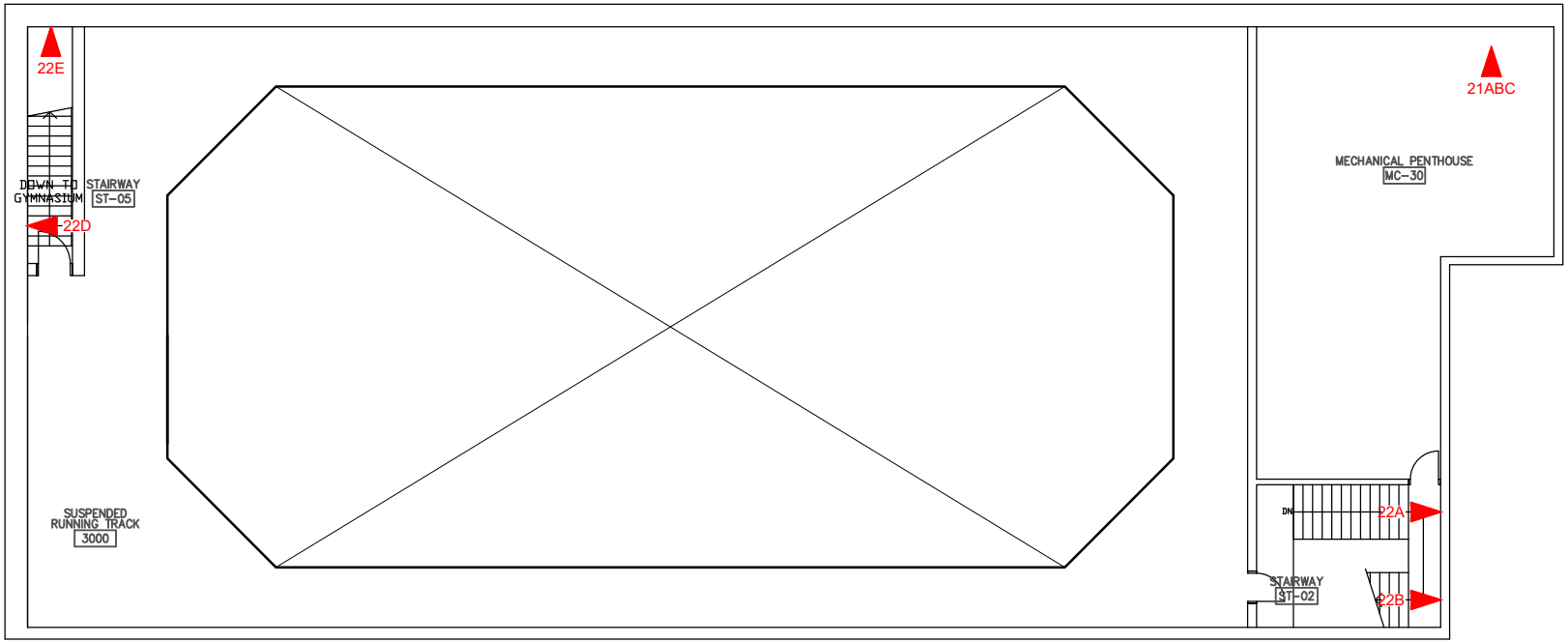
Drawing No: 2.2

Scale: NTS

Drawn By: PN

Approved By: MZ

MB CONSULTANTS
Occupational Hygiene & Environment



Legend:

xx Asbestos Bulk Sample Location

Notes:
Locations of site features are approximate and may vary from that shown.

Drawing Title:

Asbestos Bulk Sample Locations

Client Address:

City of Brampton
2 Wellington, Street
Brampton, Ontario

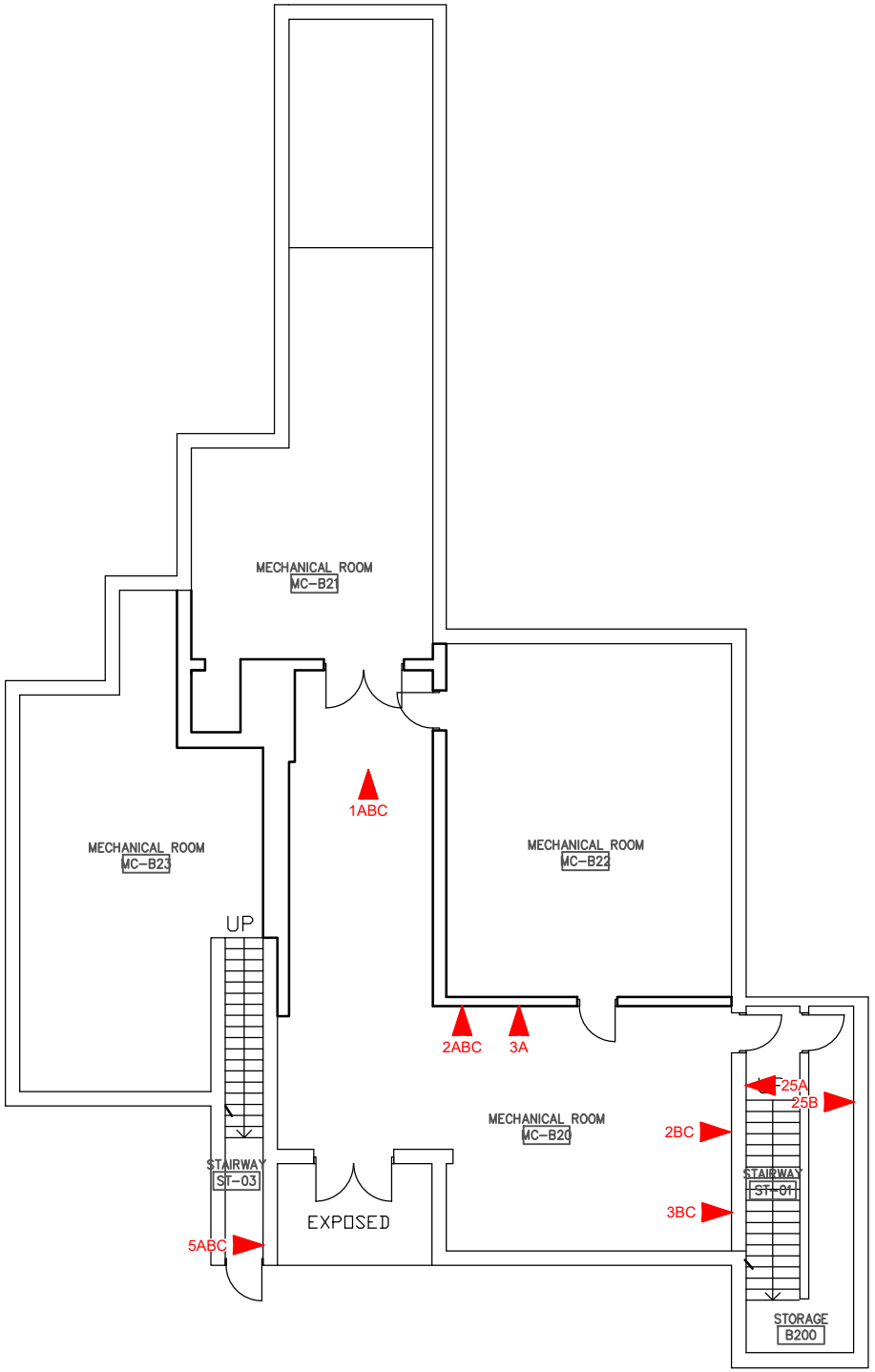
Project Location:
Third Floor
Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario

Project No: 24918-046

N

Date: Feb. 2021	Drawing No: 2.3
Scale: NTS	
Drawn By: PN	
Approved By: MZ	

CONSULTANTS
Occupational Hygiene & Environment



Legend:

xx ► Asbestos Bulk Sample Location

Notes:
Locations of site features are approximate and may vary from that shown.

Drawing Title:

Asbestos Bulk Sample Locations

Client Address:

City of Brampton
2 Wellington, Street
Brampton, Ontario

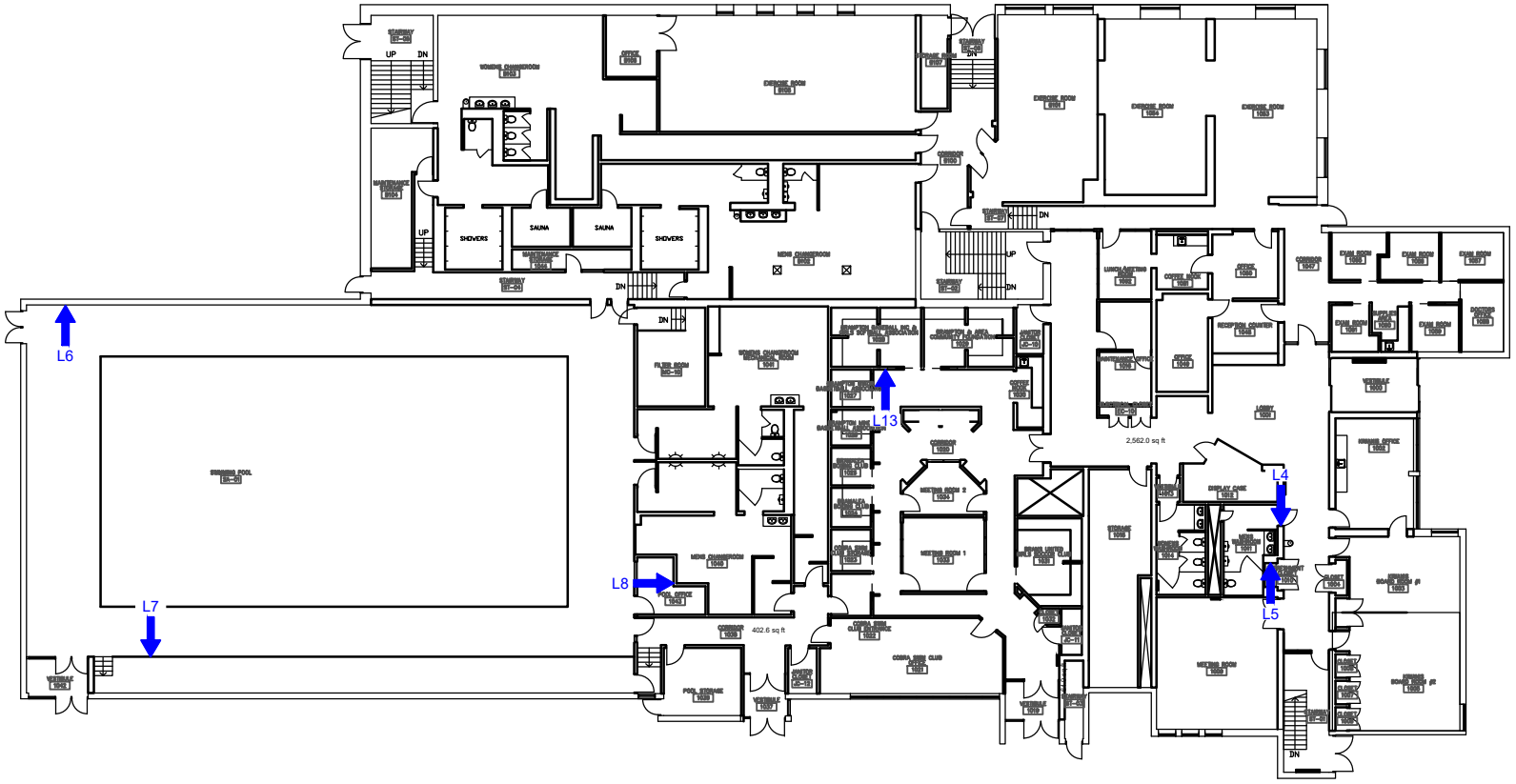
Project Location:
Basement
Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario

Project No: 24918-046

N

Date: Feb. 2021	Drawing No:
Scale: NTS	2.4
Drawn By: PN	
Approved By: MZ	

MB CONSULTANTS
Occupational Hygiene & Environment



Legend:

LX → Lead Bulk Sample Location

Notes:
Locations of site features are approximate and may vary from that shown.

Drawing Title:

Lead Bulk Sample Locations

Client Address:

City of Brampton
2 Wellington, Street
Brampton, Ontario

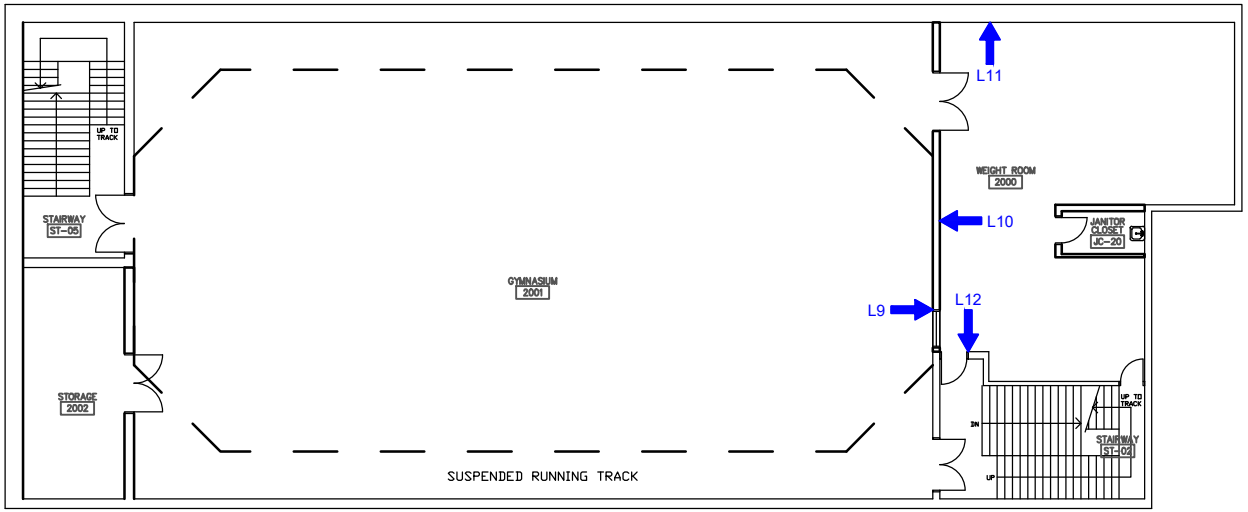
Project Location:
First Floor
Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario

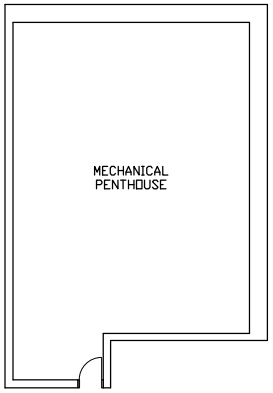
Project No: 24918-046

N

Date: Feb. 2021	Drawing No: 3.1
Scale: NTS	
Drawn By: PN	
Approved By: MZ	

MB CONSULTANTS
Occupational Hygiene & Environment





Legend:

LX → Lead Bulk Sample Location

Notes:
Locations of site features are approximate and may vary from that shown.

Drawing Title:

Lead Bulk Sample Locations

Client Address:

City of Brampton
2 Wellington, Street
Brampton, Ontario

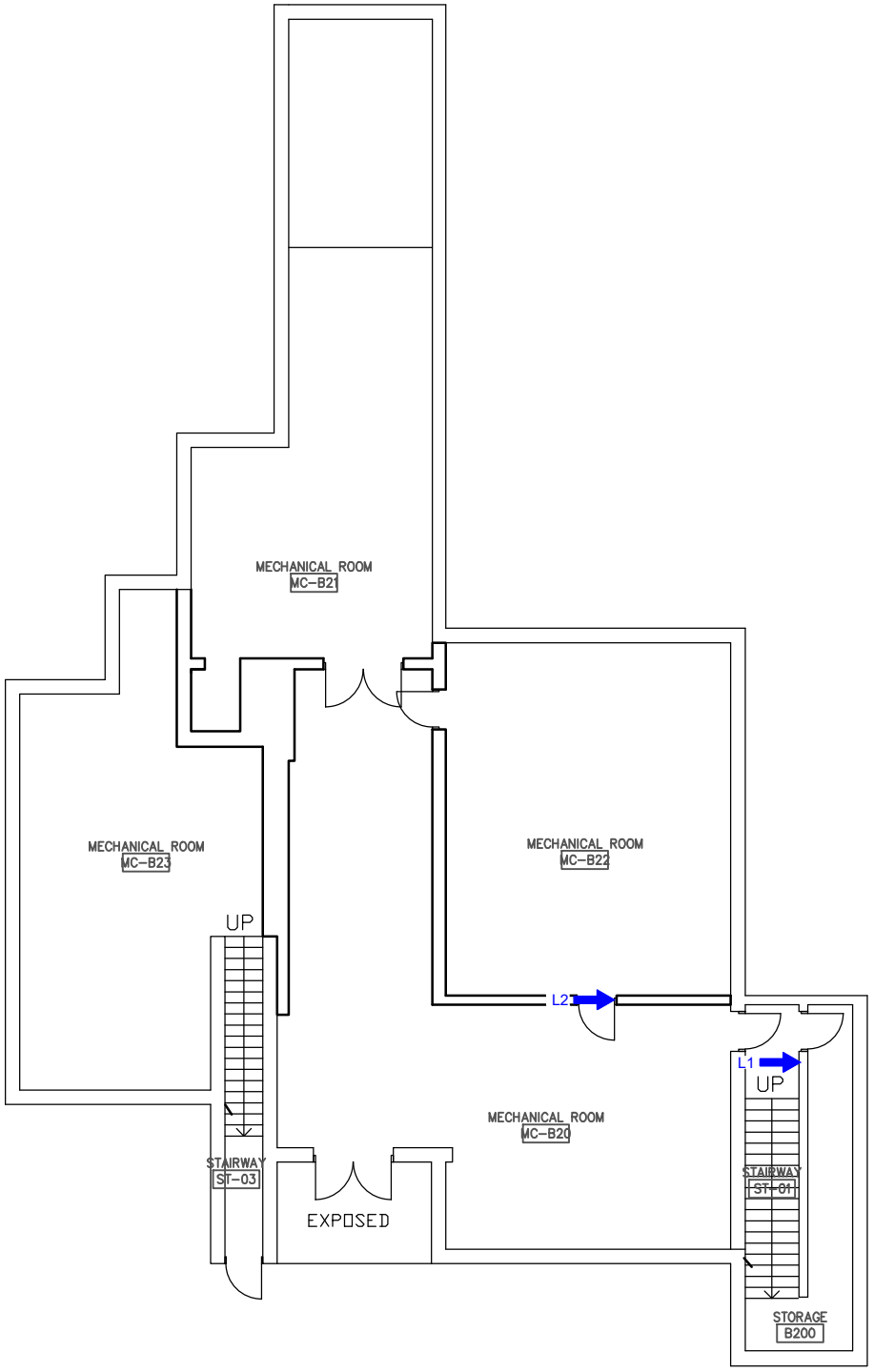
Project Location:
Second Floor & Mechanical Penthouse
Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario

Project No: 24918-046

N

Date: Feb. 2021	Drawing No:
Scale: NTS	3.2
Drawn By: PN	
Approved By: MZ	

MTE CONSULTANTS
Occupational Hygiene & Environment



Legend:

LX → Lead Bulk Sample Location

Notes:
Locations of site features are approximate and may vary from that shown.

Drawing Title:

Lead Bulk Sample Locations

Client Address:

City of Brampton
2 Wellington, Street
Brampton, Ontario

Project Location:
Basement
Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario

Project No: 24918-046

N

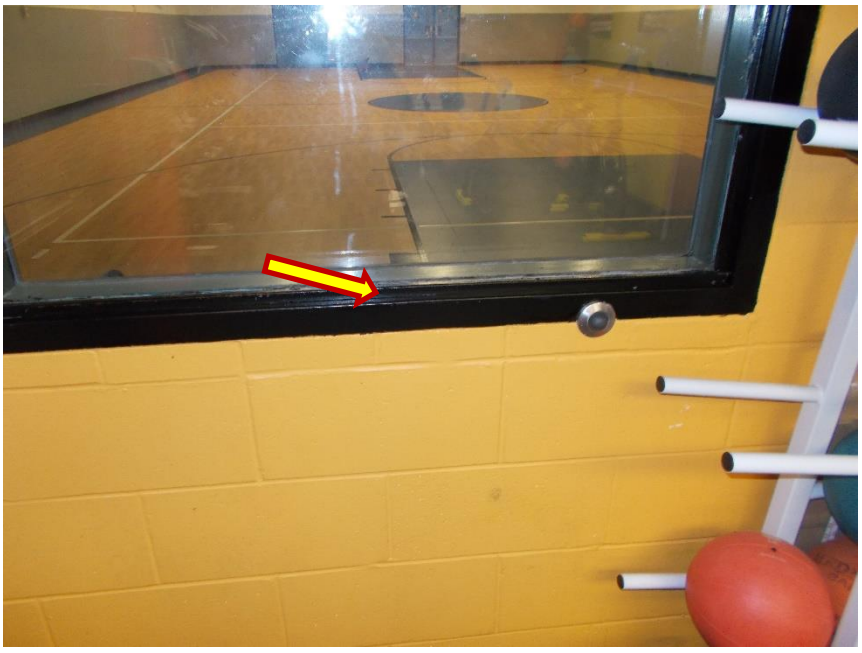
Date: Feb. 2021	Drawing No: 3.3
Scale: NTS	
Drawn By: PN	
Approved By: MZ	

CONSULTANTS
Occupational Hygiene & Environment

SITE PHOTOGRAPHS

Asbestos

Photograph 1: View of the asbestos-containing black tar observed on the roof at the Subject Location.

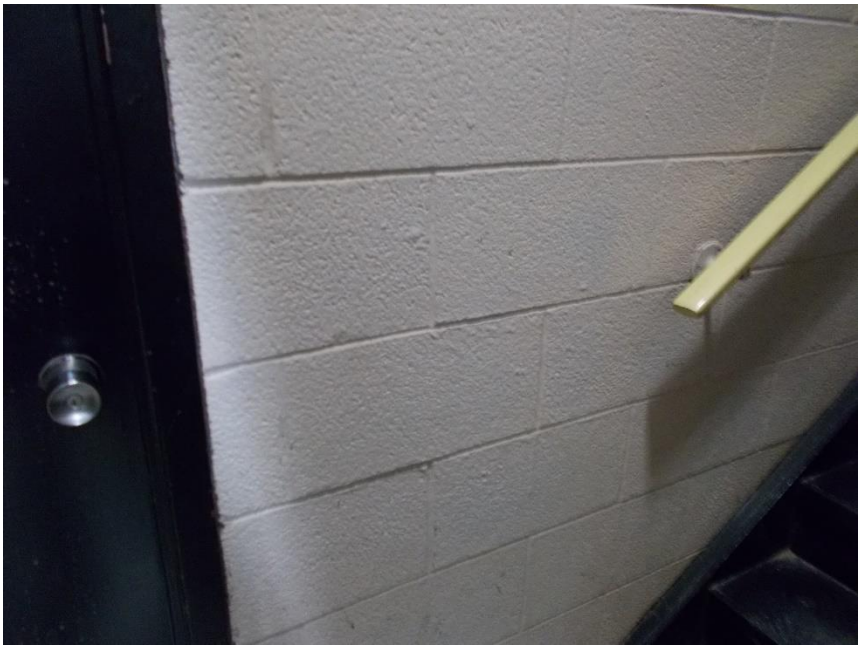


Photograph 2: View of the asbestos-containing caulking observed in Room 2002 at the Subject Location.

Photograph 3: View of the asbestos-containing sealant material observed on the block walls throughout the subject location.

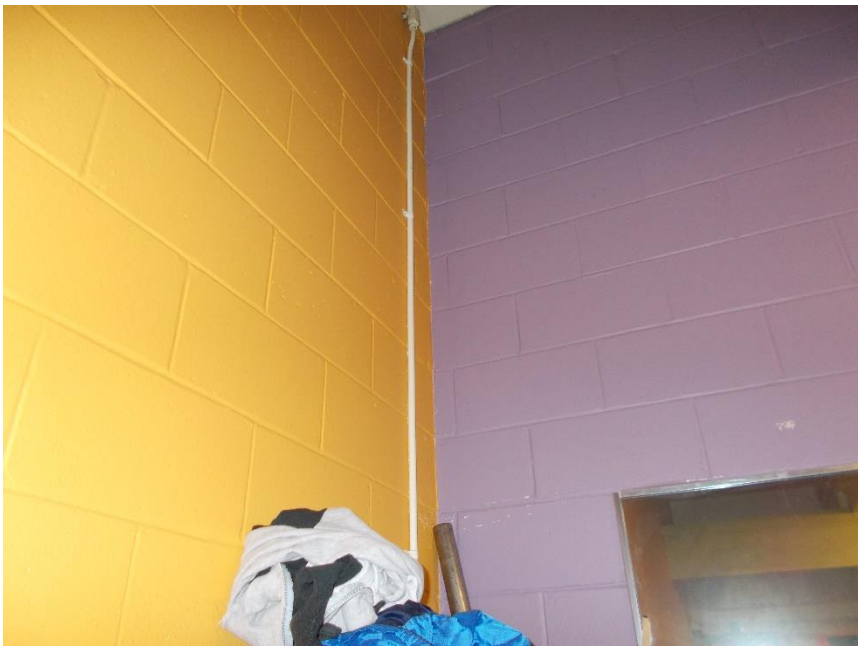
Photograph 4: View of the asbestos-containing VFTs observed in Room 2002 at the Subject Location

Lead



Photograph 5: View of the lead-containing yellow paint observed on the block wall in Stairwell ST-01 at the Subject Location.

Photograph 6: View of the lead-containing brown paint observed on the door in Room MC-B22 at the Subject Location.



Photograph 7: View of the lead-containing purple paint observed on the block wall in Room 2004 at the Subject Location.

Photograph 8: View of the lead-containing white paint observed on the block wall in Room 1082 at the Subject Location.

PCBs

Photograph 9: View of a non-PCB containing light ballast observed at the Subject Location.

Ozone Depleting Substances

Photograph 10: View of the air handling units suspected to contain ozone depleting refrigerant observed on the roof at Subject Location.

HAZARDOUS MATERIALS SUMMARY TABLE

Hazardous Materials Summary Table

Room Name & Number/ ID	Surface	Material Observed	Potential Hazardous Material	Condition	Friable/ Non-Friable	Quantity	Sample Id.	Abatement Priority	Estimated Abatement Cost
MCB20-01	Duct	Caulking: red	No asbestos detected	–	–	–	24918-046-1A to 24918-046-1C	–	–
MC-B20	Block wall	Sealant	No asbestos detected	–	–	–	24918-046-2A to 24918-046-2C	–	–
MC-B20	Block wall	Mortar	No asbestos detected	–	–	–	24918-046-3A to 24918-046-3C	–	–
MC-B22	**Door**	**Brown paint**	**0.075% lead**	**Intact**	**_**	**_**	**24918-046-L2**	**3**	**_**
1004A	Door	Caulking: grey	No asbestos detected	–	–	–	24918-046-4A to 24918-046-4C	–	–
1004	Ceiling	SCTs	No asbestos detected	–	–	–	24918-046-6A to 24918-046-6C	–	–
1005	Block wall	Mortar	No asbestos detected	–	–	–	24918-046-5A to 24918-046-5C	–	–
1013	Column	DJC	No asbestos detected	–	–	–	24918-046-13A to 24918-046-13C	–	–
1043	Door	Blue paint	No lead detected	–	–	–	24918-046-L3	–	–
1046	Floor	VFTs	No asbestos detected	–	–	–	24918-046-7A to 24918-046-7C	–	–
1046	Floor	Mastic: black	No asbestos detected	–	–	–	24918-046-7A to 24918-046-7C	–	–

Hazardous Materials Summary Table

Room Name & Number/ ID	Surface	Material Observed	Potential Hazardous Material	Condition	Friable/ Non-Friable	Quantity	Sample Id.	Abatement Priority	Estimated Abatement Cost
1046	Floor	VFTs	No asbestos detected	–	–	–	24918-046-8A to 24918-046-8C	–	–
1046	Floor	Mastic: grey	No asbestos detected	–	–	–	24918-046-8A to 24918-046-8C	–	–
1046	Floor	VFTs	No asbestos detected	–	–	–	24918-046-9A to 24918-046-9C	–	–
1046	Floor	Mastic: grey	No asbestos detected	–	–	–	24918-046-9A to 24918-046-9C	–	–
1046	Wall	DJC	No asbestos detected	–	–	–	24918-046-10A to 24918-046-10C	–	–
1047	Floor	VFTs	No asbestos detected	–	–	–	24918-046-11A to 24918-046-11C	–	–
1047	Floor	Mastic: yellow	No asbestos detected	–	–	–	24918-046-11A to 24918-046-11C	–	–
1047	Window	Caulking: grey	No asbestos detected	–	–	–	24918-046-12A to 24918-046-12C	–	–
1048	Wall	Light green paint	No lead detected	–	–	–	24918-046-L4	–	–
1048	Brick wall	Mortar	No asbestos detected	–	–	–	24918-046-25C	–	–

Hazardous Materials Summary Table

Room Name & Number/ ID	Surface	Material Observed	Potential Hazardous Material	Condition	Friable/ Non-Friable	Quantity	Sample Id.	Abatement Priority	Estimated Abatement Cost
1049	Wall	DJC	No asbestos detected	–	–	–	24918-046-14E	–	–
1055	Wall	DJC	No asbestos detected	–	–	–	24918-046-14F	–	–
1056B	Wall	DJC	No asbestos detected	–	–	–	24918-046-14D	–	–
1056	Window	Putty: black	No asbestos detected	–	–	–	24918-046-15A to 24918-046-15C	–	–
1058	Floor	DJC	No asbestos detected	–	–	–	24918-046-14C	–	–
1058	Brick wall	Caulking: red	No asbestos detected	–	–	–	24918-046-24A to 24918-046-24C	–	–
1059	Wall	DJC	No asbestos detected	–	–	–	24918-046-14G	–	–
1060	Wall	DJC	No asbestos detected	–	–	–	24918-046-14A	–	–
1061	Floor	VFTs	No asbestos detected	–	–	–	24918-046-16A to 24918-046-16C	–	–
1061	Floor	Mastic: grey	No asbestos detected	–	–	–	24918-046-16A to 24918-046-16C	–	–

Hazardous Materials Summary Table

Room Name & Number/ ID	Surface	Material Observed	Potential Hazardous Material	Condition	Friable/ Non-Friable	Quantity	Sample Id.	Abatement Priority	Estimated Abatement Cost
1062	Wall	DJC	No asbestos detected	–	–	–	24918-046-14B	–	–
1081	Wall	Blue paint	No lead detected	–	–	–	24918-046-L7	–	–
1082	**Wall**	**White paint**	**0.013% lead**	**Intact**	**–**	**–**	**24918-046-L5**	**3**	**–**
1082	Wall	Dark yellow paint	No lead detected	–	–	–	24918-046-L6	–	–
1102	Brick wall	Caulking: grey	No asbestos detected	–	–	–	24918-046-17A to 24918-046-17C	–	–
2001	Block wall	Grey paint	No lead detected	–	–	–	24918-046-L8	–	–
2001	**Window**	**Caulking: grey**	**3% Chrysotile**	**Intact**	**Non-friable**	**10 lf**	**24918-046-20A**	**3**	**–**
2001	Window	Caulking: grey	Not analyzed	–	–	–	24918-046-20B to 24918-046-20C	–	–
2002	**Floor**	**VFTs**	**3% Chrysotile**	**Intact**	**Non-friable**	**350 sf**	**24918-046-19A**	**3**	**–**
2002	Floor	Mastic: grey	No asbestos detected	–	–	–	24918-046-19A to 24918-046-19C	–	–
2004	Block wall	Orange paint	No lead detected	–	–	–	24918-046-L9	–	–
2004	**Block wall**	**Purple paint**	**0.019% lead**	**Intact**	**–**	**–**	**24918-046-L10**	**3**	

Hazardous Materials Summary Table

Room Name & Number/ ID	Surface	Material Observed	Potential Hazardous Material	Condition	Friable/ Non-Friable	Quantity	Sample Id.	Abatement Priority	Estimated Abatement Cost
2009	Block wall	Sealant	Not analyzed (Presumed Asbestos-Containing)	–	–	–	24918-046-22C	3	–
2010	Block wall	Sealant	Not analyzed (Presumed Asbestos-Containing)	–	–	–	24918-046-22G	3	–
3006	Block wall	Sealant	Not analyzed (Presumed Asbestos-Containing)	–	–	–	24918-046-22A	3	–
3006	**Block wall**	**Sealant**	**0.5% Chrysotile**	**Intact**	**Non-friable**	**troughout**	**24918-046-22B**	**3**	**–**
3006	Block wall	Sealant	Not analyzed (Presumed Asbestos-Containing)	–	–	–	24918-046-22D	3	–
3009	Block wall	Sealant	Not analyzed (Presumed Asbestos-Containing)	–	–	–	24918-046-22E to 24818-046-22F	3	–
3009	Block wall	Caulking: grey	No asbestos detected	–	–	–	24918-046-23A to 24818-046-23C	–	–

Hazardous Materials Summary Table

Room Name & Number/ ID	Surface	Material Observed	Potential Hazardous Material	Condition	Friable/ Non-Friable	Quantity	Sample Id.	Abatement Priority	Estimated Abatement Cost
MC-30	Duct	Mastic: grey	No asbestos detected	–	–	–	24918-046-21A to 24818-046-21C	–	–
ST-01	**Block wall**	**Yellow paint**	**0.20% lead**	**Intact**	**_**	**_**	**24918-046-L1**	**3**	**_**
ST-02	Brick wall	Mortar	No asbestos detected	–	–	–	24918-046-25A	–	–
ST-1004	Brick wall	Mortar	No asbestos detected	–	–	–	24918-046-25B	–	–
1004A, Exterior	Door	Caulking: light beige	No asbestos detected	–	–	–	24918-046-27A to 24818-046-27C	–	–
1045, Exterior	Window	Puttt	No asbestos detected	–	–	–	24918-046-26A to 24818-046-26C	–	–
Wall around Pool	Wall	Caulking: light pink	No asbestos detected	–	–	–	24918-046-28A to 24818-046-28C	–	–
Roof	**Floor**	**Tar: black**	**10% Chrysotile**	**Intact**	**Non-friable**	**5 sf**	**24918-046-18A**	**3**	**_**
Room 2004B	**Block wall**	**Red paint**	**0.018% lead**	**Intact**	**_**	**_**	**24918-046-L11**	**3**	**_**
Corridor #1055	Wall	Blue paint	<0.017% lead	–	–	–	24918-046-L12	–	–

Legend

Hazardous Materials Summary Table

Room Name & Number/ ID	Surface	Material Observed	Potential Hazardous Material	Condition	Friable/ Non-Friable	Quantity	Sample Id.	Abatement Priority	Estimated Abatement Cost
Condition			Intact (no visible damage), Minor Damage (small amounts broken, scrapped, deteriorated), Severe Damage (serious damage observed)						
Potential for Damage			Low = low traffic, minor air turbulence, low vibration, Moderate = moderate traffic, air movement, vibration, Height = Likelihood of disturbance is high						
Abatement Priority			1 = immediate abatement required, 2 = abatement required within 12 months, 3 = abatement required if material is affected either through renovation or disturbance						

BACKGROUND INFORMATION ON HAZARDOUS MATERIALS

ASBESTOS

Asbestos is a naturally occurring mineral. Asbestos is divided into two mineral groups: Serpentine and Amphibole. The division between the two types of asbestos is based upon the crystalline structure. The fibers of asbestos are long and thin, easily distinguishable when compared with non-asbestos minerals. The construction industry has been using asbestos for many years because of the ability of asbestos to withstand high temperatures as well as its strength and resistance to corrosive chemicals.

When asbestos-containing material is disturbed dust is released into the air that contains asbestos fibers that have the potential to be inhaled into the lungs. Depending on the size of the individual fibers inhaled, some fibers can make their way deep into the air sacs (alveoli) of the lungs. Exposure to asbestos fibers may result in scarring of the lung tissue (asbestosis), cancer of the chest cavity (mesothelioma) or other asbestos related cancers.

ACRYLONITRILE

Acrylonitrile is explosive, flammable and toxic, found as a colorless or yellow clear liquid. It is used to produce a variety of products including plastics, adhesives, gaskets, seals and hoses. Health effects resulting in acute exposure to acrylonitrile vary from minor symptoms such as eye irritation, itching skin, blisters, and headaches, sneezing and vomiting. Chronic exposure may cause cancers of the stomach, lymph system and brain.

ARSENIC

The common form of arsenic is grey in color with a metallic appearance. Arsenic has been used in the manufacturing of glass to eliminate the green color resulting from the impurities of iron compounds. It was also used in the productions of poisons. Arsenic is poisonous in doses significantly larger than 65 mg (1 grain), and poisoning can arise from a single large dose or from repeated small doses.

BENZENE

Benzene is an aromatic organic hydrocarbon existing either as a clear liquid or a vapour. Benzene is highly flammable and volatile material and was primarily a by-product in petroleum refineries. However, it has also been commonly used to produce styrene, synthetic rubbers, plastics, resins and solvents.

Serious health effects can occur from exposure to benzene, mainly as a result of inhalation of vapours and mists. Ingestion by swallowing and absorption through the skin are also possible routes of exposure. Health effects can result from ingesting food or drink contaminated with benzene. Symptoms can range from irritated eyes, red blistering skin, headaches, nausea and drowsiness. Benzene exposure can also induce blood and bone marrow toxicity.

COKE OVEN EMISSIONS

Coke oven emissions can be either in a condensed form as a brownish thick liquid, or uncondensed form as a vapour. Coke oven emissions are a mixture of coal tar, coal tar pitch, and creosote and contain chemicals such as benzo(a)pyrene, benzanthracene, chrysene, and phenanthrene.

Chronic (long-term) exposure to coke oven emissions in humans results in conjunctivitis, severe dermatitis, and lesions of the respiratory and digestive systems. Epidemiologic studies of coke oven workers have reported an increase in cancer of the lung, trachea, bronchus, kidney, prostate, and other sites.

ETHYLENE OXIDE

Sources of ethylene oxide emissions into the air include uncontrolled emissions or venting with other gases in industrial settings. Other sources of ethylene oxide air emissions include automobile exhaust and its release from commodity-fumigated materials. Individuals may be exposed to ethylene oxide through breathing contaminated air or from smoking tobacco or being in the proximity to someone who is smoking.

Ethylene Oxide has been linked to reproductive damage, including spontaneous abortions; cytogenetic damage; neurological effects ranging from nausea and dizziness to peripheral paralysis; and tissue irritation.

ISOCYANATES

Isocyanates are compounds that contain a group of atoms consisting of Nitrogen (N), Carbon (C), and Oxygen (O), which make isocyanates very useful in the manufacturing industry. Isocyanates are commonly used in the production of plastics, foams, and coatings.

Health effects associated with exposure to isocyanates are: decreased lung function, cold and flu-like symptoms, fever and shortness of breath. Exposure to isocyanates can be through inhalation of vapour, mist or dust, or by direct contact.

LEAD

For thousands of years lead has been used industrially because of its poor conductive property. Lead has been commonly used for electric storage batteries, pigments, paints, and rubber compounds.

Health effects associated with lead exposure can result in damage to the kidneys, gastrointestinal system, nervous system and reproductive system. Symptoms range from vomiting, and abdominal cramps to pains in joints and muscles.

MERCURY

At Room temperature mercury is in the form of a silver colored liquid. Mercury can exist in three forms: elemental, the pure form; organic, where mercury is bonded to a carbon molecule; or inorganic, where mercury is bonded to a molecule other than carbon.

Mercury can be absorbed into the body by inhalation, ingestion or absorption through the skin. As a health hazard mercury can affect the respiratory system resulting in coughing and chest pains. Mercury poisoning can also cause kidney damage, skin irritation and may even harm the nervous system.

SILICA

Silica can be found naturally in two forms, crystalline or amorphous material. Crystalline silica is regulated due to its significant toxicity over the amorphous silica. The three most common forms of crystalline silica in the workplace are: quartz, cristobalite and tridymite. The physical properties of silica make it a valuable substance for use in a variety of different industries and processes such as an abrasive and scouring compound, fillers for paint and mastic and optical equipment. Health effects resulting from exposure to crystalline silica range from eye and skin irritation, coughing and sneezing to silicosis a progressive lung disease.

VINYL CHLORIDE

Vinyl chloride is required in the manufacture of polyvinyl chloride (PVC) and at Room temperature is present as a colorless, flammable gas. Vinyl chloride is also known as chloroethene, chloroethylene, and ethylene monochloride, and can result from the breakdown of other substances such as trichloroethane, trichloroethylene, and tetrachloroethylene.

Common exposure is a result of inhaling vinyl chloride from industrial leaks, hazardous waste sites and landfills. Symptoms of breathing vinyl chloride are sleepiness, dizziness or labored breathing. Chronic exposure can cause liver and nerve damage or cancer.

OZONE DEPLETING SUBSTANCES

The main source of ozone depleting substances is in the form of man-made halocarbon refrigerants (chlorofluorocarbon (CFCs), freons and halons). CFCs and other contributory substances are referred to as ozone-depleting substances (ODS). Since the ozone layer of the earth prevents most harmful ultraviolet light from passing through the Earth's atmosphere, these ozone depleting substances require proper disposal and limit its release into the atmosphere. The main health concern regarding ODS are the effects of increased surface UV radiation on human health.

MOULD

Mould is a colloquial term used to define large and taxonomically diverse number of fungal species where their growth results in a “mouldy” appearance on porous building materials (i.e. gypsum wallboard, wood, suspended ceiling tiles, etc.). Essentially, the building materials become discoloured by a layer of fungal growth.

Mould is a fungus that grows in the form of multicellular filaments called hyphae. A connected network of hyphae, called a mycelium, is considered a single organism. Mould reproduces via spores and the formation and shape of these spores is traditionally used to classify the mould into its respective genus. In order for mould to grow it requires two things: a food source (i.e. gypsum wallboard, ceiling tiles, etc.) and water.

Mould is ubiquitous in nature and is required to breakdown detritus in nature; hence, mould spores are a common component of outdoor and indoor air. Although mould spores can be found in both indoor and outdoor air, mould growth on buildings materials is a concern. First, it can degrade the building materials and second, it can lead to a variety of health problems. General symptoms caused by mould are allergenic reactions such as watery, itchy eyes, cough, headaches or migraines, difficulty breathing, rashes, tiredness, sinus problems, nasal blockage and frequent sneezing. Various practices can be followed to mitigate mould issues in buildings, the most important of which is to remedy any water intrusion issues in a building as it facilitates the growth of mould. Removal of the affected building materials and repair of the source of water intrusion is required in buildings. Once the affected buildings have been removed the source of the allergenic reactions are reduced and/or eliminated.

PCBs

PCBs were widely used as dielectric and coolant fluids, for example in transformers, capacitors, and electric motors. Due to PCBs environmental toxicity and classification as a persistent organic pollutant, PCB production has been banned. According to the U.S. Environmental Protection Agency (EPA), PCBs have been shown to cause cancer in animals, and there is also evidence that they can cause cancer in humans. Concerns about the toxicity of PCBs are largely based on compounds within this group that share a structural similarity and toxic mode of action with dioxin. Toxic effects such as endocrine disruption and neurotoxicity are also associated with other compounds within the group.

LABORATORY ANALYSIS REPORTS

emcscientific
INCORPORATED

Laboratory Analysis Report

To:

Fred Atrash
OHE Consultants Inc.
311 Matheson Boulevard East
Mississauga, Ontario
L4Z 1X8

EMC LAB REPORT NUMBER: A65772
Job/Project Name:
Analysis Method: Polarized Light Microscopy – EPA 600
Date Received: Feb 2/21 **Date Analyzed:** Feb 18/21
Analysts: Chengming Li, *Analyst*/ Dina Yousif, *Analyst*
Reviewed By: Malgorzata Sybydlo, *Laboratory Manager*

No. of Phases Analyzed: 99
Job No: 24918-046
Number of Samples: 92
Date Reported: Feb 18/21

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
24918-046-1A	A65772-1	Caulking, red/ Duct, Rm.#MCB20-01	Red, caulking	**ND**			100
24918-046-1B	A65772-2	Caulking, red/ Duct, Rm.#MCB20-01	Red, caulking	**ND**			100
24918-046-1C	A65772-3	Caulking, red/ Duct, Rm.#MCB20-01	Red, caulking	**ND**			100
24918-046-2A	A65772-4	Sealant / Block wall, Rm.#MC-B20	Off white, cementitious material	**ND**			100
24918-046-2B	A65772-5	Sealant/ Block wall, Rm.#MC-B20	Off white, cementitious material	**ND**			100
24918-046-2C	A65772-6	Sealant/ Block wall, Rm.#MC-B20	Off white, cementitious material	**ND**			100
24918-046-3A	A65772-7	Mortar/ Block wall, Rm.#MC-B20	Grey, cementitious material	**ND**			100
24918-046-3B	A65772-8	Mortar/ Block wall, Rm.#MC-B20	Grey, cementitious material	**ND**			100
24918-046-3C	A65772-9	Mortar/ Block wall, Rm #MC-B20	Grey, cementitious material	**ND**			100
24918-046-4A	A65772-10	Caulking, grey/ Around door frame #1004A, interior	Grey, caulking	**Chrysotile**	**<0.5**		100
24918-046-4B	A65772-11	Caulking, grey/ Around door frame #1004A, interior	Grey, caulking	**Chrysotile**	**<0.5**		100

EMC LAB REPORT NUMBER: A65772
Client's Job/Project Name/No.: 24918-046
Analysts: Chengming Li, *Analyst* / Dina Yousif, *Analyst*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
24918-046-4C	A65772-12	Caulking, grey/ Around door frame #1004A, interior	Grey, caulking	**Chrysotile**	**<0.5**		100
24918-046-5A	A65772-13	Mortar/ Between block and brick wall, stair #1005	Grey, cementitious material	**ND**			100
24918-046-5B	A65772-14	Mortar/ Between block and brick wall, stair #1005	Grey, cementitious material	**ND**			100
24918-046-5C	A65772-15	Mortar/ Between block and brick wall, stair #1005	Grey, cementitious material	**ND**			100
24918-046-6A	A65772-16	Suspended Ceiling Tiles (SCTs), 4'x2' dots and fissures/ Ceiling, Hallway #1004	Grey, ceiling tile	**ND**		70	30
24918-046-6B	A65772-17	SCTs, 4'x2' dots and fissures/ Ceiling, Hallway #1004	Grey, ceiling tile	**ND**		70	30
24918-046-6C	A65772-18	SCTs, 4'x2' dots and fissures/ Ceiling, Hallway #1004	Grey, ceiling tile	**ND**		70	30
24918-046-7A	A65772-19	Vinyl Floor Tile (VFT) 12"x12" red and associated black mastic/ Floor, Rm.#1046	2 Phases: a) Red, vinyl floor tile b) Black, mastic	 **ND** **ND**			 100 100
24918-046-7B	A65772-20	VFT 12"x12" red and associated black mastic/ Floor, Rm.#1046	2 Phases: a) Red, vinyl floor tile b) Black, mastic	 **ND** **ND**			 100 100
24918-046-7C	A65772-21	VFT 12"x12" read and associated black mastic/ Floor, Rm.#1046	2 Phases: a) Red, vinyl floor tile b) Black, mastic	 **ND** **ND**			 100 100
24918-046-8A	A65772-22	VFT 12"x12" creamy and associated grey mastic/ Floor, Rm.#1046	2 Phases: a) Off white, vinyl floor tile	 **ND**			 100

EMC LAB REPORT NUMBER: A65772
Client's Job/Project Name/No.: 24918-046
Analysts: Chengming Li, *Analyst* / Dina Yousif, *Analyst*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
			b) Grey, mastic	**ND**			100
24918-046-8B	A65772-23	VFT 12"x12" creamy and associated grey mastic/ Floor, Rm.#1046	2 Phases: a) Off white, vinyl floor tile b) Grey, mastic	 **ND** **ND**			 100 100
24918-046-8C	A65772-24	VFT 12"x12" creamy and associated grey mastic/ Floor, Rm.#1046	2 Phases: a) Off white, vinyl floor tile b) Grey, mastic	 **ND** **ND**			 100 100
24918-046-9A	A65772-25	VFT 12"x12" brown and associated grey mastic/ Floor, Rm.#1046	2 Phases: a) Brown, vinyl floor tile b) Grey, mastic	 **ND** **ND**			 100 100
24918-046-9B	A65772-26	VFT 12"x12" brown and associated grey mastic/ Floor, Rm.#1046	2 Phases: a) Brown, vinyl floor tile b) Grey, mastic	 **ND** **ND**			 100 100
24918-046-9C	A65772-27	VFT 12"x12" brown and associated grey mastic/ Floor, Rm.#1046	2 Phases: a) Brown, vinyl floor tile b) Grey, mastic	 **ND** **ND**			 100 100
24918-046-10A	A65772-28	Drywall Joint Compound (DJC)/ Wall, Rm.#1046	White and off white, joint compound	**ND**			100
24918-046-10B	A65772-29	DJC/ Wall, Rm.#1046	White and off white, joint compound	**ND**			100
24918-046-10C	A65772-30	DJC/ Wall, Rm.#1046	White and off white, joint compound	**ND**			100
24918-046-11A	A65772-31	VFT 12"x12" green and associated yellow mastic/ Floor, Rm.#1047	2 Phases: a) Green, vinyl floor tile b) Yellow, mastic	 **ND** **ND**			 100 100

EMC LAB REPORT NUMBER: A65772
Client's Job/Project Name/No.: 24918-046
Analysts: Chengming Li, *Analyst* / Dina Yousif, *Analyst*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
24918-046-11B	A65772-32	VFT 12"x12" green and associated yellow mastic/ Floor, Rm.#1047	2 Phases: a) Green, vinyl floor tile b) Yellow, mastic	 **ND** **ND**			 100 100
24918-046-11C	A65772-33	VFT 12"x12" green and associated yellow mastic/ Floor, Rm.#1047	2 Phases: a) Green, vinyl floor tile b) Yellow, mastic	 **ND** **ND**			 100 100
24918-046-12A	A65772-34	Caulking, grey / Around window frame, Rm.#1047, interior	Grey, caulking	**ND**			100
24918-046-12B	A65772-35	Caulking, grey/ Around window frame, Rm.#1047, interior	Grey, caulking	**ND**			100
24918-046-12C	A65772-36	Caulking, grey/ Around window frame, Rm.#1047, interior	Grey, caulking	**ND**			100
24918-046-13A	A65772-37	DJC/ Column, lobby #1013	White, joint compound	**ND**			100
24918-046-13B	A65772-38	DJC/ Column, lobby #1013	White, joint compound	**ND**			100
24918-046-13C	A65772-39	DJC/ Column, lobby #1013	White, joint compound	**ND**			100
24918-046-14A	A65772-40	DJC/ Wall, Rm.#1060	White, joint compound	**ND**			100
24918-046-14B	A65772-41	DJC/ Wall, Rm.#1062	White, joint compound	**ND**			100
24918-046-14C	A65772-42	DJC/ Wall, Corridor #1058	White, joint compound	**ND**			100
24918-046-14D	A65772-43	DJC/ Wall, Rm.#1056B	White, joint compound	**ND**			100

EMC LAB REPORT NUMBER: A65772
Client's Job/Project Name/No.: 24918-046
Analysts: Chengming Li, *Analyst* / Dina Yousif, *Analyst*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
24918-046-14E	A65772-44	DJC/ Wall, Rm.#1049	White, joint compound	**ND**			100
24918-046-14F	A65772-45	DJC/ Wall, Corridor #1055	White, joint compound	**ND**			100
24918-046-14G	A65772-46	DJC/ Wall, Rm.#1059	White, joint compound	**ND**			100
24918-046-15A	A65772-47	Putty black/ Window glaze, Rm.#1056	Black, caulking	**ND**			100
24918-046-15B	A65772-48	Putty black/ Window glaze, Rm.#1056	Black, caulking	**ND**			100
24918-046-15C	A65772-49	Putty black/ Window glaze, Rm.#1056	Black, caulking	**ND**			100
24918-046-16A	A65772-50	VFT 12"x12" beige and associated grey mastic/ Floor, Rm.#1061	2 Phases: a) Beige, vinyl floor tile b) Grey, mastic	 **ND** **ND**			 100 100
24918-046-16B	A65772-51	VFT 12"x12" beige and associated grey mastic/ Floor, Rm.#1061	2 Phases: a) Beige, vinyl floor tile b) Grey, mastic	 **ND** **ND**			 100 100
24918-046-16C	A65772-52	VFT 12"x12" beige and associated grey mastic/ Floor, Rm.#1061	2 Phases: a) Beige, vinyl floor tile b) Grey, mastic	 **ND** **ND**			 100 100
24918-046-17A	A65772-53	Expansion joint, grey / Brick wall, Corridor #1102	Grey, caulking	**ND**			100
24918-046-17B	A65772-54	Expansion joint, grey/ Brick wall, Corridor #1102	Grey, caulking	**ND**			100
24918-046-	A65772-55	Expansion joint, grey/ Brick wall,	Grey, caulking	**ND**			100

EMC LAB REPORT NUMBER: A65772
Client's Job/Project Name/No.: 24918-046
Analysts: Chengming Li, *Analyst* / Dina Yousif, *Analyst*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
17C		Corridor #1102					
24918-046-18A	A65772-56	Tar black/ Around roof penetration, roof	Black, tar with fibres	**Chrysotile**	**10**	5	85
24918-046-18B	A65772-57	Tar black/ Around roof penetration, roof	NA	**NA**			
24918-046-18C	A65772-58	Tar black/ Around roof penetration, roof	NA	**NA**			
24918-046-19A	A65772-59	VFT 12"x12" grey and associated grey mastic/ Floor, Rm.#2002	2 Phases: a) Beige, vinyl floor tile b) Black, mastic	**Chrysotile** **ND**	**3**		97 100
24918-046-19B	A65772-60	VFT 12"x12" grey and associated grey mastic/ Floor, Rm.#2002	2 Phases: a) NA b) Black, mastic	**NA** **ND**			100
24918-046-19C	A65772-61	VFT 12"x12" grey and associated grey mastic/ Floor, Rm.#2002	2 Phases: a) NA b) Black, mastic	**NA** **ND**			100
24918-046-20A	A65772-62	Caulking grey/ Window glaze, Rm.#2001	Grey, caulking	**Chrysotile**	**3**		97
24918-046-20B	A65772-63	Caulking grey/ Window glaze, Rm.#2001	NA	**NA**			
24918-046-20C	A65772-64	Caulking grey/ Window glaze, Rm.#2001	NA	**NA**			
24918-046-21A	A65772-65	Mastic grey/ Duct, Rm.#MC-30	Grey, mastic	**ND**			100
24918-046-21B	A65772-66	Mastic grey/ Duct, Rm.#MC-30	Grey, mastic	**ND**			100

EMC LAB REPORT NUMBER: A65772
Client's Job/Project Name/No.: 24918-046
Analysts: Chengming Li, *Analyst* / Dina Yousif, *Analyst*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
24918-046-21C	A65772-67	Mastic grey/ Duct, Rm.#MC-30	Grey, mastic	**ND**			100
24918-046-22A	A65772-68[5]	Sealant/ Block wall, Stair #3006	White, cementitious material	**Chrysotile**	**<0.5**		100
24918-046-22B	A65772-69	Sealant/ Block wall, Stair #3006	White, cementitious material	**Chrysotile**	**0.5**		99.5
24918-046-22C	A65772-70	Sealant/ Block wall, Stair #2009	NA	**NA**			
24918-046-22D	A65772-71	Sealant/ Block wall, Stair #3006	NA	**NA**			
24918-046-22E	A65772-72	Sealant/ Block wall, Stair #3009	NA	**NA**			
24918-046-22F	A65772-73	Sealant/ Block wall, Stair #3009	NA	**NA**			
24918-046-22G	A65772-74	Sealant/ Block wall, Stair #2010	NA	**NA**			
24918-046-23A	A65772-75	Expansion joint grey / Block wall, Stair #3009	Grey, caulking	**ND**		0.5	99.5
24918-046-23B	A65772-76	Expansion joint grey/ Block wall, Stair #3009	Grey, caulking	**ND**		0.5	99.5
24918-046-23C	A65772-77	Expansion joint grey/ Block wall, Stair #3009	Grey, caulking	**ND**		0.5	99.5
24918-046-24A	A65772-78	Expansion joint red/ Brick wall, Corridor #1058	Brown, caulking	**ND**			100
24918-046-24B	A65772-79	Expansion joint red/ Brick wall, Corridor #1058	Brown, caulking	**ND**			100

EMC LAB REPORT NUMBER: A65772
Client's Job/Project Name/No.: 24918-046
Analysts: Chengming Li, *Analyst* / Dina Yousif, *Analyst*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
24918-046-24C	A65772-80	Expansion joint red/ Brick wall, Corridor #1058	Brown, caulking	**ND**			100
24918-046-25A	A65772-81	Mortar / Brick wall, Stair #ST-02	Grey, cementitious material	**Chrysotile**	**<0.5**		100
24918-046-25B	A65772-82	Mortar/ Brick wall, Stair #ST-1004	Grey, cementitious material	**Chrysotile**	**<0.5**		100
24918-046-25C	A65772-83	Mortar/ Brick wall, Corridor #1048	Grey, cementitious material	**Chrysotile**	**<0.5**		100
24918-046-26A	A65772-84	Putty black/ Around glass and window frame, Rm.#1045, exterior	Black, caulking	**ND**			100
24918-046-26B	A65772-85	Putty black/ Around glass and window frame, Rm.#1045, exterior	Black, caulking	**ND**			100
24918-046-26C	A65772-86	Putty black/ Around glass and window frame, Rm.#1045, exterior	Black, caulking	**ND**			100
24918-046-27A	A65772-87	Caulking light beige / Around door frame, Area #1004A, exterior	Beige, caulking	**ND**			100
24918-046-27B	A65772-88	Caulking light beige/ Around door frame, Area #1004A, exterior	Beige, caulking	**ND**			100
24918-046-27C	A65772-89	Caulking light beige/ Around door frame, Area #1004A, exterior	Beige, caulking	**ND**			100
24918-046-28A	A65772-90	Expansion joint light pink/ Wall around the pool, exterior	Light brown, caulking	**ND**			100
24918-046-28B	A65772-91	Expansion joint light pink/ Wall around the pool, exterior	Light brown, caulking	**ND**			100
24918-046-28C	A65772-92	Expansion joint light pink/ Wall around the pool, exterior	Light brown, caulking	**BD**			100

EMC LAB REPORT NUMBER: A65772
Client's Job/Project Name/No.: 24918-046
Analysts: Chengming Li, *Analyst* / Dina Yousif, *Analyst*

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

EMSL Canada Inc.
2756 Slough Street, Mississauga, ON L4T 1G3
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EMSL Canada Or	552101630
CustomerID:	55OHEI93
CustomerPO:	24918-046
ProjectID:	

Attn: **Fred Atrash**
OHE Consultants
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Mississauga, ON L4Z 1X8

Phone: (905) 890-9000
Fax: (905) 890-9005
Received: 2/2/2021 02:11 PM
Collected:

Project: **24918-046**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client SampleDescription	*Collected*	*Analyzed*	*Weight*	*RDL*	*Lead Concentration*
24918-046-L1		2/5/2021	0.2342 g	0.0085 % wt	0.20 % wt
552101630-0001	Site: Yellow paint on block wall, Stairway #ST-01				
24918-046-L2		2/5/2021	0.2261 g	0.0088 % wt	0.075 % wt
552101630-0002	Site: Brown paint on door frame, Rm.#MC-B22				
24918-046-L3		2/5/2021	0.2054 g	0.0097 % wt	<0.0097 % wt
552101630-0003	Site: Blue paint on door frame, Rm.#1043 Insufficient sample to reach reporting limit.				
24918-046-L4		2/5/2021	0.1105 g	0.018 % wt	<0.018 % wt
552101630-0004	Site: Light green paint on block wall, Hallway #1048 Insufficient sample to reach reporting limit.				
24918-046-L5		2/5/2021	0.2422 g	0.0083 % wt	0.013 % wt
552101630-0005	Site: White paint on block wall, Rm.#1082				
24918-046-L6		2/5/2021	0.2407 g	0.0083 % wt	<0.0083 % wt
552101630-0006	Site: Dark yellow paint on block wall, Rm.#1082				
24918-046-L7		2/5/2021	0.0932 g	0.021 % wt	<0.021 % wt
552101630-0007	Site: Blue paint on brick wall, Rm.#1081 Insufficient sample to reach reporting limit.				
24918-046-L8		2/5/2021	0.1302 g	0.015 % wt	<0.015 % wt
552101630-0008	Site: Grey paint on block wall Gym, Rm.#2001 Insufficient sample to reach reporting limit.				
24918-046-L9		2/5/2021	0.1317 g	0.015 % wt	<0.015 % wt
552101630-0009	Site: Orange paint on block wall, Rm.#2004 Insufficient sample to reach reporting limit.				
24918-046-L10		2/5/2021	0.1785 g	0.011 % wt	0.019 % wt
552101630-0010	Site: Purple paint on block wall, Rm.#2004				

Rowena Fanto, Lead Supervisor
or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted.
Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA-LAP, LLC - ELLAP #196142

Initial report from 02/16/2021 11:18:06

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EMSL Canada Or	552101630
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Attn: **Fred Atrash**
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Phone:	(905) 890-9000
Fax:	(905) 890-9005
Received:	2/2/2021 02:11 PM
Collected:	

Project: **24918-046**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client SampleDescription	*Collected*	*Analyzed*	*Weight*	*RDL*	*Lead Concentration*
24918-046-L11		2/5/2021	0.1115 g	0.018 % wt	0.018 % wt
552101630-0011	Site: Red paint on block wall, Rm.#2004B				
24918-046-L12		2/5/2021	0.1184 g	0.017 % wt	<0.017 % wt
552101630-0012	Site: Blue paint on drywall, Corridor #1055 Insufficient sample to reach reporting limit.				

Rowena Fanto, Lead Supervisor
or other approved signatory

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Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA-LAP, LLC - ELLAP #196142

Initial report from 02/16/2021 11:18:06

APPLICABLE REGULATIONS AND/OR GUIDELINES

DESIGNATED SUBSTANCES REGULATIONS

In accordance with Section 30 of the Occupational Health and Safety Act (OHSA), Designated Substances and other potentially hazardous building materials must be identified prior to construction or demolition that may disturb such materials. Designated Substances include:

Asbestos	Benzene
Lead	Acrylonitrile
Mercury	Coke Oven Emissions
Silica	Arsenic
Isocyanates	Ethylene Oxide
Vinyl Chloride	

A Designated Substances report is completed to fulfil the Owner's requirements under Section 30 of the OHSA. A copy of the report must be provided to the general contractor who in turn must submit the report to all subcontractors prior to the commencement of any demolition, construction or renovation work.

Ontario Regulation 490/09 "Designated Substances" (O. Reg. 490/09) provides guidance on exposure monitoring, permissible exposure levels, medical monitoring, etc. for all Designated Substances in an industrial setting. There are no specific Ministry of Labour (MOL) regulations for control of the Designated Substances, with the exception of asbestos, on construction projects; however, the MOL actively enforces the general duty clause of the OHSA to take all reasonable precautions in the circumstances of protection of a worker. It is important to note that Ontario Regulation 213/91 "Construction Projects" (O. Reg. 213/91) applies to construction projects and provides instruction on general requirements, safe work practices, reporting, etc.

ASBESTOS

Three regulations govern the control, handling, transport and disposal of asbestos in Ontario:

- Ontario Regulation 278/05 "Asbestos on Construction Projects and in Buildings and Repair Operations" made under OHSA (O. Reg. 278/05);
- Ontario Regulation 347/90 "General – Waste Management" (as amended) made under the Environmental Protection Act (O. Reg. 347/90); and,
- The regulations respecting "The Handling and Offering for Transport and Transporting of Dangerous Goods".

O. Reg. 278/05

O. Reg. 278/05 applies to buildings with regards to maintenance, renovations or demolition work where Asbestos-Containing Materials (ACMs) are or may be disturbed.

Under O. Reg. 278/05 a building owner must instate an Asbestos Management Program (AMP) for the building. The major requirements for the AMP including the following:

- Preparation and maintenance of a record of the location of ACMs in the building;
- Notification of the building's tenants of the location of such material;
- Establishment of a training program for those employees of the owner who may work in close proximity to and disturb the material;
- Periodic inspection (once in a 12 month period) of the material to determine its condition;
- Remedial action on material that has deteriorated following the precautions and procedures prescribed by the regulation as Type 1, Type 2 and Type 3; and,
- Removal of ACMs to the extent practicable prior to demolition of a building or part thereof.

The regulation prescribes work to be conducted according to three procedure types. The procedure to be followed depends on the type of material and the regulation provides instruction on how the work must be performed.

O. Reg. 347/90

O. Reg. 347/90 applies to the disposal of all hazardous materials, including asbestos waste, from the location of generation to a landfill site. The regulation also prescribes procedures on how the asbestos waste is to be buried at the landfill site.

The major requirements to the building owner are to ensure that:

- The waste is appropriately packaged and labelled;
- The transport vehicle has an appropriate placard;
- The asbestos waste is transported on the same day as received by the landfill site; and,
- The route of travel is the most direct.

The building owners are held responsible for their asbestos waste as prescribed in the regulation until it is accepted by the waste disposal site.

These regulations govern the packaging mode of transport labelling, placards and documentation of waste while in transport. The labelling requirements differ from O. Reg. 347/90.

The major requirement to the building owner is to ensure the waste meets the packaging requirements and that a bill of lading accompanies the shipment.

LEAD

As stated previously there are no specific regulations regarding lead on construction projects; however, the MOL published a guideline entitled "Lead on Construction Projects" to raise the awareness of employers and workers to the hazards posed by lead in construction and the measures and procedures that should be taken to control those hazards.

The document provides information on the following:

- Health effects associated with lead exposure;
- Methods for controlling the lead hazard;
- Classification of work; and,
- Measure and procedures for working with lead.

The guideline classifies operations involving lead-containing materials into three groups, Type 1, Type 2 and Type 3 operations. The procedure to be followed depends on the anticipated airborne concentration of lead generated during the operation, which is dependent on the type of work performed. The guideline also provides instruction on how the work must be performed.

SILICA

Again, there are no specific regulations regarding silica on construction projects; however, the MOL published a guideline entitled "Silica on Construction Projects" to raise the awareness of employers and workers to the hazards posed by silica in construction and the measures and procedures that should be taken to control those hazards.

- Health effects associated with silica exposure;
- Methods for controlling the silica hazard;
- Classification of work; and,
- Measure and procedures for working with silica.

The guideline classifies operations involving silica-containing materials into three groups, Type 1, Type 2 and Type 3 operations. The procedure to be followed depends on the anticipated airborne concentration of silica generated during the operation, which is dependent on the type of work performed. The

guideline also provides instruction on how the work must be performed.

POLYCHLORINATED BIPHENYLS (PCBs)

The federal PCB Regulations, SOR/2008-273, regulates the use, handling, storage, management and release of PCBs and any product containing PCBs. The purpose of the regulation is to also accelerate the elimination of these substances by setting deadlines to end the use of PCBs and products containing PCBs and sending them for destruction.

Ontario Regulation 362/90 "Waste Management-PCBs" made under the Environmental Protection Act (O. Reg. 362/90) controls the waste management and transfer of PCBs. Under O. Reg. 362/90 a PCB material is defined as a material containing a PCB concentration of 50 parts per million (ppm) by weight.

OZONE DEPLETING SUBSTANCES

The federal Ozone Depleting Substances Regulations SOR/99-7 (as amended), regulates the import, export, manufacture, use and sale of ozone depleting substances (e.g. chlorofluorocarbons, halons, etc.) in Canada.

In addition, the federal Halocarbon Regulations SOR/2003-289 (as amended), governs the release, recovery and recycling of ozone depleting substances and their halocarbon alternatives in refrigeration and air conditioning equipment in Canada.

Lastly, Ontario Regulation 463/10 made under the Environmental Protection Act regulates the disposal, transport and transfer of ozone depleting substances and halocarbons and refrigerants in Ontario.

MOULD AND WATER DAMAGED BUILDING MATERIALS

Currently, there are no Canadian regulations that govern the presence of mould and water damaged materials in the workplace environment. However, the Health Canada document "Fungal Contamination in Public Buildings: Health Effects and Investigation Methodology" (2004) concludes that current knowledge supports the need to prevent damp conditions and mould growth and to remediate mould growth and clean mould contamination in buildings. Therefore, the presence of mould growth, mould contaminated materials and/or water damaged materials in the occupied environment is interpreted as a failure of Health Canada guidelines and as such requires remedial action.

In addition, the MOL has issued a document titled "Alert: Mould in Workplace Buildings". This document explains the MOL's position with respect to the presence of mould growth in workplace buildings. Essentially, there is a responsibility to ensure the health and safety of workers. This includes protecting workers from biological hazards in workplace buildings. Various sections of the Industrial, Construction, Mining or Health Care regulations may also apply to maintenance and remediation activities.

The Canadian Construction Association (CCA) document CCA 82 - 2004 “Mould Guidelines for the Canadian Construction Industry” (CCA 82/04) provides guidelines for the assessment and remediation of mould in indoor environments.

ABOVEGROUND AND UNDERGROUND STORAGE TANKS

The regulatory framework for storage tanks is as follows:

- Technical Standards and Safety Act
- Ontario Regulation 217/01: Liquid Fuels
- Liquid Fuels Handling Code 2017
- CSA B139-15 Installation Code for Oil Burning Equipment

CSA B139-15 holds strength as a regulation through a Technical Standards & Safety Authority adoption document making it part of the Liquid Fuels Handling Code 2017. The Liquid Fuels Handling Code 2017 was made part of Ontario Regulation 217/01 by way of a Technical Standards & Safety Authority adoption document.

SURVEY METHODOLOGY

GENERAL SURVEY METHODOLOGY

The survey consisted of an extensive examination of all accessible areas of the building to identify hazardous building materials. Materials suspected to contain hazardous materials were assessed based on the surveyor's knowledge regarding the historical use of hazardous building materials in buildings, through published data and through previous experiences.

Accessible is defined as an area above a suspended ceiling tile, within an access hatch or behind a closed door, not impeded by any structure, article or thing. An area enclosed by cement block, plaster, solid lumber, etc., where minor demolition is required to gain entry is considered non-accessible. The walkthrough survey was augmented with layout drawings where available.

OHE's surveyors completed a Room by Room sheet which details the findings in each room entered. The Room by Room sheet details the room number and/or room description including the materials observed in the room and the condition of the material. The Room by Room sheet also records sampling information, quantity of the material(s), accessibility of the material(s) and the recommended control action.

OHE's approach to the work followed accepted industry procedures as well as our own in-house protocols. The examination of materials was largely performed visually with some occasion where physical contact was necessary to assess the condition or examine for underlying layers.

ASBESTOS SURVEY METHODOLOGY

This following information summarizes the bulk sample analysis methodology and the methodology for the assessment of the condition of Asbestos-Containing Materials (ACMs).

Bulk samples were collected for subsequent analysis during the building survey. A small volume of material (approximately one teaspoon full) was removed either from a damaged section of suspect material or cut out of intact material and then repaired by sealing with an appropriate surfacing compound, tape, paint or plaster to prevent fibre release. The collected samples were placed in plastic bags and sealed until they were opened by an independent laboratory.

Bulk Sample Analysis Methodology

The bulk samples of suspect ACMs were analyzed in accordance with a US EPA method for the determination of asbestos content in bulk materials, EPA Method 600/R-93/116.

The EPA Method requires that the samples be analyzed using the Polarized Light Microscopy (PLM) technique. The percentage of asbestos in the sample is measured as perceived by the analyst in comparison to standard area projections and is greatly influenced by the analyst's experience. The method is useful for the qualitative identification of asbestos (type) and the semi-quantitative (% estimates) determination of asbestos content in bulk samples.

The asbestos bulk samples were analyzed by EMSL Canada Incorporated, an independent and NVLAP accredited laboratory. To ensure quality results, the independent laboratory chosen must successfully participate in an "Asbestos Proficiency Analytical Testing Program" and as such, this laboratory is responsible for their findings.

Assessment of ACMs Methodology

The assessment of ACMs involves the evaluation of a number of factors by the surveyor including:

- Asbestos content
- Condition of the material
- Accessibility
- Water damage
- Activity and vibration
- Presence in air plenum/direct air stream

Where ACMs are found to be in good condition, firmly bound and not likely to deteriorate or fall, the recommended procedure is to evaluate the condition of the material on a periodic basis (which should be at least once a year unless specified more frequently) in order to detect gradual deterioration. This process is referred to as an "Operation and Maintenance Program".

Damaged material is identified by surface crumbling, blistering, water stains, gouges, marring or being otherwise abraded. The accumulation of powder dust or debris similar in appearance to the suspect material can be used as confirmatory evidence.

In situations where the ACMs are found to have deteriorated or likely to fall, the following are the four abatement options that may be specified in this report:

1. **Cleaning**. The cleaning of asbestos-containing debris may be performed using a High Efficiency Particulate Air (HEPA) filter vacuum cleaner or by damp wiping techniques. All fallen asbestos material must be cleaned upon discovery. In situations where the material will continue to fall due to deterioration, damage or abrasion, additional corrective work is required, i.e., the material must be repaired, permanently enclosed or removed.

2. **Repairs**. This option is usually selected in situations where damage to the ACMs are of a minor nature and is not likely to reoccur due to accessibility or activity. This method of repair is chosen in situations where performing the repair activities will not cause significant disturbance to the underlying material. Typical repairs include the repair of thermal insulation by the application of mastic (paint adhesive) to lagging (canvas cloth). The repair of sprayed fireproofing or acoustical texturized material can involve the application of an encapsulant to limited areas of abraded or damaged material. If this option is followed, the sprayed material must be capable of supporting the additional weight of the encapsulant.

3. **Enclosure**. An enclosure consists of the construction of a physical barrier, typically constructed from drywall or metal sheeting. This option is applicable in situations where the removal of materials with asbestos is not practicable, is of a high financial cost, or where damage is likely to occur without a protective

barrier. Where the installation of the barrier is likely to disturb the ACMs, the work must be performed in isolation from the building's normal environment.

4. **Removal**. This option is recommended in situations where the ACMs are damaged beyond repair and the material is highly likely to be damaged due to nearby activities, by renovation or during demolition. The precautions employed may vary depending on the volume of the material to be removed and whether the material is friable or not. Typical programs can include the use of glove bags for limited amounts of thermal pipe insulation or minor amounts of fireproofing may be removed within a small polyethylene lined enclosure. For larger amounts of asbestos, more stringent protocols are used and consist of attached shower facilities, the establishment of a negative pressure differential, a filtration system for the air and monitoring for exposure to asbestos fibres.

METHODOLOGY FOR LEAD IN PAINT ANALYSIS

Testing for lead in paint was carried out using an X-ray Fluorescence (XRF) Spectrum Analyser. Painted surfaces contain concentrations of various elements which the XRF can detect using low-level radioactivity. The XRF unit is positioned against the exposed painted surface and the radiation from the XRF is directed at the painted surface. The radiation is absorbed by the painted surface and emits energy back to the analyzer as fluorescence. The level of fluorescence will be distinctive to a particular element present in the paint. Lead emissions are measured by the analyzer, and then converted into an electrical signal. The analyzer uses this electric signal to calculate and display the lead concentration in the paint surface. The low levels of radiation provide for accurate readings with the precision of ±0.05 mg/cm2 when measuring lead concentrations. The XRF is equipped with a depth index that indicates where the lead is located within the paint layers. The detection limit of the instrument varies with depth and ranges from 0.002 mg/cm2 to 0.05 mg/cm2. The analyzer used by OHE performs an automatic self-calibration/quality control check when the unit is switched on.

METHODOLOGY FOR LEAD IN PAINT BULK SAMPLING AND ANALYSIS

Bulk samples were collected for subsequent analysis during the building survey. A small volume of material (approximately one teaspoon full) was removed either from a damaged section of suspect material or removed from an inconspicuous area using clean hand tools. The collected samples were placed in plastic bags and sealed until they were opened by an independent laboratory

Bulk Sample Analysis Methodology

Bulk samples of suspect lead-containing materials were analyzed in accordance with a US EPA method for the determination of lead content in bulk materials, EPA Method (SW 846 3050B/7000B). The EPA Method requires that the samples be analyzed using the Flame Atomic Absorption Spectrometry (SW 846 3050B/7000B) technique. This method may be used determine trace elements in solution.

The lead bulk samples were analyzed by EMSL Analytical, Incorporated, an independent and ELLAP accredited laboratory.

METHODOLOGY FOR THE INVESTIGATION OF PCB-CONTAINING EQUIPMENT

The investigation for PCBs included a representative and random examination of fluorescent lamp ballasts present in each building. Information collected from the labels of inspected light ballasts was cross referenced with the Environment Canada publication entitled "Identification of Lamp Ballasts Containing PCBs" (Revised August 1991). The investigation was restricted to the equipment observed and excludes PCB-containing components that may be concealed. Due to safety precautions, only the exterior of electrical equipment was inspected. If the equipment labels did not provide enough information on the contents with respect to the subject substances, the findings were noted and recommendations regarding the next course of action were provided.

METHODOLOGY FOR THE INVESTIGATION OF OZONE DEPLETING SUBSTANCES

The investigation for ODSs included a visual examination of devices, equipment and building systems that are suspected to contain ODSs, including but not limited to, chillers, coolers, refrigerators and HVAC systems. The investigation was restricted to the equipment observed and excludes components that may be concealed. Due to safety precautions, only the exterior of devices, equipment and building systems were inspected. If the equipment labels did not provide enough information on the contents with respect to the subject substances, the findings were noted and recommendations regarding the next course of action were provided.

METHODOLOGY FOR THE INVESTIGATION OF MOULD AND WATER DAMAGED BUILDING MATERIALS

The investigation for mould and water damaged building materials included a visual inspection along accessible building finishes (i.e. walls, floors, ceilings, etc.).

Where applicable, the use of a moisture meter and/or an intrusive visual inspection was conducted. The following outlines the methodology for moisture measurements and intrusive visual inspections:

Less than 17% MC/WME	“DRY”	Optimal state
17-20% MC/WME	“AT RISK”	Moist conditions that may or may not support mould amplification*
Greater than 20% MC/WME	“WET” or “SATURATED”	High water activity and the likelihood of mould amplification*

* Mould amplification is dependent upon current environmental conditions and the composition of the building materials.

Methodology for the Investigation of Other Hazardous Substances

The scope of work for the subject survey also consisted of a visual inspection for the presence of other potentially hazardous building materials and substances including mercury, silica, manmade mineral fibres, urea formaldehyde foam insulation and aboveground/underground storage tanks.

PROJECT LIMITATIONS

The survey was non-destructive in nature where applicable, samples were taken in these areas where suspect material was present during the survey.

Hazardous building materials may be present in areas not accessible for view and identification. In situations where hazardous building materials extend into a non-accessible area, the materials were assumed to also be present in those areas and have been reported as such. Contractors and maintenance personnel should be warned of the possibility of undisclosed hazardous building materials in enclosed areas. All hazardous building materials discovered in these areas should be treated as a hazardous building material until proven otherwise as per all applicable regulations and guidelines.

Asbestos is also assumed to be present in various building materials which were not sampled as part of the survey since they were excluded from the scope of work. These materials include, but are not limited to, vermiculite in solid block walls, above solid ceilings and in manufactured wall panels; elevator and lift brakes; high voltage wiring; mechanical packing, ropes and gaskets; exterior cladding, soffit and fascia boards on building; roofing materials, roofing felt/tar; and building paper and refractory materials within boilers. In cases of demolition and/or renovation, all excluded materials shall be assumed asbestos-containing until proven otherwise by bulk sampling and analysis.

In cases where asbestos was identified in some but not all samples of similar materials, the conservative approach was applied and all such material was assumed and reported to contain asbestos. When a renovation is planned, we recommend a detailed sampling of suspected asbestos-containing material to confirm the presence of asbestos. Materials that are removed through renovations should be replaced with non-asbestos-containing materials only. This must be documented. Confirmatory sampling will not be required on any new products if the manufacturer supplies written confirmation that these materials are asbestos-free.

Water damaged building materials were observed in various locations throughout the Subject Location. The locations detailed in this report are based on the observations noted at the time of the site visit and can change if site conditions change. For removal and/or repair operations, these areas should be confirmed on-site.

RESULTS OF SAMPLING AND INSPECTIONS:

Asbestos
Lead
PCBs

Table I.1

Summary of Bulk Samples Analysis Results for the Presence of Asbestos by Polarized Light Microscopy (PLM) with Dispersion Staining

Collected on January 28, 2021

OHE Sample Number	Sample Description	Sample Location	Analysis Results (% and Type of Asbestos)
24918-046-1A	Caulking: red	Duct, Room #MCB20-01	None Detected
24918-046-1B	Caulking: red	Duct, Room #MCB20-01	None Detected
24918-046-1C	Caulking: red	Duct, Room #MCB20-01	None Detected
24918-046-2A	Sealant	Block wall, Room #MC-B20	None Detected
24918-046-2B	Sealant	Block wall, Room #MC-B20	None Detected
24918-046-2C	Sealant	Block wall, Room #MC-B20	None Detected
24918-046-3A	Mortar	Block wall, Room #MC-B20	None Detected
24918-046-3B	Mortar	Block wall, Room #MC-B20	None Detected
24918-046-3C	Mortar	Block wall, Room #MC-B20	None Detected
24918-046-4A	Caulking: grey	Around door frame #1004A, Interior	<0.5% Chrysotile
24918-046-4B	Caulking: grey	Around door frame #1004A, Interior	<0.5% Chrysotile
24918-046-4C	Caulking: grey	Around door frame #1004A, Interior	<0.5% Chrysotile
24918-046-5A	Mortar	Between block and brick wall, Stair #1005	None Detected
24918-046-5B	Mortar	Between block and brick wall, Stair #1005	None Detected
24918-046-5C	Mortar	Between block and brick wall, Stair #1005	None Detected
24918-046-6A	Suspended Ceiling Tiles (SCTs), 4'x2' dots and fissures	Ceiling, Hallway #1004	None Detected
24918-046-6B	SCTs, 4'x2' dots and fissures	Ceiling, Hallway #1004	None Detected
24918-046-6C	SCTs, 4'x2' dots and fissures	Ceiling, Hallway #1004	None Detected
24918-046-7A	Vinyl Floor Tile (VFT): 12"x12", red	Floor, Room #1046	None Detected

Table I.1 (Continued)

OHE Sample Number	Sample Description	Sample Location	Analysis Results (% and Type of Asbestos)
24918-046-7A	Mastic: black	Floor, Room #1046	None Detected
24918-046-7B	VFT: 12”x12”, red	Floor, Room #1046	None Detected
	Mastic: black	Floor, Room #1046	None Detected
24918-046-7C	VFT: 12”x12”, red	Floor, Room #1046	None Detected
	Mastic: black	Floor, Room #1046	None Detected
24918-046-8A	VFT: 12”x12”, creamy	Floor, Room #1046	None Detected
	Mastic: grey	Floor, Room #1046	None Detected
24918-046-8B	VFT: 12”x12”, creamy	Floor, Room #1046	None Detected
	Mastic: grey	Floor, Room #1046	None Detected
24918-046-8C	VFT: 12”x12”, creamy	Floor, Room #1046	None Detected
	Mastic: grey	Floor, Room #1046	None Detected
24918-046-9A	VFT: 12”x12”, brown	Floor, Room #1046	None Detected
	Mastic: grey	Floor, Room #1046	None Detected
24918-046-9B	VFT: 12”x12”, brown	Floor, Room #1046	None Detected
	Mastic: grey	Floor, Room #1046	None Detected
24918-046-9C	VFT: 12”x12”, brown	Floor, Room #1046	None Detected
	Mastic: grey	Floor, Room #1046	None Detected
24918-046-10A	Drywall Joint Compound (DJC)	Wall, Room #1046	None Detected
24918-046-10B	DJC	Wall, Room #1046	None Detected
24918-046-10C	DJC	Wall, Room #1046	None Detected
24918-046-11A	VFT: 12”x12”, green	Floor, Room #1047	None Detected

Table I.1 (Continued)

OHE Sample Number	Sample Description	Sample Location	Analysis Results (% and Type of Asbestos)
24918-046-11A	Mastic: yellow	Floor, Room #1047	None Detected
24918-046-11B	VFT: 12”x12”, green	Floor, Room #1047	None Detected
	Mastic: yellow	Floor, Room #1047	None Detected
24918-046-11C	VFT: 12”x12”, green	Floor, Room #1047	None Detected
	Mastic: yellow	Floor, Room #1047	None Detected
24918-046-12A	Caulking: grey	Around window frame, Room.#1047, Interior	None Detected
24918-046-12B	Caulking: grey	Around window frame, Room #1047, Interior	None Detected
24918-046-12C	Caulking: grey	Around window frame, Room #1047, Interior	None Detected
24918-046-13A	DJC	Column, Lobby #1013	None Detected
24918-046-13B	DJC	Column, Lobby #1013	None Detected
24918-046-13C	DJC	Column, Lobby #1013	None Detected
24918-046-14A	DJC	Wall, Room #1060	None Detected
24918-046-14B	DJC	Wall, Room #1062	None Detected
24918-046-14C	DJC	Wall, Corridor #1058	None Detected
24918-046-14D	DJC	Wall, Room #1056B	None Detected
24918-046-14E	DJC	Wall, Room #1049	None Detected
24918-046-14F	DJC	Wall, Corridor #1055	None Detected
24918-046-14G	DJC	Wall, Room #1059	None Detected
24918-046-15A	Putty: black	Window glaze, Room #1056	None Detected
24918-046-15B	Putty: black	Window glaze, Room #1056	None Detected
24918-046-15C	Putty: black	Window glaze, Room #1056	None Detected

Table I.1 (Continued)

OHE Sample Number	Sample Description	Sample Location	Analysis Results (% and Type of Asbestos)
24918-046-16A	VFT: 12”x12”, beige	Floor, Room #1061	None Detected
	Mastic: grey	Floor, Room #1061	None Detected
24918-046-16B	VFT: 12”x12”, beige	Floor, Room #1061	None Detected
	Mastic: grey	Floor, Room #1061	None Detected
24918-046-16C	VFT: 12”x12”, beige	Floor, Room #1061	None Detected
	Mastic: grey	Floor, Room #1061	None Detected
24918-046-17A	Caulking: expansion joint, grey	Brick wall, Corridor #1102	None Detected
24918-046-17B	Caulking: expansion joint, grey	Brick wall, Corridor #1102	None Detected
24918-046-17C	Caulking: expansion joint, grey	Brick wall, Corridor #1102	None Detected
24918-046-18A	**Tar: black**	**Roof, Around roof penetration**	**10% Chrysotile**
24918-046-18B	**Tar: black**	**Roof, Around roof penetration**	**Not Analyzed (Stop positive)**
24918-046-18C	**Tar: black**	**Roof, Around roof penetration**	**Not Analyzed (Stop positive)**
24918-046-19A	**VFT: 12”x12”, grey**	**Floor, Room #2002**	**3% Chrysotile**
	Mastic: grey	Floor, Room #2002	None Detected
24918-046-19B	**VFT: 12”x12”, grey**	**Floor, Room #2002**	**Not Analyzed (Stop positive)**
	Mastic: grey	Floor, Room #2002	None Detected
24918-046-19C	**VFT: 12”x12”, grey**	**Floor, Room #2002**	**Not Analyzed (Stop positive)**
	Mastic: grey	Floor, Room #2002	None Detected
24918-046-20A	**Caulking: grey**	**Window glaze, Room #2001**	**3% Chrysotile**
24918-046-20B	**Caulking: grey**	**Window glaze, Room #2001**	**Not Analyzed (Stop positive)**
24918-046-20C	**Caulking: grey**	**Window glaze, Room #2001**	**Not Analyzed (Stop positive)**

Table I.1 (Continued)

OHE Sample Number	Sample Description	Sample Location	Analysis Results (% and Type of Asbestos)
24918-046-21A	Mastic: grey	Duct, Room #MC-30	None Detected
24918-046-21B	Mastic: grey	Duct, Room #MC-30	None Detected
24918-046-21C	Mastic: grey	Duct, Room #MC-30	None Detected
24918-046-22A	Sealant	Block wall, Stair #3006	<0.5% Chrysotile
24918-046-22B	**Sealant**	**Block wall, Stair #3006**	**0.5% Chrysotile**
24918-046-22C	**Sealant**	**Block wall, Stair #2009**	**Not Analyzed (Stop positive)**
24918-046-22D	**Sealant**	**Block wall, Stair #3006**	**Not Analyzed (Stop positive)**
24918-046-22E	**Sealant**	**Block wall, Stair #3009**	**Not Analyzed (Stop positive)**
24918-046-22F	**Sealant**	**Block wall, Stair #3009**	**Not Analyzed (Stop positive)**
24918-046-22G	**Sealant**	**Block wall, Stair #2010**	**Not Analyzed (Stop positive)**
24918-046-23A	Caulking: expansion joint, grey	Block wall, Stair #3009	None Detected
24918-046-23B	Caulking: expansion joint, grey	Block wall, Stair #3009	None Detected
24918-046-23C	Caulking: expansion joint, grey	Block wall, Stair #3009	None Detected
24918-046-24A	Caulking: expansion joint, red	Brick wall, Corridor #1058	None Detected
24918-046-24B	Caulking: expansion joint, red	Brick wall, Corridor #1058	None Detected
24918-046-24C	Caulking: expansion joint, red	Brick wall, Corridor #1058	None Detected
24918-046-25A	Mortar	Brick wall, Stair #ST-02	<0.5% Chrysotile
24918-046-25B	Mortar	Brick wall, Stair #ST-1004	<0.5% Chrysotile
24918-046-25C	Mortar	Brick wall, Corridor #1048	<0.5% Chrysotile
24918-046-26A	Putty: black	Around glass and window frame, Room #1045, Exterior	None Detected
24918-046-26B	Putty: black	Around glass and window frame, Room #1045, Exterior	None Detected

Table I.1 (Continued)

OHE Sample Number	Sample Description	Sample Location	Analysis Results (% and Type of Asbestos)
24918-046-26C	Putty: black	Around glass and window frame, Room #1045, Exterior	None Detected
24918-046-27A	Caulking: light beige	Around door frame, Area #1004A, Exterior	None Detected
24918-046-27B	Caulking: light beige	Around door frame, Area #1004A, Exterior	None Detected
24918-046-27C	Caulking: light beige	Around door frame, Area #1004A, Exterior	None Detected
24918-046-28A	Caulking: expansion joint, light pink	Wall around the pool, Exterior	None Detected
24918-046-28B	Caulking: expansion joint, light pink	Wall around the pool, Exterior	None Detected
24918-046-28C	Caulking: expansion joint, light pink	Wall around the pool, Exterior	None Detected

Table I.2

Summary of Bulk Sample Analysis Results for the Presence of Lead by Flame Atomic Absorption Spectrometry (AAS)

Collected on January 28, 2021

OHE Sample Number	Sample Description	Sample Location	Contains Lead by weight (%)
24918-046-L1	**Yellow Paint**	**Block wall, Stairway #ST-01**	**0.20**
24918-046-L2	**Brown paint**	**Door frame, Room #MC-B22**	**0.075**
24918-046-L3	Blue paint	Door frame, Room #1043	<0.0097
24918-046-L4	Light green	Block wall, Hallway #1048	<0.018
24918-046-L5	**White paint**	**Block wall, Room #1082**	**0.013**
24918-046-L6	Dark yellow paint	Block wall, Room #1082	<0.0083
24918-046-L7	Blue paint	Brick wall, Room #1081	<0.021
24918-046-L8	Grey paint	Block wall, Gym, Room #2001	<0.015

Table I.2 (Continued)

OHE Sample Number	Sample Description	Sample Location	Contains Lead by weight (%)
24918-046-L9	Orange paint	Block wall, Room #2004	<0.015
24918-046-L10	**Purple paint**	**Block wall, Room #2004**	**0.019**
24918-046-L11	**Red paint**	**Block wall, Room #2004B**	**0.018**
24918-046-L12	Blue paint	Drywall, Corridor #1050	<0.017

Table I.3

Summary of the Visual Inspection of the Light Ballasts for PCBs Content

Manufacturer	Quantity Verified	Room #	Markings	Containing PCB
Universal	1	Room #1062	Electronic Ballast	No

REASSESSMENT OF DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS

Kiwanis Youth Centre for Sports Excellence
247 McMurphy Avenue South
Brampton, Ontario

Prepared For:

City of Brampton
2 Wellington Street West
Brampton, Ontario

Presented by:

ECOH
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ECOH Project No.: 25703-23-06

September 29, 2023

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1.0 INTRODUCTION

ECOH Management Inc. (ECOH) was retained by the City of Brampton to conduct a reassessment of designated substances and hazardous materials of the Kiwanis Youth Centre for Sports Excellence located at 247 McMurphy Avenue South, Brampton, Ontario (hereby referred to as the "facility" or "project area").

Building Information	
Building Use	Recreation
Number of Floors/Levels	Three (3) floors and a basement
Total Area (ft^2)	38,527 ft^2
Year of Construction	1971
Significant Additions or Renovations	Not Known
Structure	Masonry
Exterior	Masonry, Brick
Flooring	Vinyl Floor Tiles, Vinyl Sheet Flooring, Carpet, Wood, Ceramic Tiles, and Concrete
Interior Walls	Drywall, Brick, and Masonry
Ceiling	Suspended Ceiling Tiles, Drywall, and Open Deck

The assessment was performed to verify the established locations and type of designated substances and hazardous building materials incorporated in the facility's structure(s) and its finishes, and to provide recommendations as necessary to fulfil requirements set forth under the Ontario Occupational Health and Safety Act and associated regulations.

Mr. Joey Huynh of ECOH performed the fieldwork on April 14, 2023.

The assessment was performed for the purposes of long-term management of designated substances and hazardous materials contained within building materials, and not for construction or renovation purposes. An additional pre-renovation/pre-demolition assessment for designated substances and hazardous materials should be conducted prior to any future demolition, renovation or maintenance activities that may disturb building materials that potentially contain designated materials or hazardous substances.

2.0 METHODOLOGY AND SCOPE

The methodology and scope of the assessment completed at this site are detailed in the overview document titled "Designated Substances & Hazardous Materials Assessment Scope of Work and Methodology Report", dated April 2020, prepared by ECOH. A copy of this document is available from the City of Brampton, and forms part of this report by reference.

For the purpose of this assessment ECOH reviewed the following:

- *"Hazardous Building Materials Survey",* Kiwanis Youth Centre for Sports Excellence, 247 McMurphy Avenue South, Brampton, ON, OHE Consultants. Project No. 24918-046, dated: April 2021.

Evaluation Criteria and Abatement Priority Matrix

The recommendations for remediation are based on the evaluation criteria and Abatement Priority Matrix Table provided in Appendix I of the aforementioned, "Assessment of Designated Substances and Hazardous Materials", dated April 2020. The following is a prioritized list of typical short-term actions.

PRIOIRTY 1	**Immediate Abatement Required**
PRIORITY 2	**Abatement Required Prior to Disturbance**
PRIORITY 3	**Abatement Required if Material is Affected Either Through Renovation or Disturbance. Inspect Materials at Regular Intervals.**

3.0 FINDINGS

Material	Findings
Asbestos	Confirmed ACM were identified in the facility as follows: • Non-friable black tar as a component of roof penetrations, • Non-friable vinyl floor tiles as a component of floors is present in Room 2002, • Non-friable grey caulking as a component of windows is present in Room 2001, • Non-friable sealant as a component of walls is present throughout the facility. All confirmed ACM materials observed were found to be in GOOD condition at the time of the survey.
Lead	Four (4) lead-based paints were observed in the facility. • Yellow paint on wall of ST-01,

Material	Findings
	• Brown paint on wall of Room MC-B22, • Purple paint on wall of Room 2004, • Red paint on wall of Room 2004, and • White paint on wall of Room 1082. No other major sources of lead or lead-containing products were identified during the survey; however, lead may be present in: • Paint in layers below top layer, • Ceramic tile glazing, • Wiring connectors and electric cable sheathing, and • Piping and solder joints/bell-and-spigot joints on piping.
Mould	Mould was not identified in the facility at the time of the assessment.
Mercury	Minor quantities are present as a vapour within fluorescent tubes lights and as a possible constituent of paints and adhesives.
Silica	Present in all concrete and masonry products.
Polychlorinated Biphenyls (PCBs)	Assumed to be present as a component of ballasts for fluorescent lights/ high-intensity discharge (HID) lights. Light fixtures within the facility were inspected and labelled “No PCBs”.
Benzene	No potential sources of Benzene were identified.
Other Designated Substances and Hazardous Materials	Acrylonitrile, Arsenic, Coke Oven Emissions, Ethylene Oxide, Isocyanates, and Vinyl Chloride Monomer were not noted in significant quantities or forms, if at all.
Underground/ Aboveground Storage Tanks (UST/AST)	UST/AST were not observed within the facility.

Further findings are presented in attached Appendices:

- Appendix I – Survey Drawings, depicting the location of presumed and assumed asbestos-containing materials and room location numbers referenced throughout the report.
- Appendix II – Inventory of Hazardous Materials, providing a general description of the quantity or nature of the designated substance identified in each location within the facility.
- Appendix III – Observation Report, documenting instances of damaged hazardous materials and/or mould growth.

- Appendix IV – Results of Bulk Sample Analysis, providing a summary of all bulk sampled collected as well as laboratory chain of custodies and certificates of analyses.
- Appendix V – Inventory of Underground/Aboveground Storage Tanks (UST/AST).

4.0 RECOMMENDATIONS

The following details the specific recommendations for the facility:

- All Designated Substances and Hazardous Materials identified on-site are present in good condition with no immediate remedial action required.
- General recommendations for compliance with applicable regulations have been provided in overview document titled “Assessment of Designated Substances and Hazardous Materials”, dated April 2020, prepared by ECOH. A copy of this document is available from the City of Brampton.
- As confirmed ACM was identified within the facility, an Asbestos Management Plan (AMP) must be implemented. Refer to the aforementioned overview document for more details.
- Prior to future construction or renovation projects, additional assessments will be required to confirm the presence of Designated Substances that have been assumed to be on-site and/or that may be present in concealed areas (such as above solid ceilings). The impact to Designated Substances during future construction or renovation work should be assessed on a project-by-project basis.

5.0 LIMITATIONS OF ASSESSMENT

Due to the nature of building construction and on-going building activities, some limitations exist as to the possible thoroughness of a building survey. The field observations, measurements and analysis are considered sufficient in detail and scope to form a reasonable basis for the findings and conclusions presented in this report. The findings and conclusions drawn by ECOH Management Inc. (ECOH) are limited to the specific scope of work for which ECOH was retained and are based solely on information generated as a result of the specific scope of work authorized by the City of Brampton. The results of the assessment are limited to visual inspection of areas made accessible to ECOH personnel and information obtained from facility personnel, when obtained.

ECOH warrants that the findings and conclusions contained herein have been made in accordance with generally accepted evaluation methods in the industry

and applicable regulations at the time of the performance of the assessment. However, there is no warranty, expressed or implied, that this assessment has uncovered all environmental concerns on the subject site. In addition, ECOH cannot guarantee the completeness or accuracy of information supplied by a third party.

This report was prepared by ECOH for the City of Brampton. The material in it reflects ECOH's professional interpretation of information available at the time of report preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. ECOH accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. Should additional information become available that suggests other environmental issues of concern beyond that described in this report, ECOH retains the right to review this information and modify conclusions and recommendations presented in this report accordingly.

6.0 CLOSURE

Should there be any questions regarding the contents of this report, please contact the undersigned at 905-795-2800.

ECOH
Environmental Consulting
Occupational Health

Prepared by:

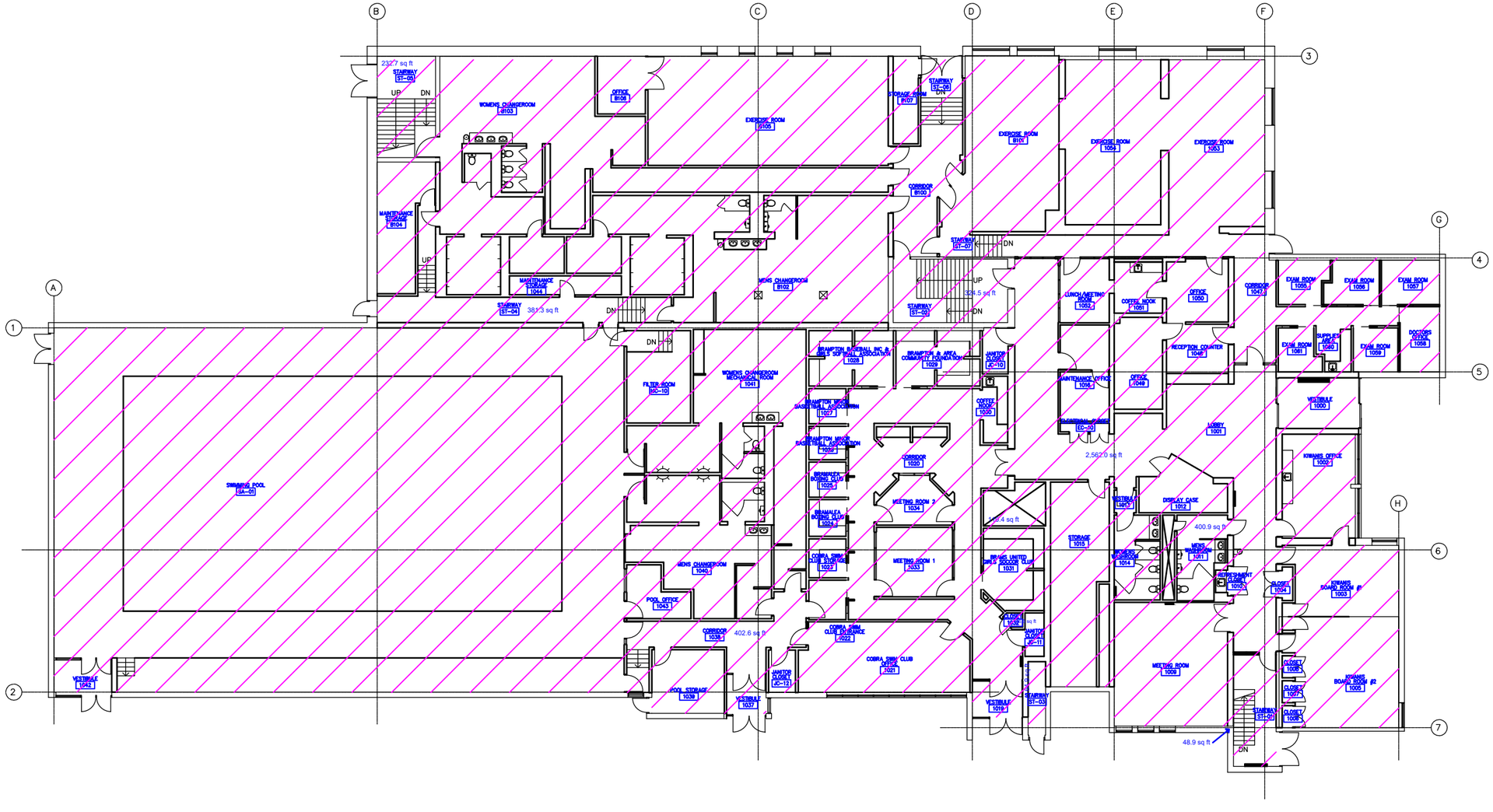
Joey Huynh, B.Sc. (Hons.)
Senior Environmental Scientist

Reviewed by:

Steve Bizi
Senior Project Manager

APPENDIX I

SURVEY DRAWINGS



Legend

1001	Location Numbers
	Asbestos-Containing Block Wall Sealant 1
	Asbestos-Containing Block Wall Sealant 2
	Asbestos-Containing Block Wall Sealant 3
	Asbestos-Containing Black Tar

Note:
Asbestos-Containing Sealant is present on Block Walls throughout the Facility.

Asbestos-Containing Tar is present through the roof of the Facility.

All information relating to room size and location is approximate and for visual aid only. ECOH does not guarantee the drawing to be complete, absolute, accurate or current. The drawing should not be used by any party in lieu of obtaining architectural drawings.

Figure 1

First Floor Plan

BUILDING NAME:
Kiwanis Youth Centre for Sports Excellence

LOCATION:
247 McMurphy Avenue South,
Brampton, Ontario

PROJECT:
Asbestos Reassessment Survey

CLIENT: City of Brampton			
PROJECT NUMBER: 25703-S-009-01	**DATE:** May 2023	**DRW BY:** EM	
CAD FILE: FIG1-4 P25703-S-009-01 Kiwanis Youth Centre	**SCALE:** Not to Scale	**CHK BY:** SB	

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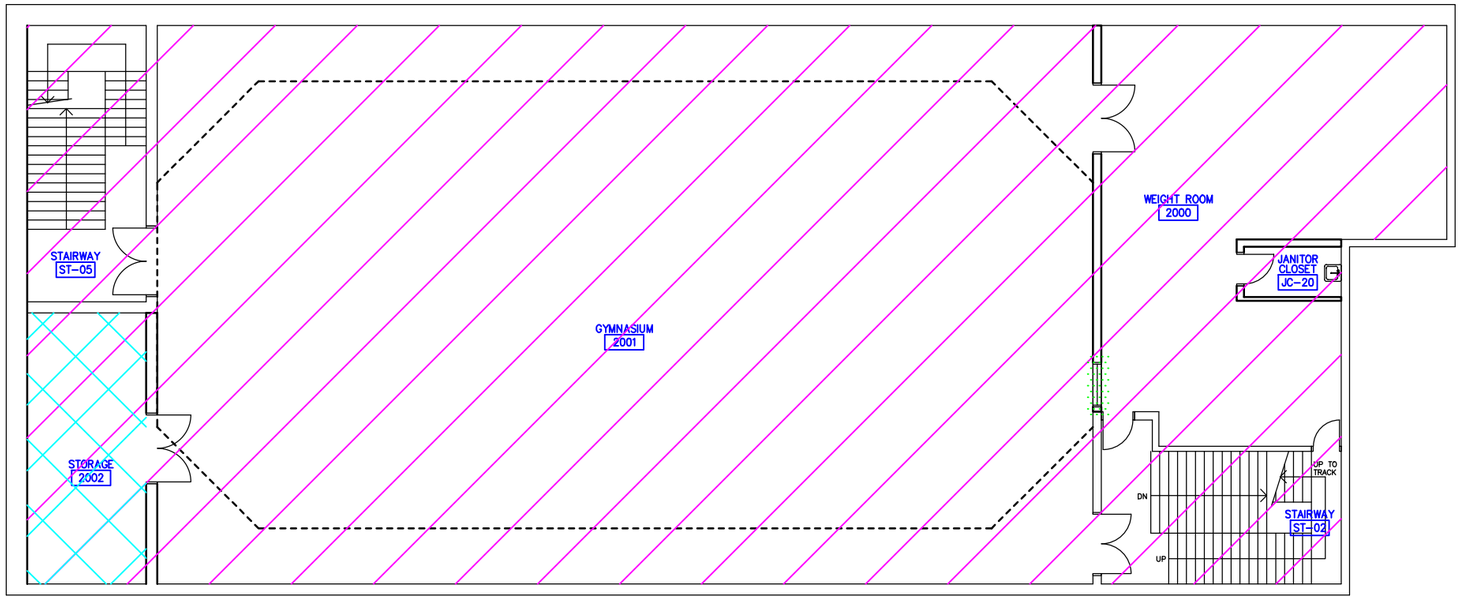

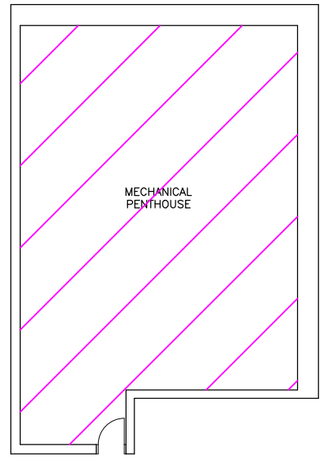

Legend

1001	Location Numbers
	Asbestos-Containing Block Wall Sealant 1
	Asbestos-Containing Block Wall Sealant 2
	Asbestos-Containing Block Wall Sealant 3
	Asbestos-Containing Black Tar

Note:
Asbestos-Containing Sealant is present on Block Walls throughout the Facility.

Asbestos-Containing Tar is present through the roof of the Facility.

All information relating to room size and location is approximate and for visual aid only. ECOH does not guarantee the drawing to be complete, absolute, accurate or current. The drawing should not be used by any party in lieu of obtaining architectural drawings.

Figure 2

Second Floor & Mechanical Penthouse Floor Plan

BUILDING NAME:
Kiwanis Youth Centre for Sports Excellence

LOCATION:
247 McMurphy Avenue South,
Brampton, Ontario

PROJECT:
Asbestos Reassessment Survey

CLIENT: City of Brampton			
PROJECT NUMBER: 25703-S-009-01	**DATE:** May 2023	**DRW BY:** EM	
CAD FILE: FIG1-4 P25703-S-009-01 Kiwanis Youth Centre	**SCALE:** Not to Scale	**CHK BY:** SB	

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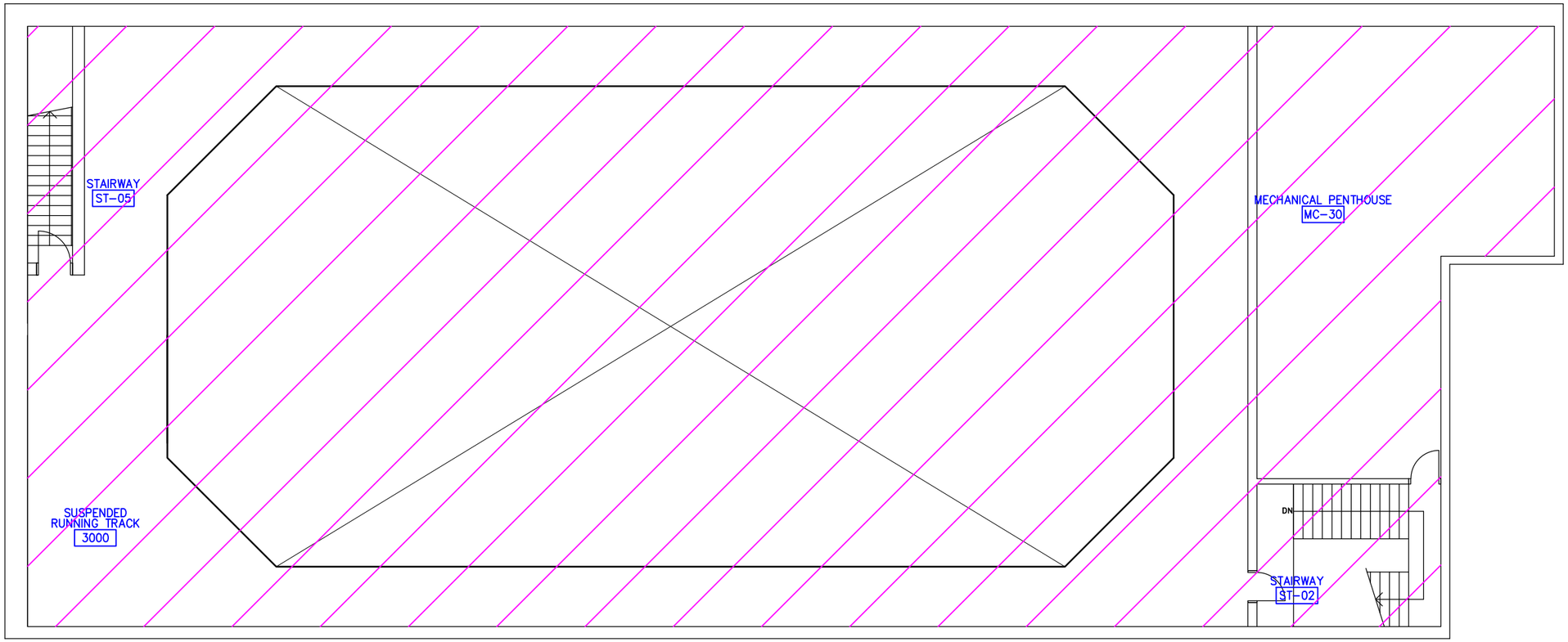
3rd Level Mechanical



Legend

1001	Location Numbers
	Asbestos-Containing Block Wall Sealant 1
	Asbestos-Containing Block Wall Sealant 2
	Asbestos-Containing Block Wall Sealant 3
	Asbestos-Containing Black Tar

Note:
Asbestos-Containing Sealant is present on Block Walls throughout the Facility.

Asbestos-Containing Tar is present through the roof of the Facility.

All information relating to room size and location is approximate and for visual aid only. ECOH does not guarantee the drawing to be complete, absolute, accurate or current. The drawing should not be used by any party in lieu of obtaining architectural drawings.

Figure 3

Third Floor Plan

BUILDING NAME:
Kiwanis Youth Centre for Sports Excellence

LOCATION:
247 McMurphy Avenue South,
Brampton, Ontario

PROJECT:
Asbestos Reassessment Survey

CLIENT: City of Brampton			
PROJECT NUMBER: 25703-S-009-01	**DATE:** May 2023		**DRW BY:** EM
CAD FILE: FIG1-4 P25703-S-009-01 Kiwanis Youth Centre	**SCALE:** Not to Scale		**CHK BY:** SB

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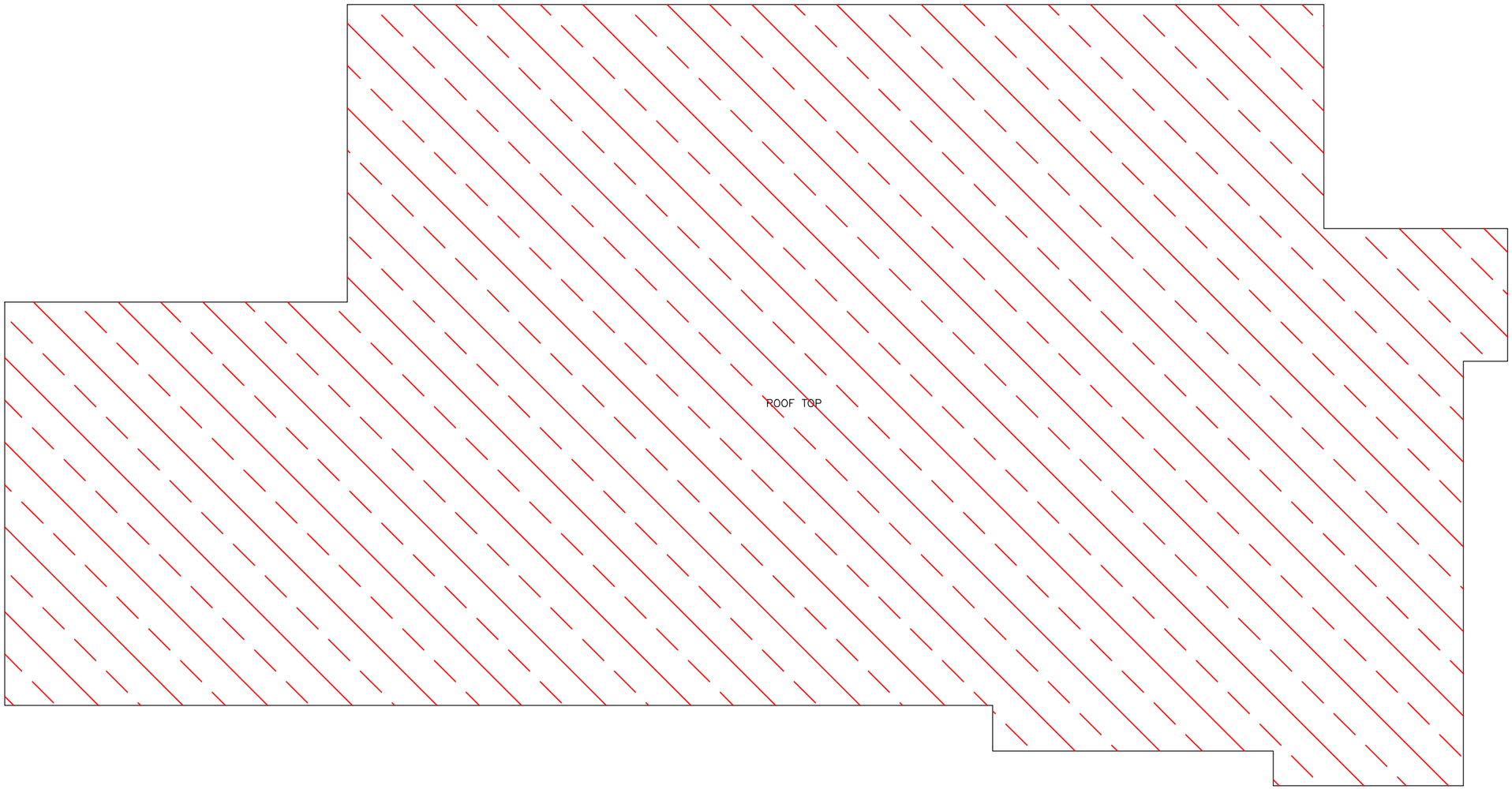

Legend

1001	Location Numbers
	Asbestos-Containing Block Wall Sealant 1
	Asbestos-Containing Block Wall Sealant 2
	Asbestos-Containing Block Wall Sealant 3
	Asbestos-Containing Black Tar

Note:
Asbestos-Containing Sealant is present on Block Walls throughout the Facility.

Asbestos-Containing Tar is present through the roof of the Facility.

All information relating to room size and location is approximate and for visual aid only. ECOH does not guarantee the drawing to be complete, absolute, accurate or current. The drawing should not be used by any party in lieu of obtaining architectural drawings.

Figure 4

Roof Floor Plan

BUILDING NAME:
Kiwanis Youth Centre for Sports Excellence

LOCATION:
247 McMurphy Avenue South,
Brampton, Ontario

PROJECT:
Asbestos Reassessment Survey

CLIENT: City of Brampton			
PROJECT NUMBER: 25703-S-009-01	**DATE:** May 2023	**DRW BY:** EM	
CAD FILE: FIG1-4 P25703-S-009-01 Kiwanis Youth Centre	**SCALE:** Not to Scale	**CHK BY:** SB	

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APPENDIX II

INVENTORY OF IDENTIFIED HAZARDOUS MATERIALS

Hazardous Materials Summary Table

Room Name & Number/ ID	Surface	Material Observed	Potential Hazardous Material	Condition	Friable/ Non-Friable	Quantity	Sample Id.	Abatement Priority	Estimated Abatement Cost
MCB20-01	Duct	Caulking: red	No asbestos detected				24918-046-1A to 24918-046-1C		–
MC-B20	Block wall	Sealant	No asbestos detected				24918-046-2A to 24918-046-2C		–
MC-B20	Block wall	Mortar	No asbestos detected				24918-046-3A to 24918-046-3C		–
MC-B22	**Door**	**Brown paint**	**0.075% lead**	**Intact**			**24918-046-L2**	**3**	**–**
1004A	Door	Caulking:	NO asbestos				24918-046-4A to 24918-046-4C		–
1004	Ceiling	SCTs	No asbestos detected				24918-046-6A to 24918-046-6C		–
1005	Block wall	Mortar	No asbestos				24918-046-5A to 24918-046-5C		–
1013	Column	DJC	No asbestos detected				24918-046-13A to 24918-046-13C		–
1043	Door	Blue paint	NO lead detected				24918-046-L3		–
1046	Floor	VFTs	No asbestos detected				24918-046-7A to 24918-046-7C		–
1046	Floor	Mastic: black	No asbestos detected				24918-046-7A to 24918-046-7C		–

Hazardous Materials Summary Table

Room Name & Number/ ID	Surface	Material Observed	Potential Hazardous Material	Condition	Friable/ Non-Friable	Quantity	Sample Id.	Abatement Priority	Estimated Abatement Cost
1046	Floor	VFTs	No asbestos detected	–	–	–	24918-046-8A to 24918-046-8C	–	–
1046	Floor	Mastic: grey	No asbestos detected	–	–	–	24918-046-8A to 24918-046-8C	–	–
1046	Floor	VFTs	No asbestos detected	–	–	–	24918-046-9A to 24918-046-9C	–	–
1046	Floor	Mastic: grey	No asbestos	–	–	–	24918-046-9A to 24918-046-9C	–	–
1046	wall	DJC	No asbestos detected	–	–	–	24918-046-10A to 24918-046-10C	–	–
1047	Floor	VFTs	No asbestos	–	–	–	24918-046-11A to 24918-046-11C	–	–
1047	Floor	Mastic: yellow	NO asbestos detected	–	–	–	24918-046-11Ato 24918-046-11C	–	–
1047	Window	Caulking:	NO asbestos detected	–	–	–	24918-046-12A to 24918-046-12C	–	–
1048	Wall	Light green	No lead detected	–	–	–	24918-046-L4	–	–
1048	Brick wall	Mortar	No asbestos detected	–	–	–	24918-046-25C	–	–

Hazardous Materials Summary Table

Room Name & Number/ ID	Surface	Material Observed	Potential Hazardous Material	Condition	Friable/ Non-Friable	Quantity	Sample Id.	Abatement Priority	Estimated Abatement Cost
1049	Wall	DJC	No asbestos	–	–	–	24918-046-14E	–	–
1055	Wall	DJC	No asbestos detected	–	–	–	24918-046-14F	–	–
1056B	Wall	DJC	No asbestos	–	–	–	24918-046-14D	–	–
1056	Window	Putty. black	No asbestos detected	–	–	–	24918-046-15A to 24918-046-15C	–	–
1058	Floor	DJC	No asbestos detected	–	–	–	24918-046-14C	–	–
1058	Brick wall	Caulking: red	No asbestos detected	–	–	–	24918-046-24A to 24918-046-24C	–	–
1059	Wall	DJC	No asbestos detected	–	–	–	24918-046-14G	–	–
1060	Wall	DJC	No asbestos detected	–	–	–	24918-046-14A	–	–
1061	Floor	VFTs	No asbestos detected	–	–	–	24918-046-16A to 24918-046-16C	–	–
1061	Floor	Mastic: grey	No asbestos detected	–	–	–	24918-046-16A to 24918-046-16C	–	–

Hazardous Materials Summary Table

Room Name & Number/ID	Surface	Material Observed	Potential Hazardous Material	Condition	Friable/ Non-Friable	Quantity	Sample Id.	Abatement Priority	Estimated Abatement Cost
1062	Wall	DJC	No asbestos detected	_	_	_	24918-046-14B	_	_
1081	Wall	Blue paint	No lead detected	_	_	_	24918-046-L7	_	_
1082	**Wall**	**White paint**	**0.013% lead**	**Intact**	_	_	**24918-046-L5**	**3**	_
1082	Wall	Dark yellow Paint	No lead detected	_	_	_	24918-046-L6	_	_
1102	Brick wall	Caulking:	No asbestos detected	_	_	–	24918-046-17A to 24918-046-17C	–	–
2001	Block wall	Grey paint	No lead detected	_	_	_	24918-046-L8	_	_
2001	**Window**	**Caulking:**	**3% Chrysotile**	**Intact**	**Non-friable**	**10 lf**	**24918-046-20A**	**3**	
2001	Window	Caulking:	Not analyzed	_	_	–	24918046-20B to 24918-046-20C	–	–
2002	**Floor**	**VFTs**	**3% Chrysotile**	**Intact**	**Non-friable**	**350 sf**	**24918-046-19A**	**3**	
2002	Floor	Mastic: grey	No asbestos detected	_	_	–	24918-046-19A to 24918-046-19C	–	–
2004	Block wall	Orange paint	No lead detected	_	_	_	24918-046-L9	_	_
2004	**Block wall**	**Purple paint**	**0.019% lead**	**Intact**	_	_	**24918-046-L10**	_	_

Hazardous Materials Summary Table

Room Name & Number/ID	Surface	Material Observed	Potential Hazardous Material	Condition	Friable/ Non-Friable	Quantity	Sample Id.	Abatement Priority	Estimated Abatement Cost
2009	Block wall	Sealant	Not analyzed (Presumed Asbestos-Containing)	–	–	–	24918-046-22C	3	–
2010	Block wall	Sealant	Not analyzed (Presumed Containing)	–	–	–	24918-046-22G	3	–
3006	Block wall		Not analyzed (Presumed Asbestos-Containing)	–	–	–	24918-046-22A	3	–
3006	**Block wall**	**Sealant**	**0.5% Chrysotile**	**Intact**	**Nonfriable**	**throughout**	**24918-046-22B**	**3**	–
3006	Block wall	Sealant	Not analyzed (Presumed Asbestos-Containing)	–	–	–	24918-046-22D	3	–
3009	Block wall	Sealant	Not analyzed (Presumed Containing)	–	–	–	24918-046-22E to 24818-046-22F	3	–
3009	Block wall	Caulking:	No asbestos detected	–	–	–	24918-046-23Ato 24818-046-23C	–	–
MC-30	Duct	Mastic: grey	No asbestos detected	–	–	–	24918-046-21A to 24818-046-21C	–	–
ST-0l	**Block wall**	**Yellow paint**	**0.20% lead**	**Intact**			**24918-046-LI**	**3**	–
ST-02	Brick wall	Mortar	No asbestos detected	–	–	–	24918-046-25A	–	–

Hazardous Materials Summary Table

ST- 1004	Brick wall	Mortar	No asbestos detected	–	–	–	24918-046-25B	–	–
1004A, Exterior	Door	Caulking: light beige	No asbestos detected	–	–	–	24918-046-27A to 24818-046-27C	–	–
1045, Exterior	Window	Puttt	No asbestos detected	–	–	–	24918-046-26A to 24818-046-26C	–	–
Wall around Pool	Wall	Caulking: light pink	No asbestos detected	–	–	–	24918-046-28Ato 24818-046-28C	–	–
Roof	**Floor**	**Tar: black**	**10% Chrysotile**	**Intact**	**Non-friable**	**5 sf**	**24918-046-18A**	**3**	–
Room 2004B	**Block wall**	**Red paint**	**0.018% lead**	**Intact**	–	–	**24918-046-LII**	**3**	–
Corridor # 1055	Wall	Blue paint	<0.017% lead	–	–	–	24918-046-L12		–

Legend

Condition	Intact (no visible damage), Minor Damage (small amounts broken, scrapped, deteriorated), Severe Damage (serious damage observed)
Potential for Damage	Low = low traffic, minor air turbulence, low vibration, Moderate = moderate traffic, air movement, vibration, Height = Likelihood of disturbance is high
Abatement Priority	1 = immediate abatement required, 2 = abatement required within 12 months, 3 = abatement required if material is affected either through renovation or disturbance

APPENDIX III

OBSERVATION REPORT

Client Name:	**Site Location:**	**Project No.**
City of Brampton	Kiwanis Youth Centre for Sports Excellence, 247 McMurphy Avenue South, Brampton, ON	25703-23-06

Photo No. 1. **Date:** April 14, 2023 **Location:** Roof **Description:** Asbestos-containing (10% Chrysotile) black tar on roof penetrations.	**No Photo Available**

Photo No. 2. **Date:** April 14, 2023 **Location:** Various Locations **Description:** Asbestos-containing (0.5% Chrysotile) sealant on block walls. This was observed to be in GOOD condition.	

Client Name:	**Site Location:**	**Project No.**
City of Brampton	Kiwanis Youth Centre for Sports Excellence, 247 McMurphy Avenue South, Brampton, ON	25703-23-06

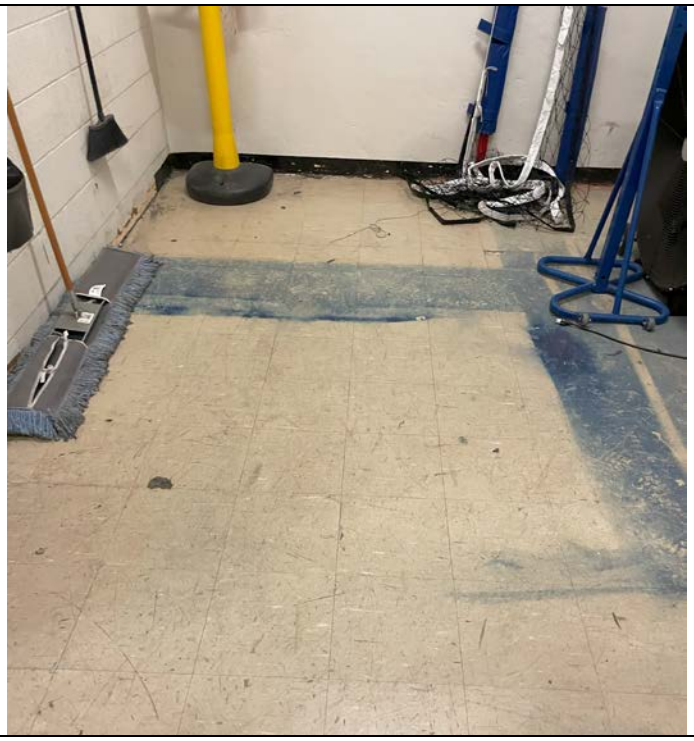
Photo No. 3. **Date:** April 14, 2023 **Location:** Room 2002 **Description:** Asbestos-containing (3% Chrysotile) vinyl floor tiles on floors. This was observed to be in GOOD condition.	

Photo No. 4. **Date:** April 14, 2023 **Location:** Room 1009 **Description:** Asbestos-containing (3% Chrysotile) grey caulking on window. This was observed to be in GOOD condition.	

Client Name:	**Site Location:**	**Project No.**
City of Brampton	Kiwanis Youth Centre for Sports Excellence, 247 McMurphy Avenue South, Brampton, ON	25703-23-06

Photo No. 5. **Date:** April 14, 2023 **Location:** Room MC-B20 **Description:** Lead-containing brown paint on door. This was observed to be in GOOD condition.	

Photo No. 6. **Date:** April 14, 2023 **Location:** Room ST-01 **Description:** Lead-containing yellow paint on walls. This was observed to be in GOOD condition.	

Client Name:	**Site Location:**	**Project No.**
City of Brampton	Kiwanis Youth Centre for Sports Excellence, 247 McMurphy Avenue South, Brampton, ON	25703-23-06

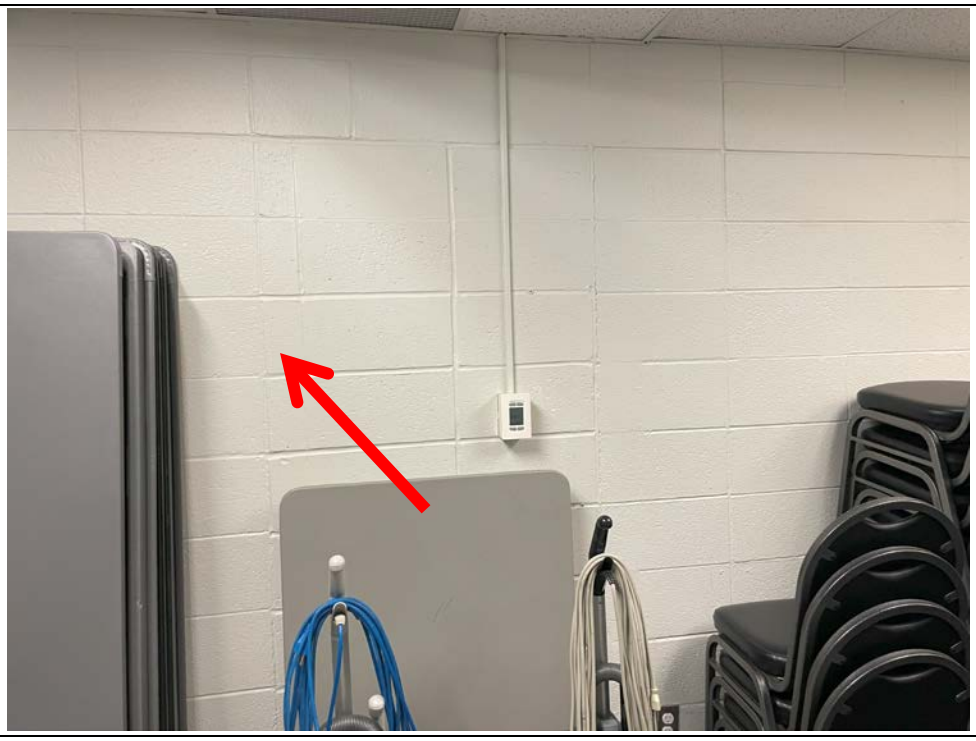
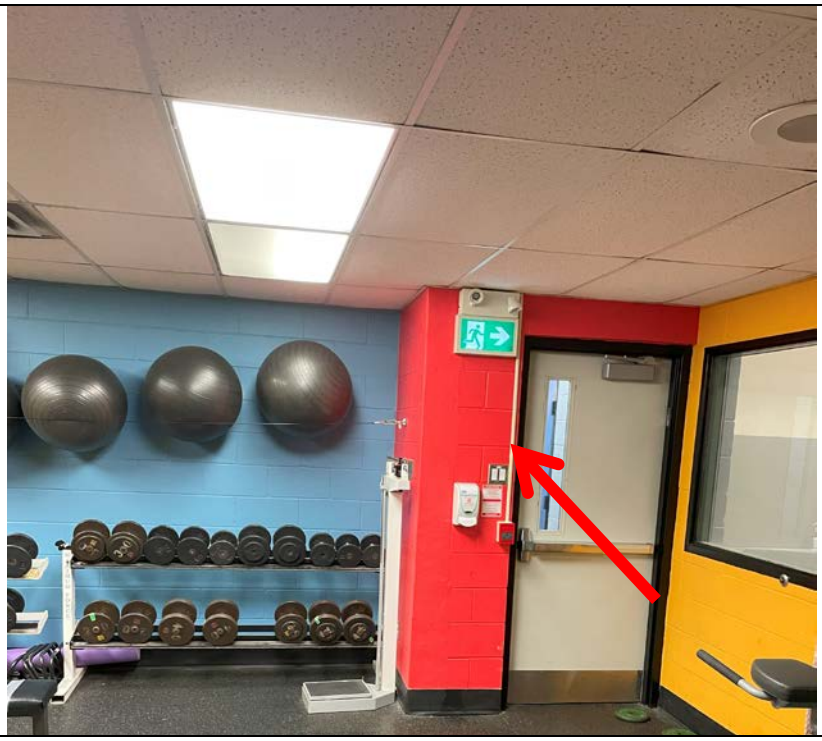
Photo No. 7. **Date:** April 14, 2023 **Location:** Room 1082 **Description:** Lead-containing white paint on walls. This was observed to be in GOOD condition.	

Photo No. 8. **Date:** April 14, 2023 **Location:** Room 2000 **Description:** Lead-containing purple paint on wall. This was observed to be in GOOD condition.	

Client Name:	**Site Location:**	**Project No.**
City of Brampton	Kiwanis Youth Centre for Sports Excellence, 247 McMurphy Avenue South, Brampton, ON	25703-23-06

Photo No. 9.	
Date: April 14, 2023	
Location: Room 2000	
Description: Lead-containing red paint on wall. This was observed to be in GOOD condition.	

APPENDIX IV

RESULTS OF BULK SAMPLE ANALYSIS
(NO INFORMATION TO REPORT)

APPENDIX V

INVENTORY OF UST/AST STORAGE TANKS

(NO INFORMATION TO REPORT)

Project Description:	Level 1 & 2 Mould Abatement		**Page 1 of 5**
Project Location:	Kiwanis Youth Centre, 247 McMurchy Avenue South, Brampton, ON Cobra Swim Entrance (Loc. 1037), Janitor's Closet (Loc. JC-12)		
Report Details:	Inspection Report		
Date:	June 6, 2022	**ECOH Project No.:**	**25769-40**

1. INTRODUCTION

ECOH Management Inc. (ECOH) was retained by City of Brampton to conduct visual inspections prior to, during and following the abatement of mould growth on drywall within Cobra Swim Entrance (Loc. 1037) and water damaged paint on concrete block wall within Janitor's Closet (Loc. JC-12) of Kiwanis Youth Centre located at 247 McMurchy Avenue South, Brampton, ON (here referred to as the "Project Area").

Due to the presence of water-damaged materials, Level 1 & 2 mould safety precautions were required. The mould abatement followed recommendations of the assessment conducted on April 11, 2022, and detailed in:

- "*Mould Assessment and Scope of Work for Abatement" – Cobra Swim Entrance (Loc. 1037), Janitor's Closet (Loc. JC-12) – Ground Floor, Kiwanis Youth Centre, 247 McMurchy Ave. S, Brampton, ON, ECOH Project No. 25769-40, dated: April 19, 2022*.

All remediation work was performed by Furcon Environmental Inc. (Furcon). All mould abatement work was performed following Environmental Abatement Council of Canada (EACC) document, *Mould Abatement Guidelines, 3rd Edition* – 2015.

2. ACTIVITIES

1. Mr. Hasan Rahman of ECOH were on site to monitor the abatement work on May 17, 2022.
2. Prior to commencement of abatement work, the ECOH inspector met with Furcon Site Supervisor to discuss planned work activities. It was agreed that Level 1 and 2 mould safety procedures and general lead safety procedures were suitable for the planned work. The full scope of work is detailed below in Table 1:

Table 1 - Scope of Work

Project Area	Material & Location	Quantity	Precautions
Cobra Swim Entrance (Loc. 1037)	Mould-affected drywall and ceramic tile baseboard on east wall	80 SF	**Level 2**
	Water-damaged drywall and ceramic tile baseboard on west wall	10 SF	**Level 2**
Janitor's Closet (Loc. JC-12)	Water damaged peeling orange paint on south concrete block wall	20 SF	**Level 1**

3. Visual inspections during renovation/clean-up work revealed the following in all work areas:
   a) Clearly visible signs were posted indicating warning of health hazard, as per mould guidelines.
   b) National Institute of Occupational Safety and Health (NIOSH) approved respirators were properly used by all people entering the work areas (i.e., half-face respirators, or better).
   c) Protective clothing was properly used by all people entering the work areas. Protective clothing was made of material that does not readily retain nor permit penetration of dust and biological contaminants, consisted of head covering and fully body covering that fits snugly at the ankles, wrists, and neck, and shall include suitable footwear.
   d) Only persons wearing protective clothing and suitable respiratory protection entered the work areas.
   e) Ventilation ducts, to and from the work area, were sealed.
   f) Eating, drinking, chewing, or smoking was not observed.
   g) Drop sheets were used in work areas to reduce the spread of debris materials.
   h) The integrity of enclosures/work areas was maintained at all times.
   i) Compressed air was not used to clean up and remove dust from any surface.
   j) Waste was bagged, and independently sealed, prior to leaving the work site.
   k) Debris was collected in polyethylene sheeting and bags.
4. Visual inspections were completed prior to, during, and following clean-up. Any deficiencies were communicated to Furcon and rectified accordingly.
5. Following remediation of mould-affected materials, Furcon cleaned all underlying surfaces within the work areas using a HEPA-filtered vacuum and wet wiping procedures.
6. ECOH performed a final visual inspection of the work areas upon completion of the work. Vertical and horizontal surfaces were free of any obvious dust, debris, and suspect or visible mould.
7. Abatement of mould-affected materials was completed, as per the scope. No further abatement activities are required within the Project Area.

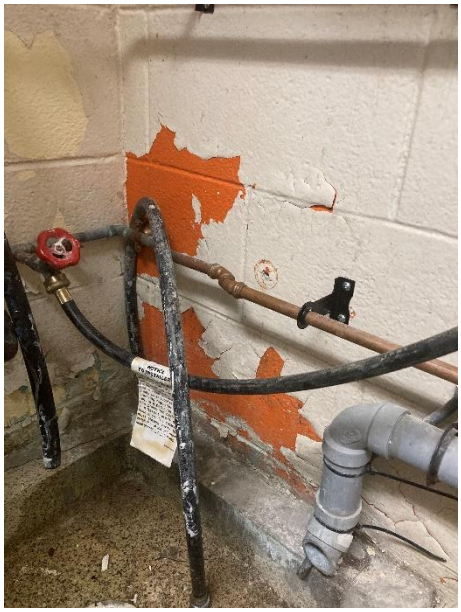


Photo 1: Visible water-damaged/peeling paint on concrete block wall (Loc. JC-12)

Photo 2: Concrete block wall after abatement (Loc. JC-12)

Photo 3: Water-damaged drywall on west wall prior to abatement (Loc. 1037)

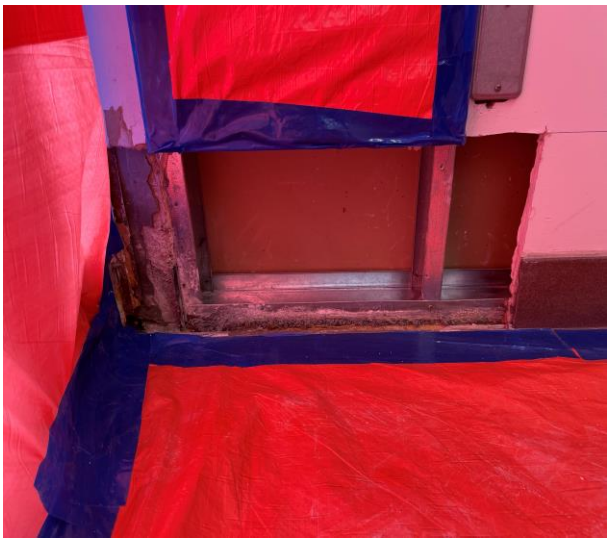


Photo 4: Drywall on west wall after abatement (Loc. 1037)

Photo 5: Water-damaged drywall on east wall prior to abatement (Loc. 1037)

Photo 6: Drywall on east wall after abatement (Loc. 1037)

3. CONCLUSIONS AND RECOMMENDATIONS

Visual inspections support that control measures were effective, and that health and safety requirements were met. Based on the visual assessment of previous mould-affected materials in the Project Area, ECOH recommends:

1. Regularly monitor the affected areas for potential condensation and leaks that may support mould growth. If condensation and/or leaks develop, investigate and address cause(s).

4. LIMITATIONS

This report was prepared for the exclusive use of City of Brampton and is based on the mould abatement inspection of the subject area located at Kiwanis Youth Centre, 247 McMurchy Avenue South, Brampton, Ontario on May 17, 2022. Only those items which are capable of being observed and are reasonably obvious to ECOH personnel, or have been identified to ECOH by other parties, can be reported. ECOH has exercised a degree of thoroughness and competence that is consistent with the profession during the execution of the mould abatement inspections. ECOH considers the opinions and information as they are presented in this report to be factual at the time of the investigation of the subject space.

It is important to note the investigation was completed with the utmost care and our extensive expertise in carrying out investigations. ECOH believes that the information collected during the assessment concerning the Property is reliable. No other warranties are implied or expressed. ECOH, to the best of its knowledge, believes this report to be accurate; however, ECOH cannot guarantee the completeness or accuracy of information supplied to ECOH by third parties.

ECOH is an Environmental Consulting Company as such any results or conclusions presented in this report should not be construed as legal advice. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. ECOH accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions based on this report.

We trust that this report meets your requirements, and we thank you for the opportunity to be of service. Should you have any questions, please do not hesitate to contact us at (905) 795-2800.

Sincerely,

ECOH
Environmental Consulting
Occupational Health

Prepared by:

Hasan Rahman, EIT
Environmental Scientist

Reviewed by:

Ankit Sajwan, B.Sc. (Env.)
Project Manager

1 GENERAL

1.1 The requirements of the Articles of Agreement, Conditions of the Contract, Division 1 apply to and form all Sections of the Contract Documents and the Work.

1.2 Work in this Specification is divided into descriptive sections which are not intended to identify absolute contractual limits between Subcontractors, nor between the Contractor and their Subcontractors. The Contractor is responsible for organizing division of labour and supply of materials essential to complete the Contract. The Consultant assumes no liability to act as an arbiter to establish subcontract limits between Sections or Divisions of Work.

1.3 It is intended that Work supplied under these Contract Documents shall be complete and fully operational in every detail for the purpose required. Provide all items, articles, materials, services and incidentals, whether or not expressly specified or shown on Drawings, to make finished Work complete and fully operational, consistent with the intent of the Contract Documents.

1.4 Work designated as “N.I.C.” is not included in this Contract.

1.5 Specifications, Schedules and Drawings are complementary and items mentioned or indicated on one may not be mentioned or indicated on the others.

1.6 Contractors finding discrepancies or ambiguities in, or omissions from the Drawings, Specifications or other Contract Documents, or having doubt as to the meaning and intent of any part thereof shall contact the Consultant for clarification. If the Consultant is not contacted for clarification, execute the Work in accordance with the most stringent requirements.

1.7 Mention in the specifications or indication on the drawings of materials, products, operations, or methods, requires that the Contractor provide each item mentioned or indicated of the quality or subject to the qualifications noted; perform according to the conditions stated in each operation prescribed; and provide labour, materials, Products, equipment and services to complete the Work.

1.8 Where the singular or masculine is used in the Contract Documents, it shall be read and construed as if the plural, feminine or neuter had been used when the context or the statement so requires and as required to complete the Work, and the rest of the sentence, clause, paragraph, or Article shall be construed as if all changes in grammar, gender or terminology thereby rendered necessary had been made.

1.9 The terms “approved”, “review”, “reviewed”, “accepted”, “acceptance”, “acceptable”, “satisfactory”, “selected”, “directed”, “instructed”, “required”, “submit”, “permitted” or similar words or phases are used in standards or elsewhere in Contract Documents, it shall be understood, that words “by (to) the Consultant” follow, unless context provides otherwise.

1.10 Where the words 'submit', 'acceptable' and 'satisfactory' are used in the Contract Documents, they shall be considered to be followed by the words 'to the Consultant' unless the context provides otherwise.

1.11 The terms “exposed” or “exposed to view” refers to surfaces that are within the line of vision of persons from any accessible viewpoint, both within and without the building. Where any part of a surface is exposed to view, all other portions of that surface shall also be considered as exposed to view.

1.12 Contractor to add The City of Brampton and Cherie Ng Architect Inc. as Additional Insured Names in the Contractor's Commercial General Liability insurance policy.

1.13 Contractor to forward a copy of their Commercial General Liability Insurance Certificate of Insurance with the Additional Insured Names to the architect at the Pre-Construction Meeting.

2 EXISTING SITE CONDITIONS

2.1 Make a careful examination of the site, and investigate and be satisfied as to all matters relating to the nature of the Work to be undertaken, as to the means of access and egress thereto and therefrom, as to the obstacles to be met with, as to the extent of the Work to be performed, any limitations under which the work has to be executed, and any and all matters which are referred to in the Contract Documents.

2.2 Report any inconsistencies, ambiguities, discrepancies, omissions, and errors between Site conditions and Contract Documents to the Consultant prior to the commencement of Work. If inconsistencies, ambiguities, discrepancies, omissions, and errors are not reported and clarified, the most stringent requirement shall govern, as determined by the Consultant. Ensure that each Subcontractor performing work related to the site conditions has examined it so that all are fully informed on all particulars which affect the Work thereon in order that construction proceeds competently and expeditiously.

2.3 Before commencing the Work of any Section or trade, carefully examine the Work of other Sections and trades upon which it may depend, examine substrate surfaces, and report in writing to the Consultant, defects which might affect new Work. Commencement of Work shall constitute acceptance of conditions and Work of other sections, trades, and Other Contractors upon which the new Work depends. If repair of surfaces is required after commencement of specific work it shall be included in the work of the trade providing the specific system or finish.

3 CONTINUITY OF EXISTING SERVICES

3.1 Shutdowns and planning of operations that may affect Owner's use of services shall be coordinated with and in accordance with the Owner's written directions. Provide notice for all required interruptions to utility, heating, cooling, mechanical, electrical, and life safety systems.

3.2 Make written requests for shutdown at least 5 working days in advance, unless specifically stated herein or as otherwise instructed by the Owner.

3.3 Shutdowns shall be scheduled in advance with Owner and shutdown period shall be minimized to Owner's convenience. Facilities in existing adjacent areas will be occupied during the Work.

3.4 Major shutdowns shall take place on weekends or at night by prior arrangement with and at no additional cost to the Owner.

3.5 Minimize disruption, vibration, noise and dust to the function of existing building.

3.6 These requirements are for security reasons and for the consideration of the Owner. Requirements shall not be construed as cause for elimination or restriction of Contractor's working schedule, claims for delay or work, nor additional cost.

4 ACCESS / PROPERTY CONSTRAINTS

4.1 Provide and maintain access facilities as may be required for access to the Work.

4.2 Minimize disruption, noise and dust to the functions of existing operational areas of existing buildings. Times of entry, routes of access and time required to complete the Work shall be arranged and scheduled in cooperation with the Owner.

4.3 Confine Work and operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the premises with products.

4.4 Organize delivery of materials/equipment to and removal of debris and equipment from place of Work to permit continual progress of work and suitable for restricted site conditions.

4.5 Determine and make arrangement as required for loading and unloading of equipment and Products at times that will not affect public traffic flow and that will be permitted by the City of Brampton. Conform to City by-laws with regard to parking restrictions and other conditions.

4.6 Make provisions and arrangements and provide allowances if times for loading and unloading allowed by the City of Brampton are other than regular working hours.

4.7 All Products, materials and equipment required on Site shall be portable and/or size suitable for access and movement on Site and without causing damage to buildings.

4.8 Workers shall not enter existing building beyond construction areas except where required for connection or modification to existing services or other such work. Arrange such requirements with Owner prior to entering existing occupied areas.

4.9 Provide locked doors in barriers, permit access by Owner and Consultant to Work areas and to areas Contractor is responsible for.

5 SETTING OUT

5.1 Before commencing work, verify lines, levels and dimensions shown on the drawing and report discrepancies in levels or dimensions to the Consultant. Be responsible for work done prior to the receipt of the Consultant's decision regarding reported discrepancies

6 PARKING

6.1 Parking may be permitted on Site provided it does not disrupt the performance of Work, Site safety or the movement of vehicular or pedestrian traffic and is acceptable to the Consultant and permitted by the City of Brampton.

7 COORDINATION

7.1 Coordination of the Work of all Sections of the specifications as required to complete the Project is the responsibility of the Contractor.

7.2 Coordinate with removals/installations specified in other Divisions and Other Contracts.

7.3 Ensure that Subcontractors and trades cooperate with other subcontractors and trades whose work attaches to or is affected by their own work. Ensure that minor adjustments are made to make adjustable work fit fixed work.

7.4 Allow access of Owner's Other Contractors on site and to areas of Work. Cooperate and coordinate with such Other Contractors. Schedule work to complement work of such Other Contractors.

7.5 Entry by the Owner's own forces and by Other Contractors shall not mean acceptance of the Work and shall not relieve the Contractor of their responsibility to complete the Contract.

7.6 Existing equipment shall remain in present locations unless designated otherwise. Protect from damage. Remove, store and reinstall existing fixed equipment, fixtures and components which interfere with construction and which are scheduled for relocation.

7.7 Placing, installation, application and connection of work by the Owner’s own forces or by Other Contractors on and to the Contractor's Work shall not relieve the Contractor of his responsibility to provide and maintain the specified warranties.

7.8 Pay particular attention to types of ceiling construction and clearances throughout, especially where recessed fixtures are required. Coordinate work with Other Contractors and Subcontractors wherever ventilation ducts or piping installations occur to ensure that conflicts are avoided.

7.9 Install ceiling mounted components in accordance with final ceiling plans. Inform Consultant of conflicting installations. Install as directed.

7.10 Install and arrange ducts, piping, tubing, conduit, equipment, fixtures, materials and products to conserve headroom and space with minimum interference and in neat, orderly and tidy arrangement. Run pipes, ducts, tubing and conduit, vertical, horizontal and square with building grid unless otherwise indicated. Install piping, ducts, and conduit as close to underside of structure as possible unless shown otherwise.

7.11 Make provision for unrestricted relocation of light fixtures to replace ceiling panels at grid spaces of the same size, without interference or restriction by items located within the ceiling space.

7.12 Where supports or openings are to be left for the installation of various parts of the Work furnish the necessary information to those concerned in ample time so that proper provision can be made for such items. Cutting, drilling and the subsequent patching required for failing to comply with this requirement shall be performed at a later date at no additional Cost to Owner.

7.13 Ensure that setting drawings, templates, and all other information necessary for the location and installation of materials, fixtures, equipment, holes, sleeves, inserts, anchors, accessories, fastenings, connections, and access panels are provided by each Section whose work requires cooperative location and installation by other

Sections, and that such information is communicated to the applicable installer. Cutting, fixing and 'making good' of the work of other Contractors, Subcontractors and trades and making up of lost time involved in failing to comply with this requirement shall be performed at no additional Cost to Owner.

7.14 Be responsible for coordinating products supplied in metric (SI) and imperial units into the overall layout.

7.15 Properly coordinate the work of the various Sections and trades, taking into account the existing installations to assure the best arrangement of pipes, conduits, ducts and refrigeration, mechanical, electrical and other equipment, in the available space. Under no circumstances will any extra payment be allowed due to the failure by the Contractor to coordinate the Work. If required, in critical locations, prepare interference and/or installation drawings showing the work of the various Sections as well as the existing installation, and submit these drawings to the Consultant for review before the commencement of Work.

7.16 Protect from damage. Remove, store and reinstall existing fixed equipment, fixtures and components which interfere with construction and which are scheduled for relocation.

7.17 Coordinate with structural, refrigeration, mechanical and electrical trades to ensure protecting, supporting, disconnecting, cutting off, capping, diverting, relocating or removing of existing services in areas of Work before commencement of alteration work.

7.18 In case of damage to active services or utilities, notify Consultant and respective authorities immediately and make all required repairs under direction of Consultant and respective authorities. Carry out repairs to such damaged services and utilities continuously to completion, including working beyond regular working hours.

8 METRIC DIMENSIONS

8.1 Measurements in this specification are expressed in metric (SI) units and depending on the progress made in the various sectors of the industry are either hard or soft converted units.

8.2 All metric units specified shall be taken to be the minimum acceptable unless otherwise noted.

8.3 It is the Contractor's responsibility to check and verify with manufacturers and suppliers on the availability of materials and products in either metric or imperial sizes. Be responsible for coordinating products supplied in metric (SI) and imperial units into the overall layout.

8.4 Where both metric and imperial sizes or dimensions are shown, the metric size or dimension shall govern.

9 BUILDING DIMENSIONS

9.1 Take necessary job dimensions for the proper execution of the work. Assume complete responsibility for the accuracy and completeness of such dimensions, and for coordination.

9.2 Verify that work, as it proceeds, is executed in accordance with dimensions and positions indicated which maintain levels and clearances to adjacent work, as set out by requirements of the Drawings, and ensure that work installed in error is rectified before construction resumes.

9.3 Check and verify dimensions referring to the work and the interfacing of services.

9.4 Do not scale directly from the Drawings. If there is ambiguity or lack of information, immediately inform the Consultant. Changes required through the disregarding of this clause shall be the responsibility of the Contractor.

9.5 All details and measurements of any work which is to fit or to conform with work installed shall be taken at the building.

9.6 Advise Consultant of discrepancies and if there are omissions on Drawings, particularly reflected ceiling plans and jointing patterns for surfaces finishes, which affect aesthetics, or which interfere with services, equipment or surfaces. Do not proceed with work affected by such items without direction from the Consultant.

9.7 Provide written requirements for site conditions and surfaces necessary for the execution of respective work, and provide setting drawings, templates and all other information necessary for the location and installation of material, holes, sleeves, inserts, anchors, accessories, fastenings, connections and access panels. Inform respective contractors whose work is affected by these requirements and preparatory work.

10 INTERFERENCE AND COORDINATION DRAWINGS

10.1 Coordinate placement of equipment to ensure that components will be properly accommodated within the spaces provided prior to commencement of work.

10.2 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the spaces provided.

10.3 Prepare drawings to indicate coordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are coordinated.

10.4 Take complete responsibility for any remedial work that results from failure to coordinate any aspect of the Work prior to its fabrication/installation.

10.5 Ensure that accesses and clearance required by jurisdictional authorities and/or for easy maintenance of equipment are provided in the layout of equipment and services.

11 CUTTING AND PATCHING

11.1 Execute Work to avoid damage to other Work.

11.2 Execute cutting, fitting and patching including excavation and fill to complete the Work.

11.3 Employ appropriate trades with skilled labour to perform cutting Work.

11.4 Fit Work segments together, to integrate with penetrations through surfaces and with other Work.

11.5 Remove and replace defective and non-conforming Work.

11.6 Do any drilling, cutting, fitting, patching and finishing that may be required to make the various classes and kinds of other Work fit together in a professional and finished manner. Make watertight connections with adjoining structures

11.7 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

11.8 Execute Work by methods to avoid damage to other Work and which will provide proper surfaces to receive patching and finishing.

11.9 Cut Products using proper equipment and methods. On rigid materials, use a masonry saw or core drill. Pneumatic or impact tools are not allowed on masonry work without prior approval.

11.10 Where new Work connects with existing structures, cut, patch and make good existing work to match original condition.

11.11 Be responsible for correct formation and bridging of openings in masonry and structural walls as required.

11.12 Ensure compatibility between installed Products and ensure security of installation.

11.13 Restore Work with new Products in accordance with requirements of the Contract Documents.

11.14 Fit Work airtight to pipes, sleeves, ducts, conduits and other penetrations through surfaces.

11.15 Properly prepare surfaces to receive patching and finishing.

11.16 Refinish surfaces to match adjacent finishes; for continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

12 FIRE RATINGS

12.1 Where a material, component or assembly is required to be fire rated, the fire rating shall be as determined or listed by one of the following testing authorities acceptable to the authorities having jurisdiction:

12.2 Underwriters' Laboratories of Canada.

.1 Underwriters' Laboratories Inc.

.2 Factory Mutual Laboratories.

.3 The National Research Council of Canada.

.4 The National Board of Fire Underwriters.

.5 Intertek Testing Services.

12.3 Where reference is made to only one testing authority an equivalent fire rating as determined or listed by another of the aforementioned testing authorities is acceptable if approved by authorities having jurisdiction. Obtain and submit such approval of authorities, in writing when requesting acceptance of a proposed equivalent rating or test design.

13 FIRE SEPARATIONS

13.1 Conform to following requirements to maintain continuity of fire separations whether or not shown on the Contract Drawings.

13.2 Fire separations may be pierced by openings for electrical and similar service outlets provided such boxes are non-combustible and are tightly fitted and sealed with a ULC approved sealant for the assembly being sealed.

13.3 Construction that abuts on or is supported by a non-combustible fire separation shall be constructed so that its collapse under fire conditions will not cause the collapse of the fire separation.

13.4 At penetration through fire rated walls, ceilings or floors, completely seal voids with ULC approved firestopping material; full thickness of the construction element. In locations that require a smoke seal, provide appropriate ULC approved system installed in accordance with the manufacturer's recommendations.

14 CODES

14.1 Reference is made to standards in the specifications to establish minimum acceptable standards of materials, products and workmanship. Ensure that materials, products and workmanship meet or exceed requirements of the reference standards specified.

14.2 In the event of conflict between documents specified herein, execute the Work in accordance with the most stringent requirements.

15 STANDARDS

15.1 Where a material or product is specified in conjunction with a referenced standard, do not supply the material or product if it does not meet the requirements of the standard. Supply another specified material or product, or an acceptable material or product of other approved manufacture which does meet the requirements of the standard, at no additional cost to the Owner.

15.2 Where no standard is referred to, provide materials, products and workmanship which meet requirements of the applicable standards of the Canadian Standards Association, and Canadian General Standards Board.

15.3 If there is question as to whether a material, product or system is in conformance with applicable standards, the Consultant reserves the right to have such materials, products or systems tested to prove or disprove conformance. The cost for such testing will be paid by the Owner in the event of conformance with contract Documents or by the Contractor in the event of non-conformance.

15.4 Where application, installation and workmanship standards are cited, it is intended that referenced standards form the basis for minimum requirements of the specified item and specifications supplement the standards unless specified otherwise.

15.5 Matters may be dealt with in part by these specifications which are also dealt with, under the same or similar headings in cited standard. It is not intended that these

specifications take the place of the standards but supplement them, unless specified otherwise.

15.6 Where reference is made to manufacturer's directions, instructions or specifications they shall include full information on storing, handling, preparing, mixing, installing, erecting, applying, or other matters concerning the materials pertinent to their use and their relationship to materials with which they are incorporated.

16 PRE-CONSTRUCTION MEETING

16.1 Attend a pre-construction meeting, arranged and conducted by the Consultant.

16.2 Co-ordinate and organize attendance by representatives of major Subcontractors and parties in contract with the Contractor.

16.3 Consultant will arrange attendance of other interested parties not responsible to the Contractor.

16.4 Consultant will distribute copies of Agenda prior to meeting.

16.5 Be prepared to provide specific information relative to agenda items as they are pertinent to the Contract.

16.6 Record minutes of meeting and distribute type written copies to all participants and other interested parties, within one week of meeting date.

17 PROGRESS MEETINGS

17.1 Attend regularly scheduled progress meetings to be held on Site at times and dates that are mutually agreed to by the Owner, Consultant, and Contractor.

17.2 Co-ordinate and organize attendance of individual Subcontractors and material suppliers when requested. Relationships and discussions between Subcontractor participants are not the responsibility of the Consultant and do not form part of the meetings content.

17.3 Ensure that Contractor representatives in attendance at meetings have required authority to commit Contractor to actions agreed upon. Assign same persons to attend such meetings throughout the contract period.\

17.4 Inform the Consultant in advance of meetings regarding all items to be added to the agenda.

17.5 Consultant will distribute copies of Agenda prior to meeting.

17.6 Be prepared to provide specific information relative to agenda items at each meeting as they are pertinent to the Contract.

17.7 Agenda will include but not be limited to the following topics as are pertinent to the Contract.

.1 Review and agreement of previous minutes.
.2 Construction safety.
.3 Status of submittals.
.4 Quality control.
.5 Co-ordination.

.6 Contract Schedule.
.7 Work plan up to next scheduled meetings.
.8 Requests for information/clarification.
.9 Contemplated changes.

17.8 Record minutes of meeting and distribute type written copies to all participants and other interested parties, within one week of meeting date.

18 PRODUCT DATA

18.1 Before delivery of Products to the Site, submit Product data as specified in each section or as requested by the Consultant.

18.2 Submit manufacturer's Product data for systems, materials, and methods of installation proposed for use. Such literature shall identify systems, each component, and shall certify compliance of each component with applicable standards

19 SAMPLES

19.1 Before delivery of Products to the Site, submit samples of Products as specified or as requested by the Consultant. Label samples as to origin and intended use in the Work and in accordance with the requirements of the Specification Sections. Samples must represent physical examples to illustrate materials, equipment or work quality and to establish standards by which completed Work is judged.

19.2 Ensure samples are of sufficient size and quantity, if not already specified, to illustrate:

.1 The quality and functional characteristics of Products, with integrally related parts and attachment devices.
.2 Full range of colours available.

19.3 Notify the Consultant in writing, at time of submission, of any deviations in samples from requirements of the Contract Documents, and state the reasons for such deviations.

19.4 Identify samples with Project name, Contract number, date, Contractor's name, number and description.

19.5 If samples are not acceptable, both samples will be returned. If samples are acceptable, one sample will be so indicated and returned. Be responsible for the cost of samples that are not accepted and for resubmission of samples.

19.6 Acceptable samples shall serve as a model against which the products incorporated in the work shall be judged.

19.7 Each Product incorporated in the Work shall be precisely the same in all details as the acceptable sample.

19.8 Should there be any change from the accepted sample, submit in writing for approval of the revised characteristics and resubmit samples of the Product for approval if requested.

19.9 When samples are very large, require assembly, or require evaluation at the Site, they may be delivered to the Site, but only with approval and as directed.

20 SHOP DRAWINGS

20.1 Arrange for the preparation of shop drawings as called for in the Contract Documents or as may be reasonably requested by the Consultant. The Contractor and each Subcontractor shall operate as experts in their respective fields and all shop drawings and samples shall conform to the requirements of the Contract Documents.

20.2 The term “shop drawings” means drawings, diagrams, schematics, illustrations, schedules, performance charts, brochures and other data which are required to illustrate details of the Work.

20.3 In addition to shop drawings specified in the specification sections, submit shop drawings required by jurisdictional authorities in accordance with their requirements.

20.4 Shop drawings shall indicate the following minimum criteria and any additional criteria indicated in the individual specification sections requiring shop drawings:

.1 Clear and obvious notes of any proposed changes from the Contract Documents.
.2 Fabrication and erection dimension.
.3 Provisions for allowable construction tolerances and deflections provided for live loading.
.4 Details to indicate construction arrangements of the parts and their connections, and interconnections with other work.
.5 Location and type of anchors and exposed fastenings.
.6 Materials, physical dimensions including thicknesses, and finishes.
.7 Descriptive names of equipment.
.8 Information to verify that superimposed loads will not affect function, appearance, and safety of the work detailed as well as of interconnection work.
.9 Assumed design loadings, and dimensions and material specifications for loadbearing members.

20.5 Include in shop drawing submissions detailed information, templates, and installation instructions required for incorporation and connection of the Work.

20.6 Before submitting to the Consultant, review all shop drawings to verify that the Products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers and similar data and that it has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents. The Contractor's review of each shop drawing shall be indicated by stamp, date and signature of a qualified and responsible person possessing the appropriate authorization.

20.7 Be responsible for dimensions to be confirmed and correlated at the Site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the Work of all subtrades.

20.8 Submit shop drawings for the Consultant's review with reasonable promptness and in orderly sequence so as to cause no delay in the Work nor in the work of Other Contractors. At the time of submission, notify the Consultant in writing of any deviations in the shop drawings from the requirements of the Contract Documents. The Contractor will be held responsible for changes made from the Contract

Documents which are not indicated or otherwise communicated in writing with the submission.

20.9 Drawings submitted by the Contractor as required herein are the property of the Owner who may use and duplicate such drawings where required in association with the Work.

20.10 Submit shop drawings, as indicated in each section of the Work, signed and sealed by a licensed Professional Engineer registered in the place of the Work.

20.11 Shop drawings shall have distinct, uniform letters, numerals and line thicknesses that will ensure the production of clear legible prints and also facilitate reduced reproduction.

20.12 Shop drawings shall contain the following identification:

.1 Project name and Contract number.
.2 Applicable 6-digit Contract Specification number describing the item.
.3 Location (unit, level, room number, etc.).
.4 Name of equipment or Product.
.5 Name of Subcontractor or supplier.
.6 Signature of Contractor certifying that Shop drawing is in conformance with Contract Documents.
.7 On submissions subsequent to the first, the following additional identification:
  .1 The revision number.
  .2 Identification of the item(s) revised.

20.13 Dimensions and designations of elements shall be shown in the same system of measurement used on the applicable Contract Drawings.

20.14 Consultant reserves the right to refuse acceptance of drawing submissions not meeting the above requirements.

20.15 Consultant's review will be for conformity to the design concept and for general arrangement only and such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the Contract Documents unless a deviation on the shop drawings has been approved in writing by the Consultant. Review does not mean that Consultant approves detail inherent in shop drawings, responsibility which shall remain with Contractor submitting same.

20.16 Contractor shall make any changes in shop drawings which the Consultant may require consistent with the Contract Documents and re-submit unless otherwise directed by the Consultant. When re-submitting the shop drawings, the Contractor shall notify the Consultant in writing of any revisions other than those requested by the Consultant.

20.17 Only drawings noted for revision and resubmission need be resubmitted.

20.18 File one copy of each submitted shop drawing at the Site.

20.19 Allow two weeks for the Consultant's review of each submission.

21 CERTIFICATES

21.1 Submit certificates that are required by authorities having jurisdiction or that are requested in the specification sections.

21.2 Clearly show on each certification the name and location of the Work, name and address of Contractor, quantity and date of shipment and delivery and name of certifying company.

21.3 Certificates shall verify that Products and/or methods meet the specified requirements and shall include test reports of acceptable testing laboratories to validate certificates.

21.4 Submit certificates in duplicate and signed by an authorized representative of the certifying company

22 CERTIFICATION OF TRADESPERSON

23 Provide certificates, at the request of the Consultant, to establish qualifications of personnel employed on the Work where such certification is required by authorities having jurisdiction, by the Consultant or by the Contract Documents.

24 EXTENDED WARRANTIES

24.1 Submit extended warranties as requested in sections of the Specifications showing title and address of Contract, warranty commencement date and duration of warranty.

24.2 Extended warranties shall commence on termination of the standard warranty specified in the conditions of the contract and shall be an extension of these provisions. Clearly indicate what is being warranted and what remedial action is to be taken under the warranty. Ensure warranty bears the signature and seal of the Contractor.

24.3 Submit each extended warranty on a form that is acceptable to the Owner and Consultant.

25 SAFETY

25.1 For the purposes of the Contract, the term "Constructor", as defined in the Occupational Health and Safety Act, shall mean the Contractor who shall be responsible for ensuring that the provisions of the statutes, regulations and by-laws pertaining to the safe performance of the Work are to be observed. The "Constructor" shall submit the Notice of Project.

25.2 In the event of conflict between any of the provisions of Statues, Regulations and Bylaws, and other requirements of authorities, the most stringent provision applies.

25.3 The Contractor's representative shall be responsible for ensuring that the provisions of statutes, regulations and by-laws pertaining to safe performance of the Work and the work of Other Contractors and Owner’s own forces working on the Site are observed and that the methods of performing the Work do not endanger the personnel employed thereon nor the general public, and are in accordance with the latest edition of the Occupational Health and Safety Act. Include on the Joint Health and Safety Committee representatives of Other Contractors working on Site.

25.4 Prior to the Contractor's representative being absent from the Site for an extended period during execution of the Work, the Contractor's representative will name, in writing to the Consultant, another person who is competent to assume these responsibilities. The Contractor shall advise the Consultant of change of the individual identified as the Contractor's representative.

25.5 At the discretion of the Consultant, the "Constructor" designation may be transferred to/from a Contractor at any time at no additional cost to the Owner.

26 PROJECT RESPONSIBILITIES

26.1 The Contractor's representative shall ensure that:

26.2 All measures and procedures prescribed by the following Acts and Regulations are carried out on Site:

.1 The Occupational Health and Safety Act;
.2 The Regulations for Construction Projects;
.3 WHMIS Regulations;
.4 The Environmental Protection Act and regulations,
.5 COVID-19 Construction Practice
.6 All other legislation, regulations and standards as applicable.

26.3 Every employer and every worker performing Work on the Site must comply with the requirements referred to above.

26.4 Ensure that the health and safety of workers, employees of the Owner and the general public are protected in relation to the Work performed on the Site.

27 WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

27.1 Be familiar with and comply with WHMIS regulations.

27.2 Properly label controlled products. Provide proper warning labels and training at the Site.

27.3 Maintain on site for duration of Contract a hazardous materials log containing all required MSDS. Log shall be open for inspection by Owner, Consultant and all personnel on Site.

27.4 Provide copies of material safety data sheets (MSDS) for any controlled products prior to delivery to the Site.

27.5 Be responsible for all applicable requirements of the regulations.

27.6 Before commencing any Work on Site, attend the pre-construction meeting and provide the Consultant with a proposal as to how hazardous materials will be stored and dispensed on Site. In addition, specifically outline the measures which will be undertaken to prevent damage or injury in the event of an accidental spill.

27.7 Provide “Handling Procedure for Hazardous Materials”.

28 JOINT HEALTH AND SAFETY COMMITTEE

28.1 The Contractor shall be responsible for the establishment and operation of the Joint Health and Safety Committee as required by the Occupational Health and Safety Act.

29 SAFETY DELIVERABLES

29.1 The Contractor shall deliver to the Consultant:

.1 The Contractor's Occupational Health and Safety Policy.

.2 The Contractor's safety program to implement the Occupational Health and Safety Policy for the Contract, which will effectively prevent and control accidents for the Contract.

.3 A copy of all communications with, and including all orders by, the Ministry of Labour or other occupational health and safety enforcement authority.

.4 A copy of all accident/injury investigation reports, not just the WSIB Form 7 Employer's Report of Injury Disease. Each report must contain a statement of actions that will be taken to prevent a recurrence.

.5 A copy of all inspection reports made by the Contractor in compliance with the employer's responsibility under the Occupational Health and Safety Act.

.6 A copy of all safety information pertaining to the Contract made and furnished by the Contractor's own "Safety Personnel" or outside consultants/advisers engaged for the purpose of inspecting the workplace for occupational health and safety.

.7 A verification that all workers in the employ of the Contractor on Site, have had a WHMIS training or refresher course within the last twelve months.

.8 A verification that all workers in the employ of the Contractor have had "Explosive Activated Tool Training" on the type of tools being used.

.9 A verification that the instruction manuals are on Site for all tools and equipment being used.

.10 A copy of the most recent workers compensation experience rating account, i.e. CAD-7, NEER, and/or an insurance carrier's experience rating account.

.11 Statistical information for the purpose of determining injury frequency and severity rates (hours worked, first-aid injuries, medical aid injuries, lost time injuries, restricted workday injuries, near-miss accident/incident and significant occurrence data), in a timely manner as required by the Consultant.

.12 The immediate reporting to the Consultant of all instances that are defined in the Occupational Health and Safety Act as "Notices of Injuries" and "Occurrences" and any occasion that a worker exercises their "Right to Refuse Unsafe Work".

.13 The Consultant reserves the right to require additional or amended deliverables pertaining to safety during the duration of the Work at no additional cost to the Owner.

.14 Items specified above shall be delivered to the Consultant prior to the Contractor commencing Work on the Site.

30 DUE DILIGENCE

30.1 The Contractor acknowledges that it has read and understands the measures and procedures relating to occupational health and safety as prescribed above. The Contractor acknowledges and understands its duties as therein set out and hereby

expressly undertakes and agrees to comply with all such requirements and standards in their entirety and at the Contractor's expense.

30.2 The Contractor further agrees to fully cooperate with all health and safety requirements, rules, regulations, standards and criteria set out in the Contract Documents, which agreement is in furtherance of the Contractor's duties and responsibilities under occupational health and safety legislation.

30.3 The Contractor agrees that if, in the opinion of the Consultant or Owner, the health and safety of a person or persons is endangered or the effective operation of the system put in place to ensure the health and safety of workers on the Site is not being implemented, the Consultant or Owner may take such action as it deems necessary and appropriate in the circumstances, including, without limitation, the following:

30.4 Require the Contractor to remedy the condition forthwith at its own expense;

30.5 Require that the Site be shut down in whole or in part until such time as the condition has been remedied;

30.6 Remedy the problem and the Owner shall back-charge the Contractor for the cost of such remedial work, together with an appropriate overhead factor as determined by the Owner in its sole discretion; and

30.7 Terminate the Contract without further liability in the event the Contractor fails to comply with these provisions.

30.8 If a lien is registered, in respect to any monies held back, back-charged or assessed in accordance with these paragraphs, the Contractor shall consent to an order vacating such registration and shall indemnify the Owner for any and all loss, whereby direct or consequential which the Owner may sustain as a consequence of such registration.

31 SITE SAFETY PERSONNEL

31.1 In the event the Consultant deems it necessary, because of the Work, the Contractor shall assign a "Competent Safety Person" to assist the Contractor's representative in the discharging of safety responsibility, at no additional cost to the Owner.

32 PROGRESS PHOTOGRAPHS

32.1 Concurrently with monthly application for payment submit digital pictures by online cloud storage illustrating the progress of the Work as follows:

.1 A minimum of 20 pictures that best illustrate the progress on the site.

.2 Pictures shall be in focus and properly illuminated; view shall be unobstructed.

.3 Pictures shall be taken with a minimum 5 megapixel camera or better such that quality and details can be discerned from photo.

.4 The Pictures shall either have an accurate date-stamp present in the photo, or be numbered and dated in the digital filename.

.5 The photo's shall be labeled with the following information: The project name, the period the pictures are taken in, the monthly application number which the pictures are associated with.

33 SCHEDULES

33.1 Be responsible for planning and scheduling of the Work. As a minimum, prepare and update the following schedules:

.1 Contract Schedule.
.2 Detailed Construction Schedule.

33.2 Be responsible for ensuring that Subcontractors plan and schedule their respective portions of the Work. Subcontractor's schedules shall form part of the above mentioned schedules.

33.3 Contract Schedule:

.1 Prepare and submit the Contract Schedule within two weeks following award of Contract. This schedule, once it is reviewed by the Consultant and if it meets the Consultant's project requirements, will become contractual.

.2 The Contract Schedule shall be developed using a logic network technique for planning and scheduling.

.3 The Contract Schedule shall be submitted for approval in its optimum levelled form. This presentation may be in either a time scaled network or a bar chart form. It shall be subdivided into either work areas or systems as applicable.

.4 The Contract Schedule shall include the following information:

.1 Starting and ending dates of each activity including the float periods;
.2 Manpower requirements for each activity;
.3 Interdependency with activities of other Contractors;
.4 Dates specified in the Contract Documents;
.5 Dates on which specific data will be required for submittal, i.e., Vendor data, drawings for review, etc.

.5 This schedule shall be reviewed and updated monthly by the Contractor so as to reflect any Contract changes as well as major changes to the schedule

33.4 Detailed Construction Schedule:

.1 Prepare and submit a detailed construction schedule within two weeks of final review and acceptance of the Contract Schedule. This schedule, once it is reviewed and accepted by the Consultant, will be updated and submitted monthly with the Contract Schedule and weekly once the Contractor starts on Site.

.2 This schedule shall cover the construction period. It will show, in detail, activities on a daily basis indicating durations, manpower and constraints. The activities shown on this schedule shall further clarify or detail the activities shown on the Contract Schedule.

.3 The detailed construction schedule shall be presented in a bar chart form.

34 INSPECTION AND TESTING BY THE OWNER

34.1 The Consultant, on behalf of the Owner may appoint an independent inspection and testing company to carry out inspection and testing of the Work for conformance to the Contract Documents. Such costs for inspection and testing will be paid by the Owner.

However, any additional inspection and testing due to non-conformance to the Contract Documents shall be at the Contractor's expense.

34.2 Inspections and testing by the independent inspection an testing company will be promptly made. Uncover for examination any Work covered up prior to inspection or without approval of the Consultant. Make good such Work at no cost to the Owner.

34.3 The Owner may inspect and test Products during manufacture, fabrication, shop testing, installation, construction and testing phases of the Contract. The Consultant will ascertain the quantity and quality of testing to be performed. Inspection and testing may be performed at the place of manufacture/fabrication, storage, or at the Site as designated by the Consultant. Where inspection and testing is done either during manufacture, fabrication, or at Site, ensure that proper facilities and assistance are provided.

35 INSPECTION AND TESTING

35.1 Source and Field Quality Control specified in Other Sections:

.1 This Section includes requirements for performance of inspection and testing specified under Source Quality Control and Field Quality Control in other Sections of the specifications.

.2 Do not include in work of this Section responsibilities and procedures that relate solely to an inspection and testing company's functions that are specified in another Section which is paid for directly by the Owner. Such information is included in this Section for Contractor's information only.

36 QUALIFICATIONS OF INSPECTION AND TESTING COMPANIES

36.1 Inspection and testing companies to be certified by the Standards Council of Canada (SCC) or Canadian Council of Independent Laboratories (CCIL).

36.2 Companies engaged for inspection and testing shall provide equipment, methods of recoding and evaluation, and knowledgeable personnel to conduct tests precisely as specified in reference standards.

36.3 If requested, submit affidavits and copies of certificates of calibration made by an accredited calibrator to verify that testing equipment was calibrated and its accuracy ensured within the previous twelve months.

37 RESPONSIBILITIES OF THE CONTRACTOR DURING INSPECTION AND TESTING PROCEDURES

37.1 Be responsible for quality control methods and procedures to ensure performance of the work in accordance with the Contract Documents.

38 RESPONSIBILITIES OF INSPECTION AND TESTING COMPANIES

38.1 Determine from specifications and Drawings the extent of inspection and testing required for Work of the Contract. Subcontractors shall notify Consultant of any omissions or discrepancies in the work inspected and/or tested.

38.2 Perform applicable inspection and testing described in the Specifications and as may be additionally directed.

38.3 Provide competent inspection and testing personnel when notified by the Contractor that applicable work is proceeding. Inspection personnel shall cooperate with the Consultant and Contractor to expedite the Work.

38.4 Subcontractors shall notify the Consultant and Contractor of deficiencies and irregularities in the Work immediately when they are observed in the course of inspection and testing.

38.5 Inspection and testing companies shall not perform or supervise any of the Contractor's work, and shall not authorize:

38.6 Performance of work that is not in strict accordance with the Contract Documents.

38.7 Approval or acceptance of any part of the Work.

39 INSPECTION AND TESTING PROCEDURES

39.1 Perform specified inspection and testing only in accordance with specified reference standards, or as otherwise approved.

39.2 Observe and report on compliance of the Work to requirements of Contract Documents.

39.3 Ensure that inspectors are on site or at fabricator's operations for full duration of critical operations, and as otherwise required to determine that the Work is being performed in accordance with the contract Documents.

39.4 Identify samples and sources of materials.

39.5 Review and report on progress of the work. Report on count of units fabricated and inspected at fabricator's operations.

39.6 Observe and report on conditions of significance to work in progress at time of inspection or at fabricator's operations. Include where applicable and if critical to the work in progress:

.1 Time and date of inspection.
.2 Temperature of air, materials, and adjacent surfaces.
.3 Humidity of air, and moisture content of materials and adjacent materials.
.4 Presence of sunlight, wind, rain, snow and other weather conditions.
.5 Include in reports all information critical to inspection and testing.
.6 Ensure that only materials from the work and intended for use therein are tested.
.7 Determine locations for work to be tested.

40 TOLERANCES FOR INSTALLATION OF WORK

40.1 Unless specifically indicated otherwise, Work shall be installed plumb, level, square and straight.

40.2 Unless acceptable tolerances are otherwise specified in specification sections or are otherwise required for proper functioning of equipment, site services, and mechanical and electrical systems:

.1 "Plumb and level" shall mean plumb or level within 1 mm in 1 m.

.2 "Square" shall mean not in excess of 10 seconds lesser or greater than 90 degrees.

.3 "Straight" shall mean within 1 mm under a 1 m long straightedge.

.4 "Flush" shall mean within:

.1 6 mm for exterior concrete, masonry, and paving materials.
.2 1 mm for interior concrete, masonry, tile and similar surfaces.
.3 0.05 mm for other interior surfaces.

40.3 Allowable tolerances shall not be cumulative.

41 DEFECTS

41.1 Defective products, materials and workmanship found at any time prior to Contract Completion will be rejected regardless of previous inspections, testing, and reviews of the Work. Inspections, testing, and reviews shall not relieve the Contractor from their responsibility, but are a precaution against oversight or error. Remove and replace defective and rejected products, materials, systems, and workmanship. Be responsible for delays and expenses caused by rejection.

42 DOCUMENTS ON SITE

42.1 Maintain at job site, one copy of each of the following:

.1 Contract Documents including Drawings, Specifications, Addenda, and other modifications to the Contract.

.2 'Reviewed' or 'Reviewed as Modified' Shop Drawing

.3 Project Construction and Shop Drawing Schedules. Site Instructions and Change Orders.

.4 Field Test Reports.

.5 Reports by Authorities having Jurisdiction. Building and other applicable permits.

.6 Daily log including:

.1 Weather conditions.
.2 Excavation conditions
.3 Start and finish date of each Trade Contractor.
.4 Erection and removal dates of formwork.
.5 Date, quantities and particulars of each concrete pour.
.6 Dates and quantities and particulars of roofing and waterproofing work. Visits to the Site by Owner, Consultants, Jurisdictional Authorities, Testing and Inspection companies, and material and equipment supplier representatives.

.7 Material Safety Data Sheet pursuant to WHMIS (Occupational Health & Safety Act).

.8 As-built drawings recording as-built conditions, instructions, changes for structure, equipment, wiring, plumbing, etc., prior to being concealed.

.9 Copies of applicable codes.

.10 The above material shall be made available to the Consultant at their request.

43 DRAINAGE

43.1 Layout and construct work to ensure that positive drainage is provided to floor drains, ditches, site drains and catch basins, as set in their final position, preventing undrained areas and ponding.

43.2 Ensure that allowable construction tolerances and structural deflection do not cause ponding of water.

43.3 Report to Consultant in writing prior to executing work affected, in case adequate drainage cannot be provided.

44 REGULATORY REQUIREMENTS

44.1 The Building Code - Ontario Regulation 332/12, including all amendments, shall govern the construction of the Work.

44.2 The CSA B52 Standard – Mechanical Refrigeration Code

44.3 Comply with all By-Laws and regulations of authorities having jurisdiction. These codes and regulations constitute an integral part of the Contract Documents.

44.4 Owner shall apply and pay for Municipal Building Permit, and Contractor shall obtain and pay for all other permits, licenses, deposits, and certificates of inspection as part of the Contract Price as per Conditions of the Contract. Ensure that permits, licenses, deposits, and certificates included under specific Sections are provided as specified.

44.5 If required, pay for construction damage deposit required by authorities having jurisdiction.

44.6 Where permits, licences, and inspection fees are required by authorities having jurisdiction for specific trade functions, they shall be obtained by particular subtrade responsible for that work.

44.7 Arrange for inspection, testing of Work and acceptance required by the authorities having jurisdiction. Be responsible for necessary preparations, provisions and pay all associated costs.

44.8 Be responsible for ensuring that no work is undertaken which is conditional on permits, approvals, reviews, licences, fees, until all applicable conditions are met. No time extension will be allowed for delay in obtaining necessary permits.

44.9 Any additional work or changes to the materials due to Work not complying with the Ontario Building Code and Regulations as indicated by the Building Inspector shall be changed. All costs involved shall be borne by Contractor.

44.10 Obtain permit required to work on Municipal rights of way. Provide damage deposits for sidewalks, roads and services work, as applicable.

44.11 Give notice of completion of project prior to occupancy, as required by applicable legislation.

45 EXISTING PUBLIC SERVICE LINES

45.1 Where existing public services are indicated to be removed and/or relocated, perform Work in compliance with authorities having jurisdiction.

45.2 Make good public roads, walkways and curbs soiled or damaged due to construction to the requirements of local authorities.

46 CODES

46.1 Reference is made to standards in the specifications to establish minimum acceptable standards of materials, products and workmanship. Ensure that materials, products and workmanship meet or exceed requirements of the reference standards specified.

46.2 In the event of conflict between documents specified herein, execute the Work in accordance with the most stringent requirements.

47 STANDARDS

47.1 Where a material or product is specified in conjunction with a referenced standard, do not supply the material or product if it does not meet the requirements of the standard. Supply another specified material or product, or an acceptable material or product of other approved manufacture which does meet the requirements of the standard, at no additional cost to the Owner.

47.2 Where no standard is referred to, provide materials, products and workmanship which meet requirements of the applicable standards of the Canadian Standards Association, Canadian General Standards Board, Ontario Provincial standard specifications (OPSS), Ontario Provincial Standard Drawings (OPSD) and the applicable building code. References to "Measurement for Payment" and "Basis of Payment" in OPSS standard documents are not applicable to this Contract.

47.3 If there is question as to whether a material, product or system is in conformance with applicable standards, the Consultant reserves the right to have such materials, products or systems tested to prove or disprove conformance. The cost for such testing will be paid by the Owner in the event of conformance with contract Documents or by the Contractor in the event of non-conformance.

47.4 Where application, installation and workmanship standards are cited, it is intended that referenced standards form the basis for minimum requirements of the specified item and specifications supplement the standards unless specified otherwise.

47.5 Matters may be dealt with in part by these specifications which are also dealt with, under the same or similar headings in cited standard. It is not intended that these specifications take the place of the standards but supplement them, unless specified otherwise.

47.6 Where reference is made to manufacturer’s directions, instructions or specifications they shall include full information on storing, handling, preparing, mixing, installing,

erecting, applying, or other matters concerning the materials pertinent to their use and their relationship to materials with which they are incorporated.

47.7 Where standards, specifications, associations, and regulatory bodies are listed in the Specifications by their abbreviated designations. These are but not limited to the following:

.1 The Aluminium Association
.2 Architectural Aluminium Manufacturers Association
.3 American Association of State Highway and Transportation Officials
.4 American Concrete Institute
.5 Anti-Friction Bearing Manufacturer's Association
.6 American Institute of Electrical Engineers
.7 American Iron and Steel Institute
.8 Air Movement and Control Association
.9 Association of Municipal Electric Utilities
.10 American National Standards Institute
.11 Air-Conditioning and Refrigeration Institute
.12 American Standards Association
.13 American Society of Heating, Refrigeration and Air Conditioning Engineers
.14 American Society of Mechanical Engineers
.15 American Society of Testing and Materials
.16 Architectural Woodwork Manufacturers Association of Canada American Water Works Association
.17 Canadian Electrical Manufacturer's Association
.18 Canadian Gas Association
.19 Canadian General Standards Board
.20 Canadian Institute of Steel Construction
.21 Canadian Mortgage and Housing Corporation
.22 Canadian Paint Manufacturers Association
.23 Council of Forest Industries of British Columbia
.24 Canadian Roofing Contractors Association
.25 Canadian Standards Association
.26 Canadian Sheet Steel Building Institute
.27 Canadian Welding Bureau
.28 Canadian Wood Council
.29 Electrical and Electronic Manufacturers Association Canada Factory Mutual
.30 Institute of Electrical and Electronic Engineers
.31 Maple Flooring Manufacturers Association
.32 Military Standards
.33 Manufacturer's Standardization Society
.34 Ministry of Transportation Ontario
.35 National Association of Architectural Metal Manufacturers National Fire Protection Association
.36 National Electrical Manufacturer's Association (U.S.A.) National Lumber Grades Authority
.37 National Research Council of Canada
.38 Ontario Concrete Block Association
.39 Ontario Hydro Electrical Safety Code
.40 Ontario Provincial Standard Specification
.41 Porcelain Enamel Institute

.42 Plumbing Drainage Institute
.43 Public Health Act
.44 Sheet Metal and Air Conditioning Contractors National Association
.45 Steel Structures Painting Council
.46 Tubular Exchange Manufacturer's Association
.47 Terrazzo, Tile and Marble Association of Canada Underwriters Laboratories Inc. (U.S.)
.48 Underwriters Laboratories of Canada

48 FIRE RATINGS, ASSEMBLIES AND SEPARATIONS

48.1 Where a material, component, assembly, or separation is required to be fire rated, the fire rating shall be as determined or listed by one of the following testing authorities acceptable to the authorities having jurisdiction:

.1 Underwriters' Laboratories of Canada.
.2 Underwriters' Laboratories Inc.
.3 Factory Mutual Laboratories.
.4 The National Research Council of Canada.
.5 The National Board of Fire Underwriters.
.6 Intertek Testing Services.

48.2 Where reference is made to only one testing authority an equivalent fire rating as determined or listed by another of the aforementioned testing authorities is acceptable if approved by authorities having jurisdiction. Obtain and submit such approval of authorities, in writing when requesting acceptance of a proposed equivalent rating or test design.

48.3 Fire rated door assemblies shall include doors, frame, anchors, and hardware and shall bear label of fire rating authority showing opening classification and rating.

48.4 Material having a fire hazard classification shall be applied or installed in accordance with fire rating authorities printed instructions.

48.5 Fire rated assemblies shall be constructed in accordance with applicable fire test report information issued by fire rating authority. Deviation from fire test report will not be allowed.

48.6 Construct fire separations as continuous, uninterrupted elements except for permitted openings. Extend fire rated walls and partitions from floor to underside of structural deck above.

48.7 Fire separations may be pierced by openings for electrical and similar service outlets provided such boxes are non-combustible and are tightly fitted and sealed with a ULC approved sealant for the assembly being sealed.

48.8 Construction that abuts on or is supported by a non-combustible fire separation shall be constructed so that its collapse under fire conditions will not cause the collapse of the fire separation.

48.9 Do not use combustible members, fastenings, attachments and similar items to anchor electrical, mechanical or other fixtures to fire separations.

48.10 At penetration through fire rated walls, ceilings or floors, completely seal voids with ULC approved firestopping material; full thickness of the construction element. In

locations that require a smoke seal, provide appropriate ULC approved system installed in accordance with the manufacturer's recommendations.

49 TEMPORARY CONTROLS

49.1 Hoarding, fencing and barriers:

.1 Before commencing operations, supply, erect and maintain hoarding, fencing, and barriers around work area. Paint outside of hoarding in a colour selected by the Consultant and mark with "POST NO BILLS" sings.

.2 Provide temporary enclosures as required to protect the building in its entirety or in its parts, against the elements, to maintain environmental conditions required for work within the enclosure, and to prevent damage to materials stored within.

.3 Provide lockable gates through hoarding, fencing, and barriers for access to Site by workers and vehicles.

49.2 Prevent unauthorized entry to the Site. Barricade, guard or lock access points to the satisfaction of the Consultant and post "NO TRESPASSING" signs.

49.3 Install signs for movement of people around Work Site as required and directed by the Consultant.

49.4 Provide secure, rigid guide rails and barricades around open shafts, open edges of floors and roofs as required for protection of Work, workers, and the public.

49.5 Remove hoarding, fencing, barriers, building enclosures, guide rails and barricades upon Contract Completion unless otherwise noted on the Contract Drawings or as directed by the Consultant.

50 SERVICE AND UTILITY SYSTEMS

50.1 Consult with utility companies and other authorities having jurisdiction to ascertain the locations of existing services on or adjacent to site.

50.2 Information as to the location of existing services, if shown on the Drawings, does not relieve the Contractor of his responsibility to determine the exact number and location of existing services.

50.3 Give proper notices for new services as may be required. Make arrangements with authorities and utilities for service connections required.

50.4 Pay any charges levied by utilities or authorities for work carried out by them in connection with this Contract, unless specified otherwise.

50.5 Operate and maintain all utility systems affected by work of this Contract, until the building or specific portions thereof have been accepted by the Owner.

50.6 Report existing unknown services encountered during excavation to Consultant for instructions; cut back and cap or plug unused services. Be responsible for the protection of all active services encountered and for repair of such services if damaged.

50.7 **SCAFFOLDING, HOISTS AND CRANES**

Select, operate, and maintain scaffolding, hoisting equipment and cranes as may be required.

.1 Do not erect or operate equipment that will endanger existing structures, local municipalities hydro installations, or traffic signals.

.2 Design and construct scaffolding in accordance with CAN/CSA S269.2-M.

50.8 **TEMPORARY WORKS**

.1 Installation and Removal: Provide temporary utilities, facilities and controls in order to execute the Work expeditiously. Remove from Site all such Work after use.

.2 Arrange for connections with Owner and pay all costs for installation, maintenance and removal.

.3 Be responsible for the careful and reasonable use of Owner supplied water and power.

.4 Temporary power and lighting systems:

.5 Supply, install and maintain electrical power and necessary electrical equipment including overhead and underground feeders, transformers, motors, starters, panels, protective devices and equipment. Connections will be made available to any part of the Work within distance of a 30 m extension.

.6 Provide temporary lighting inside and outside structure of adequate intensity to illuminate construction activities. Provide temporary pedestrian lighting for sidewalk areas affected by the Work.

.7 Supply and install the type and quantity of minimum lighting equipment in each location to ensure adequate, continual illumination 24 hours per day, 7 days per week for the following:

.1 Emergency evacuation, safety and security throughout the Project at intensity levels required by jurisdictional authorities.

.2 General lighting for performance of the Work throughout the Project, evenly distributed, and at intensities to ensure that proper installations and applications are achieved.

.3 Performance of finishing trades in area as required evenly distributed, and of an intensity of at least 50 Lux.

.8 In locations approved by the Consultant. install and support the electrical plant, distribution and temporary lighting systems including service equipment and local hydro authority meter energized by the local hydro circuits. Installations shall be approved by the Consultant and shall be carried out in a neat manner to avoid interference with the application of finish material and to facilitate removal when the installed permanent lighting system is in operation.

.9 Make all necessary arrangements for and pay all costs for a temporary electrical service of sufficient capacity to supply temporary lighting, operation of power tools, cranes and equipment for all construction, implementation, and inspection and testing purposes. Supply and install necessary temporary cables and other electrical equipment and make all temporary connections as required.

.10 Temporary power distribution wiring shall comply with Ontario Hydro Electrical Safety Code. Obtain inspection certificates for temporary electrical work.

.11 Maintain the lighting systems in operation during the life of the Contract. Replace burned or missing lamps immediately.

.12 Upon Contract Completion, remove electrical plant and temporary lighting from the Site.

.13 Water Supply:

.1 Provide and pay for a continuous supply of potable water for construction use. Provide as a minimum one water connection on each floor level.

.2 Provide and maintain all temporary lines, extensions and hoses as required. Remove all temporary connections and lines on completion of the Work and make good any damage.

.14 Temporary Heating:

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside buildings must be vented to the outside or be flame less type. Solid fuel salamanders are not permitted.

.3 Maintain temperatures of minimum 10oC in areas where construction is in progress unless otherwise indicated in the Contract Documents. Protect exposed and adjacent services from freezing. Repair at no cost to the Owner any such services, buildings or other utilities disrupted by freezing.

.4 Ventilate heated areas and keep structures free from exhaust combustion gases.

.5 The permanent heating system of the building or portions thereof may be used when available only upon written permission by Consultant. If permission to use heating system is obtained:

.1 Before using air handling systems, ensure that dust/debris is removed from the premises and install temporary filters to prevent construction dust/debris from entering via return air or intake openings. keep unused ducts sealed to prevent entry of dust/debris. Replace filters frequently during construction.

.2 On competition of work remove temporary filters and install new filters in accordance with Division 23. After temporary use of air handling system is complete and before turning over system to Owner, vacuum internally to ensure all dust/debris is removed.

.6 Elevators: Elevators may be used by construction personnel as permitted by the Owner.

.7 Temporary Telephone and Data: Provide and pay for separate telephones and Data services, for local call only, as required for own use and use of the Consultant and Owner. Long distance call shall be paid by party making call.

.8 Sanitary Facilities: Provide sanitary facilities in accordance with occupational health and safety requirements in the place of the Work. Use of Owner's existing sanitary facilities or new sanitary facilities is not allowed.

51 SITE SECURITY

51.1 Provide and pay for security personnel to guard the Site and contents of the Site after working hours and during holidays as established by the Owner. Control of access shall be through hoarding and barricades during times work is in progress, and by locking hardware otherwise.

51.2 Any security service provided by the Owner is for the protection of the Owner's interest in the Work on the Site and shall not relieve the Contractor of the responsibility to protect the Site and the Work of the Contract.

52 PROTECTION

52.1 Protection of Public Area: Protect surrounding private and public property from damage during performance of the Work.

52.2 Take all necessary precautions to prevent damage to work affected by temperature, water, weather and other environmental conditions.

52.3 Protection of Building Finishes and Equipment:

.1 Provide protection for existing structure, finished and partially finished building finishes, waterproofing systems, and equipment during performance of the Work.

.2 Cover Owner's equipment and plant within the Site with 6 mil PVC sheet, or equal, taped to make it dust-tight. Equipment and existing work moved or altered to facilitate construction, movement of Products or equipment shall be stored, protected with dust-tight covers and subsequently returned to its original location.

.3 Obtain approval from the Consultant prior to the installation of temporary supporting devices into existing roof, ceiling, or wall members for the erecting of equipment or machinery. Repair roof, ceiling, and wall members used for this purpose to the satisfaction of the Consultant.

.4 Provide necessary screens, covers and hoarding as required.

.5 Any Products or equipment damaged while carrying out the Work shall be restored with new Products or equipment matching the original equipment. Damage shall include harm resulting from all construction work, such as falling objects, wheel and foot traffic, failure to remove debris, operation of machinery and equipment, and scaffolding and hoisting operations.

52.4 Fire Protection:

.1 Take precautions to prevent fires. Provide and maintain temporary fire protection equipment of a type appropriate to the hazard anticipated in accordance with authorities having jurisdiction, governing codes, regulations, by-laws and to the satisfaction of the Consultant and insurance authorities.

.2 Excessive storage of flammable liquids and other hazardous materials is not allowed on Site. Flammable liquids must be handled in approved containers. Remove combustible wastes frequently.

.3 Inspect temporary wiring, drop cords, extension cables for defective insulation or connections frequently.

.4 Open burning of rubbish is not permitted on the Site.

.5 Handle, transport, store, use and dispose of gasoline, benzine or other flammable materials with good and safe practice as required by authorities having jurisdiction.

.6 Provide fire extinguishers of the non-freezing chemical type in each temporary building, enclosure and trailer. Use only fire-proofed tarpaulins.

.7 A fire watch shall be required for each of the following activities regardless of the number, duration or size of the activity in operation:

.1 any open flame activities (e.g., soldering and welding);
.2 shutdown of fire detection system;
.3 shutdown of sprinkler system.

52.5 Maintain adequate cover over services as required by Utility Authorities.

52.6 Report any discharge of a contaminant to the Authorities having jurisdiction.

53 PEST CONTROL

53.1 Be responsible to provide control measures, restraining procedures, and treatments to prevent infestation and spread of insects, rodents and other pests deemed to be present at Site and/or noticed during course of the Work. Carry out fumigation, pest control procedure, and posting of warning signs, notices including contents of such notices in accordance with requirements of Pesticides Act and any other authorities having jurisdictions. Pesticides used shall be in accordance with Canada Pest Control Products Act, and provincial and municipal regulations.

54 FIRST-AID FACILITIES

54.1 Provide site equipment and medical facilities necessary to supply first-aid service to injured personnel in accordance with regulations of the Workmen’s Compensation Act. Maintain facilities for duration of Contract.

55 USE OF NEW PERMANENT SERVICE & EQUIPMENT

55.1 Do not use any new permanent service or equipment without Owner’s written approval.

55.2 Where permission is granted to use permanent services and equipment provide competent persons to operate services and equipment; inspect frequently and maintain facilities in proper operating condition at all times.

55.3 Permanent services and equipment shall be turned over to Owner in “as new” and perfect operating condition.

55.4 Use of permanent systems and equipment as temporary facilities shall not affect the warranty conditions and warranty period for such systems and equipment. Make due allowance to ensure that Owner will receive full benefits of equipment manufacturers warranty after project takeover.

56 PROJECT IDENTIFICATION

56.1 If required, obtain approvals from jurisdictional authorities for temporary signs.

56.2 Do not display signs without the Consultant's and Owners written consent.

56.3 Maintain signs in good condition for the duration of Contract.

57 SITE MAINTENANCE

57.1 Maintain the Site and adjacent premises in a clean and orderly condition, free from debris and other objectionable matter. Immediately remove rubbish and surplus Products, equipment and structures from the Site. If the Site is not cleaned (within 48 hours after the Contractor has been instructed to do so), the Consultant may clean the Site and retain the cost from monies due, or to become due, to the Contractor.

57.2 When the Work is substantially performed, remove surplus Products, tools, construction machinery and equipment not required for the performance of the remaining Work

58 SITE STORAGE AND OVER LOADING

58.1 Confine the Work and operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the Site with Products.

58.2 Products shall be stored only in areas designated or approved by the Consultant, and shall not be left lying on streets, sidewalks, boulevards or elsewhere within public view. Products which the Consultant may permit to be stored elsewhere than in the Contractor's storage areas shall be neatly stacked or otherwise disposed and shall be so maintained.

58.3 Fabrication shops shall not be set up within the structure except as directed by or with the permission of the Consultant.

58.4 Do not load or permit to be loaded any part of the Work with a weight or force that it is calculated to bear safely. Be solely responsible and liable for damages resulting from violation of this requirement. Provide temporary supports as strong as permanent support.

58.5 Do not cut, drill or sleeve load bearing members unless shown on drawings or otherwise approved by the Consultant in writing for each location.

58.6 Site storage and loading requirements to be in accordance with the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

59 PUBLIC CONVENIENCE AND SAFETY

59.1 Maintain sidewalks at and adjacent to the Site in a safe condition throughout the Contract. Promptly remove ice and snow.

59.2 Keep haul routes free at all times from Products spilled on highway or street surfaces and clean highways and streets of deposits due to performance of the Work to the satisfaction of the Consultant and the highway and street authorities. Clean highways and streets within 24 hours of Consultant's instruction.

59.3 The Consultant may inspect haul routes, the Site and adjacent premises daily and may halt operations, withhold payment or carry out such additional operations as necessary, deducting the cost from monies due, or to become due, to the Contractor.

60 ACCESS AND EGRESS TO SITE

60.1 Where construction requirements demand, construct access roads capable of withstanding construction equipment and haul traffic. Maintain access roads in good condition at all times. Remove access roads prior to completion of the Work unless otherwise noted and restore area as shown on the Contract Drawings.

61 PUBLIC TRAFFIC FLOW

61.1 Provide and maintain flag persons, Police Officers, traffic signals, barricades and illumination as required by Authorities having jurisdiction and/or as necessary to perform the Work and protect the public.

61.2 PUBLIC UTILITIES AND SERVICES

61.3 Verify limitations imposed on project work by presence of utilities and services, and ensure no damage occurs to them.

61.4 Notify service authorities concerned so that they protect, remove, relocate, or discontinue them, as they may require.

61.5 Make arrangements and pay for connection charges for services required for project work.

61.6 Locate poles, pipes, conduit, wires, fill pipes, vents, regulators, meters, and sanitary services work in inconspicuous locations. If not shown on Drawings, verify location of service work with Consultant before commencing installation.

62 ROADS, CURBS, GUTTERS, AND WALKS

62.1 Include all curb cuts and making good of existing curbs, walks and paving on Municipal property to provide fully paved and finished approaches to requirements of authorities having jurisdiction.

63 CONSTRUCTION PARKING

63.1 Parking will be permitted on Site provided it does not disrupt the performance of Work, Site safety or the movement of vehicular or pedestrian traffic and is acceptable to the Consultant.

64 SITE VISITORS

64.1 During the progress of the Work, afford access to visitors duly authorized by the Consultant and facilitate inspections or tests they may desire to make. Record site visitors in log book maintained on site.

64.2 Ensure Site visitors wear appropriate safety apparel.

65 EROSION AND SEDIMENTATION CONTROL

65.1 Control drainage on site to prevent flooding, erosion and run-off onto adjacent properties as a result of construction operations.

65.2 Dispose of water containing silt in suspension in accordance with requirements of jurisdictional authorities.

65.3 Conform to sedimentation and erosion control requirements of the conservation and/or municipal authority having jurisdiction. Provide and maintain until completion of work or until directed by Consultant to be removed, sediment control devices at catch basins, drainage courses and at other locations on site as directed. Comply with requirements of the local Conservation Authority.

65.4 Provide storm drain inlet protection consisting of a sediment control barrier or an excavated ponding area around storm drain inlet or curb inlet; add bracing where necessary to withstand high flow volumes and depth. Inspect inlet protection after each rainfall and repair damage. Sweep up accumulated sediment and dispose of in a controlled area. Remove inlet protection after area has been stabilized with permanent vegetation.

65.5 Prevent tracking of mud and dirt from site onto paved roads. Provide stabilized vehicle access/egress points, constructed of coarse granular material. Place additional granular material as required to maintain access/egress points in proper working order. Clean mud and dirt from paved roads at end of each day by shovelling or sweeping and subsequent washing. Dispose of mud dirt in a controlled disposal area.

66 TEMPORARY DRAINAGE AND DEWATERING

66.1 Drainage lines and gutters shall be kept open at all times. No flow of water shall be directed across or over pavements except through pipes or properly constructed troughs. Keep all portions of Work properly and efficiently drained during construction and until completion. Be responsible for all disturbances, dirt and damage which may be caused by or result from water backing up or flowing over, through, from or along any part of Work, or due to operations which may cause water to flow elsewhere.

66.2 Keep trenches and other excavations free of water at all times. Employ adequate means to remove water in a manner that will prevent loss of soil, and maintain the stability of excavation.

66.3 Dispose of such water in a manner that will not be dangerous to public health, private property or to any portion of Work completed or under construction, nor which causes an impediment to the use of streets by the public.

66.4 Drainage of trenches or other excavation through newly laid storm drainage pipe will be allowed only with the express permission of the authority having jurisdiction.

66.5 When drainage is directed to existing catch basins, regularly inspect and clean such catch basins of debris and sediment.

67 SNOW REMOVAL

67.1 Allow no accumulation of ice and snow on Site, and on roof deck when roofing operations are scheduled to take place.

67.2 Remove snow from road, Site circulation paths and elsewhere as required to permit access to Work, parking and uninterrupted construction progress.

68 POLLUTION (DUST, DEBRIS, AND NOISE) CONTROL

68.1 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

68.2 Keep premises free of waste material.

68.3 Arrange and pay for removal of all waste generated by the work in manner acceptable to authorities having jurisdiction.

68.4 Limit noise levels in accordance with requirements of authorities having jurisdiction.

68.5 Maintain temporary erosion and pollution control features installed under this contract.

68.6 Control emissions from equipment and plant to local authorities emission requirements.

68.7 Prevent abrasive-blasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

69 TREE PROTECTIONS

69.1 All trees are to be protected in accordance with the City of Brampton, Urban Forestry, Tree Protection Policy.

69.2 Within Contractor's assigned work and storage areas and adjacent to designated access routes, protect existing trees and other plants scheduled to remain. Provide approved barrier consisting of snow fencing or plywood around Tree Protection Zone (TPZ).

69.3 Leave protection areas undisturbed; do not use areas for storage, stockpiling or any other purpose. Do not dump or flush any contaminants in areas of tree feeder roots.

69.4 Where limbs, roots or portions of plants are required to be removed to accommodate new work, they shall be removed with the approval of Urban Forestry and under the supervision of an experienced arborist.

69.5 Where root systems of protected trees adjacent to construction are exposed or damaged, they shall be neatly trimmed and the area backfilled with suitable material to prevent desiccation.

69.6 Where necessary give plants an overall pruning to restore the balance between roots and top growth and/or to restore appearance.

69.7 Except at locations where specific procedures are included in Contract Documents do not alter grades around existing trees/plants without first obtaining Consultant's consent and directions.

70 SUBSTITUTIONS

70.1 Requests for substitutions will not be accepted prior to the Notification of Award. Substitutions will be considered by the Consultant provided that:

.1 The proposed substitutions have been investigated and complete data are submitted in accordance with the Specifications.

.2 Data relating to changes in the Contract Schedule, if any, and relation to other Work have been submitted.

.3 Same warranty is given for the substitution as for the original Product specified.

.4 All claims are waived for additional costs related to the substitution which may subsequently arise.

.5 Installation of the accepted substitution is co-ordinated into the Work and that full responsibility is assumed when substitutions affect other work. Make any necessary changes required to complete the Work. Revisions to the drawings for incorporation of the substitutions shall be made by the Consultant and all costs associated with the revisions shall be borne by the Contractor.

70.2 Substitutions to methods or process described in the Specifications or drawings, may be proposed for the consideration of the Consultant. Ensure that such substitutions are in accordance with the following requirements:

.1 Time spent by the Consultant in evaluating the substitution shall not be the basis for a claim by the Contractor for extensions to the Contract Time.

.2 Clearly indicate how the proposed substitutions would be advantageous to the Owner or in the opinion of the Contractor would improve the operation of the installation.

.3 Be responsible for substitutions to methods or processes concerning such Work and ensure that the warranty covering all parts of the Work will not be affected.

.4 The cost of all changes in the work of Other Contractors, necessitated by the substituted methods or processes, if accepted, is borne by the Contractor.

.5 The substituted methods or processes fit into space allotted for the specified methods or processes. Revisions to the drawings for incorporation of the substitutions shall be made by the Consultant and all costs associated with the revisions shall be borne by the Contractor.

70.3 Substitutions will not be considered if:

.1 They are indicated or implied on shop drawings or Product data without formal request.

.2 Acceptance will require substantial revision of the Specifications and Drawings.

70.4 Do not substitute Products or methods or processes into the Work unless such substitutions have been specifically approved for the Work by the Consultant.

70.5 Approved substituted Products shall be subject to the Consultant's inspection and testing procedures. Approved substituted Products shall only be installed after receipt of the Consultant's written approval.

70.6 The Contract Price will be adjusted accordingly to any and all credits arising from the substitutions mentioned above.

71 APPROVAL OF PRODUCTS AND INSTALLATION METHODS

71.1 Wherever in the Specifications it is specified that Products and installation methods shall meet approval of Authorities having Jurisdiction, underwriters, the Consultant, or others, such approval shall be in writing.

72 PRODUCT DELIVERY CONTROL

72.1 It is the responsibility of the Contractor to ensure that the supplier or distributor of materials specified or alternatives accepted, which he intends to use, has materials on the site when required. The Contractor shall obtain confirmed delivery dates from the supplier.

72.2 The Contractor shall contact the Consultant immediately upon receipt of information indicating that any material or item, will not be available on time, in accordance with the original schedule, and similarly it shall be the responsibility of all subcontractors and suppliers to so inform the Contractor.

72.3 The Consultant reserves the right to receive from the Contractor at any time, upon request, copies of actual purchase or work orders of any material or products to be supplied for the work.

72.4 If materials and products have not been placed on order, the Consultant may instruct such items to be placed on order, if direct communication in writing from the manufacturer or prime suppliers is not available indicating that delivery of said material will be made in sufficient time for the orderly completion of the Work.

72.5 The Consultant's review of purchase orders or other related documentation shall in no way release the Contractor, or his subcontractors and suppliers from their responsibility for ensuring the timely ordering of all materials and items required, including the necessary expediting, to complete the work as scheduled in accordance with the Contract Documents.

72.6 In the event of failure to notify the Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Consultant reserves the right to direct the Contractor to take the following measures at no increase in Contract Price:

.1 Substitute more readily available Products of similar or better quality and character, or

.2 Temporarily install another Product until such time as the specified Product becomes available, at which time the temporarily installed product shall be removed and the specified Product installed.

73 TRADEMARKS AND LABELS

73.1 Permanent labels, trademarks and nameplates on Products are not acceptable in the finished Work, except where required by authorities having jurisdiction, for operating instructions, or when located in service rooms.

73.2 Remove trademarks and labels by grinding, if necessary, painting out where the particular surface is being painted, or if on plated parts, replace with new plain plated or non-ferrous metal parts.

74 DELIVERY, STORAGE, HANDLING AND PROTECTION

74.1 Be responsible for handling and delivery of Products. Protect Products from damage during handling, storage and installation. Deliver store and handle items in accordance with manufacturer's instructions and as specified. Be responsible for all costs of delivery, loading and off-loading, and for transportation back to its origin for correction, if required, due to damage or defect. Reject materials and Products delivered to the Site which are damaged.

74.2 Manufacture, pack, ship, deliver, and handle Products so that no damage occurs to structural qualities and finish appearance, nor in any other way which is detrimental to their function and appearance.

74.3 Ensure that Products, while transported, are not exposed to an environment which would increase their moisture content beyond the maximum specified.

74.4 Organize delivery of materials, Products and equipment to, and removal of debris and equipment from, the site and surrounding property.

74.5 Schedule early delivery of Products to enable Work to be executed without delay. Before delivery, arrange for receiving at the Place of the Work.

74.6 Coordinate mechanical and electrical equipment and apparatus deliveries with the manufacturer's and suppliers such that equipment and apparatus is delivered to the site when it is required, or so that it can be stored within the building and protected from the elements.

74.7 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.

74.8 Deliver packaged Products, in original unopened wrapping or containers, with manufacturer's seals and labels intact.

74.9 Label packaged products to describe contents, quantity, and other information as specified.

74.10 Labels attesting that materials conform to specified reference standards will be acceptable as verification that contents meet specified requirements. In the absence of labels, submit affidavits to validate conformance of Product to reference standards, as requested by the Consultant.

74.11 Label fire-rated Products to indicate Underwriters' Laboratories approval.

74.12 Handle and store materials and products in such a manner that no damage is caused to the materials and products, the Work, the site and surrounding property.

74.13 Do not obstruct or disrupt local traffic flow during construction period.

74.14 Allocate an area within the limits of the Work acceptable to the Owner for storage of Products brought to the site by all trades. Keep storage area tidy at all times and do not use other parts of he property for storage. Arrange and pay for off-site storage when required.

74.15 Locate products on site in a manner to cause minimal interference with the Work and building activities.

74.16 Store Products off the ground, in a manner to prevent damage, adulteration, deterioration and soiling to the Products, other building components, assemblies, other products, the structure, the site and surrounding property, and in accordance with manufacturer's instructions when applicable.

74.17 Store packaged or bundled Products in original and undamaged condition complete with written application instructions. Keep manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in the Work.

74.18 Do not place or store materials and Products in corridors, public areas, streets, lanes, passageways or similar locations.

74.19 Store Products so as not to create any overloading conditions to any part of the building, structure, falsework, form work and scaffolding.

74.20 Store Products subject to damage from weather in weatherproof enclosures.

74.21 Store cementitious Products clear of earth or concrete floors, and away from walls.

74.22 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

74.23 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

74.24 Store and handle flammable liquids and other hazardous materials in approved safety containers and as otherwise prescribed by safety authorities. Store no flammable liquids or other hazardous material in bulk within the Work.

74.25 Store and mix paints in a heated and ventilated room or area assigned for this purpose. Keep this room or area locked when unattended. Remove oily rags and other combustible debris from the Place of the Work daily. Take every precaution necessary to prevent spontaneous combustion.

74.26 Protect prefinished metal surfaces by protective coatings or wrappings until time of final cleanup. Protection shall be easily removable under work of without damage to finishes. Do not permit strippable tape or coatings to become baked on surfaces which they protect.

74.27 Touch-up damaged factory finished surfaces to Consultant's satisfaction. Use primer and paint to match original.

74.28 Protect glass and other finishes against heat, slag and weld splatter by provision of adequate shielding. Do not apply Visible markings to surfaces exposed to view in finished state or that receive transparent finishes.

74.29 Protect surfaces of completed work exposed to view from staining, disfigurement and all other damage by restriction of access or by use of physical means suitable of the material and surface location.

74.30 Adequately protect trowelled concrete floors from damage. Take special measure when moving heavy loads or equipment on them.

74.31 Keep finished concrete floors free from oils, grease or other material likely to damage or discolour them or affect bond of applied finishes. Once building is enclosed, keep floors as dry as possible after curing.

74.32 Protect finished flooring from pedestrian traffic with reinforced kraft paper as a minimum, secured in place and with joints sealed by reinforced pressure sensitive tape. Maintain protection in place until contract completion.

74.33 Protect finished flooring from continuing construction work and delivery of products with plywood panels of minimum 6 mm thickness with joints between panels sealed with reinforced pressure sensitive tape. Maintain protection in place until work and deliveries are complete.

74.34 Make good or replace damaged materials to the satisfaction of the Consultant.

74.35 Hazardous Materials Information:

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets (MSDS) in accordance with jurisdictional authorities.

.2 Deliver copies of Material Safety Data Sheets (MSDS) to the Consultant on all Products intended for use in the Work and designated as a "controlled product."

75 AVAILABILITY

75.1 If delays in supply of Products are foreseeable, notify the Consultant of such, in order that remedial action may be authorized in ample time to prevent delay in performance of Work.

75.2 In the event of failure to notify the Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Consultant reserves the right to direct the Contractor to take the following measures at no increase in Contract Price:

.1 Substitute more readily available Products of similar or better quality and character, or

.2 Temporarily install another Product until such time as the specified Product becomes available, at which time the temporarily installed product shall be removed and the specified Product installed.

76 MANUFACTURER'S INSTRUCTIONS

76.1 Unless otherwise indicated in the Specifications, fabricate, install, apply, connect, install, erect, use, clean, and condition Products in accordance with manufacturer's instructions except where more stringent requirements are specified. Do not rely on labels or enclosures provided with Products. Obtain written instructions directly from manufacturers.

76.2 Notify the Consultant in writing, of conflicts between the Specifications and manufacturer's instructions, so that the Consultant may establish the course of action. If requested, make a copy of those instructions available at the Site.

76.3 In cases of improper installation or erection of Products, due to failure in complying with these requirements, the Consultant may direct removal and re-installation at no increase in Contract Price.

77 WORKMANSHIP

77.1 Workmanship shall be the best quality, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Consultant if required Work is such as to make it impractical to produce required results.

77.2 Do not employ any unfit person or anyone unskilled in their required duties. The Consultant reserves the right to require the dismissal from the Place of the Work, workers deemed incompetent, careless, insubordinate or otherwise objectionable.

77.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Consultant, whose decision is final.

77.4 Give particular attention to finished dimensions and elevations of the Work. Make finished Work fit indicated spaces accurately. Make finished Work flush, plumb, true to lines and levels and accurate in all respects.

77.5 In finished areas, conceal pipes, ducts, conduit and wiring in floors, walls, ceilings, chases, or behind furring except where indicated otherwise.

77.6 Ensure that service poles, fill-pipes, vents, regulators, metres and similar service installations are located in inconspicuous locations. If not indicated on drawings, verify location of service installations with Consultant prior to commencing installation.

77.7 Ensure that integrity of fire separations is maintained where they are penetrated.

77.8 Finish access panels and doors to match adjacent wall and/or ceiling finish unless otherwise specified or indicated.

77.9 Keep surfaces, on which finished materials will be applied, free from grease, oil, and other contamination which would be detrimental in any way to the application of finish materials.

77.10 Enforce fire prevention methods at site. Do not permit fires, open flame heating devices or accumulation or debris. Use flammable materials only if all safety precautions are taken. Provide and maintain in working order ULC labelled fire extinguishers of types suitable for fire hazard in each case, and locate them in prominent location and to approval of jurisdictional authorities.

77.11 Where flammable materials are being applied, ensure that adequate ventilation is provided, spark-proof equipment is used, and smoking and open flames are prohibited.

78 DIMENSIONS

78.1 Check all dimensions at the Site before fabrication and installation commences and report discrepancies to the Consultant.

78.2 Where dimensions are not available before fabrication commences, ensure that dimensions required are agreed upon between the parties concerned.

78.3 Prior to commencing work, ensure that clearances required by jurisdictional authorities can be maintained

78.4 Wall thicknesses and openings shown on the drawings may be nominal only; ascertain actual sizes at the Site.

78.5 Verify dimensions of shop fabricated portions of the Work at the Site before shop drawings and fabrications are commenced. The Owner will not accept claims for extra expense by reason of non-compliance with this requirement.

78.6 Fabricate and erect manufactured items, shop fabricated items, and items fabricated on or off site, to suit site dimensions and site conditions.

78.7 In areas where equipment is to be installed, check dimensional data on equipment to ensure that area and equipment dimensions are compatible with necessary access and clearance provided. Ensure that equipment supplied is dimensionally suitable for space provided.

78.8 Leave areas clear where space is indicated to be reserved for future equipment, including access to such future equipment.

78.9 Whether shown on the Drawings or not, leave adequate space and provision for servicing of equipment and removal and reinstallation of replaceable items such as motors, coils and tubes.

79 RELOCATION OF MECHANICAL AND ELECTRICAL ITEMS

79.1 The Owner and the Consultant reserve the right to relocate outlets at a later date, but prior to installation, without additional cost to Owner, assuming that the relocation per outlet does not exceed 3000 mm from the original location. No credits will be anticipated where relocation per outlet of up to and including 3000 mm reduces materials, products and labour.

79.2 Should relocations per outlet exceed 3000 mm from the original location the Contract Price will be adjusted in accordance with the provisions for changes in the Contract Documents.

79.3 Alter the location of pipes and other equipment, without additional cost to the Owner, if approved, provided the change is made before installation.

79.4 Make necessary changes, due to lack of coordination, as required and when approved, at no additional cost, to accommodate structural and building conditions.

80 EXPANSION, CONTRACTION, AND DEFLECTION

80.1 Conform to manufacturer's recommended installation temperatures. If items, components, assemblies, systems, and finishes are installed at temperatures different from operation or service temperatures, make provisions for expansion and contraction in service as acceptable to manufacturer and consultant. Repair all resulting damage should expansion provisions provide inadequate.

80.2 Make provisions for expansion and contraction due to temperature changes within components, Products and assemblies, and between adjacent components, Products and assemblies, and due to building movements including but not limited to creep, column shortening, deflection, sway and twist. Ensure provisions for expansion, contraction and building movements prevent damages from occurring to and within components, Products and assemblies.

80.3 Make adequate allowance at wall and partition heads for deflection of the structure above. Determine requirements from Consultant where additional information is required. Where partitions butt to underside of floor assembly, or structural framing, the clearance shall be based on the span of the members supporting the floor or structural framing. In making such allowance use methods which maintain the integrity of the wall or partition as a sound, and/or fire barrier.

80.4 Make provisions in pipes, plenums, ducts and vessels containing air and fluids as is necessary to prevent damage due to fluid and air induced pressure, surges and vibrations, to pipes, plenums, ducts and vessels and to adjacent components, assemblies and construction to which pipes, ducts, plenums and vessels are attached or pass through.

81 DIELECTRIC SEPARATION

81.1 Ensure that a dielectric separator is provided in a permanent manner over entire contact surfaces to prevent electrolytic action (galvanic corrosion) between dissimilar materials. Similarly, prevent corrosion to aluminum in contact with alkaline materials such as contained in cementitious materials.

82 FASTENINGS

82.1 Include in the work of each section necessary fastenings, anchors, inserts, attachment accessories, and adhesives. Where installation of devices is in work or other sections, deliver and locate devices in ample time for installation.

82.2 Do not install fibre, plastic or wood plugs or blocking for fastenings in masonry, concrete, or metal construction, unless specified or indicated on drawings.

82.3 Install work with fastenings or adhesives in sufficient quantity to ensure permanent secure anchorage of materials, construction, components and equipment under static conditions, and to resist building thermal movement, creep and vibration.

82.4 Provide metal fastenings and accessories in same material, texture, colour, sheen and finish as metal on which they occur, unless indicated otherwise.

82.5 Prevent electrolytic action between dissimilar metals and materials.

82.6 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior Work, and where attached to, or contained within, exterior walls and slabs, unless stainless steel or other material is specified. Leave steel anchors bare where cast in concrete.

82.7 Space anchors within their load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

82.8 Conceal fasteners where indicated. Keep exposed fastenings to a minimum, space evenly and in an organized symmetrical pattern.

82.9 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

83 ADJUSTING

83.1 Ensure that all components of assemblies fit snugly, accurately and in true planes, and that moving parts operate positively and freely, without binding and scraping.

83.2 Verify that work functions properly and adjust it accordingly to ensure satisfactory operation. Lubricate Products as recommended by manufacturer.

84 DEMONSTRATION AND INSPECTION OF PRODUCTS AND SYSTEMS

84.1 Arrange for a demonstration of systems and operating Products upon the 100% completion of their installation and prior to certification for Substantial Performance.

84.2 Include in the arrangements for the attendance of the Consultant, Owner, jurisdictional authorities, and personnel assigned by the Owner for the operation of the systems and/or Products.

84.3 Demonstrations shall be conducted by the Subcontractor responsible for the installation of the systems and/or Product, assisted by representatives of the manufacturer or supplier. All personnel conducting the demonstration shall be completely knowledgeable of all conditions of the operating, functioning and maintenance of the systems and/or Products.

84.4 Owner's representative will acknowledge the successful completion of each demonstration on a form provided by the Contractor. The form shall be agreed to by the Owner, Consultant and Contractor prior to demonstration and testing.

84.5 Submit copies of letters from manufacturers of Systems and/or Products before making application for certificate of Substantial Performance to verify that the Products has been installed and connected correctly, and that it is operating in a satisfactory manner. The certification shall be based upon inspection and testing of the Products by competent technical personnel. Include in letter of certification the names of personnel conducting the testing and inspection, the methods of inspection utilized, and the location in the building of the Products certified.

84.6 Following submission of letters of certification and their acceptance by the Owner, the owner shall have the right to use the Products on a trial basis and for instructing their personnel in its use.

85 FINAL INSPECTIONS AND CLOSE OUT

85.1 Submit proposed closeout procedures and schedule of inspection to Consultant for approval before final demonstrations and inspections commence.

85.2 Arrange for, conduct and document final demonstrations, inspections, close-out and take-over at completion of the Work in accordance with procedures described in OAA/OGCA TAKE-OVER PROCEDURES, OAA/OGCA Document No. 100. Where "Architect" is referred to in Document No. 100 it shall mean Consultant.

86 CERTIFICATE OF COMPLIANCE

86.1 Submit Certificate of Compliance, prior to the application for Substantial Performance, for each of the following items.

.1 An affidavit relative to the use of lead-free solder for all domestic water lines, regardless of location.

.2 Products for which Material Safety Data Sheets have been submitted and accepted.

.3 Other Work/Products identified in the Contract Documents as requiring a Certificate of Compliance.

86.2 Each Certificate of Compliance shall indicated names and addresses of the project, the Owner, the date of issue, product description including name, number, manufacturer, with a statement verifying that the Work/Product installed meets specified requirements and, if applicable, complies with the submitted and accepted Material Safety Data Sheets.

86.3 Each Certificate of compliance shall be issued on the subcontractor's letterhead, properly executed, under whose work the prospective Work/Product has been provided.

86.4 Each Certificate of Compliance shall be endorsed by the Contractor with his authorized stamp/signature. Ensure that submissions are made to allow sufficient time for review without delaying progress of scheduled completion.

87 GARBAGE DISPOSAL AND CLEANUP

87.1 Provide waste containers for the disposal of all waste materials resulting from performance of their work.

87.2 No hazardous or contaminated waste material shall be placed in Owner’s waste containers and Subtrades shall make their own arrangements for the disposal off site of any such material resulting from performance of their work.

87.3 Remove all regular waste material and debris from their work areas and deposit in the waste containers at the end of each working day. Any clean up work not performed as requested will be carried out by the Owner with all resultant costs being charged to the Subtrade.

88 CLEANING

88.1 Progress cleaning:

.1 Remove from finish work, spatters, droppings, labels, and debris, before they set up.

.2 Ensure that only cleaning materials are used which are recommended for the purpose by both the manufacturer of the surface to be cleaned and of the cleaning material.

.3 Maintain building work areas "broom clean" at least on a daily basis, but cleaning shall also be done immediately before finishing work.

.4 No waste material may be burned or buried at site. Remove waste as often as required to avoid accumulation, no less than, at the end of each working day.

.5 Remove packaging materials and debris from the site immediately after product and equipment is unwrapped or uncrated.

.6 Ensure that volatile fluid wastes are not disposed of in storm or sanitary sewers, inopen drain courses, or anywhere on site.

.7 Do not allow waste material and debris to accumulate in an unsightly or hazardous manner. Sprinkle dusty accumulations with water. Provide containers in which to collect waste material and debris. Dispose of hazardous products in accordance with requirements of jurisdictional authorities.

.8 Ensure that cleaning operations are scheduled to avoid deposits of dust or other foreign matter on surfaces during finishing work and until wet or tacky surfaces are cured.

.9 Provide instructions for final cleaning of finishing work, and for inclusion in Maintenance and Operating Manuals.

88.2 Final cleaning:

.1 Before final inspection, replace glass and mirrors broken, damaged, and etched during construction, or which are otherwise defective.

.2 In addition to requirements for progress cleaning, Work shall include final cleaning by skilled cleaning specialists on completion of construction.

.3 Remove temporary protections and make good defects before commencement of final cleaning.

.4 Final cleaning shall remove dust, stains, paint spots, soil, grease, fingerprints, and accumulations of construction materials, interior and exterior to the building for all new work throughout new and existing Building. Work shall be done in accordance with manufacturer's instructions for each material.

.5 Maintain cleaning until Owner has taken possession of building or portions thereof.

89 PROGRESS RECORDS

89.1 Maintain on site, permanent written records of daily progress of the Work. Records shall be open to review by Consultant and Owner at all times and a copy shall be furnished to Consultant on a weekly basis.

89.2 Records shall show dates of commencement, progress and completion of various trades and items of work. Particulars pertaining to number of employees of various

trades and type and quantity of equipment employed daily, temperature, protection methods and other such data shall be noted.

90 RECORD DRAWINGS

90.1 Complete appended Electronic File Release Agreement and submit complete with required fee. Final record drawings to be submitted in both CAD and PDF format.

90.2 Authorized deviations from drawings shall be marked in red accurately on one set of drawing prints in a neat, legibly printed manner and shall be dated. Prior to final inspection, neatly transfer the recorded information to a second set of drawing prints of the most recent revision to the drawings and submit both sets to the Consultant.

90.3 Maintain record drawings up to date as Work progresses. Status of maintained record drawings may be considered as a condition for validation of applications for payment.

90.4 Identify each record drawing as "Contract Record Copy" and maintain the record drawings in good condition. Make record drawings available to the Consultant at all times.

90.5 Record drawings shall include accurate dimensioned record of deviations and changes in Work from drawings.

90.6 Record drawings shall be signed and dated by Contractor.

90.7 Submit record drawing to Consultant for review and make corrections as directed by Consultant.

90.8 Record accurately all deviations in the Work.

90.9 Accurately record locations of concealed structure, mechanical and electrical services and similar Work not clearly in view, the location of which is required for maintenance, alteration Work and future additions. Do not conceal such Work until the location has been recorded.

90.10 Accurately record locations of equipment bases, anchors, concrete pads and roof curbs, sleeves, piping, conduits, ducts, maintenance holes and valves, etc. located either below, outside or within structure.

90.11 Where piping, conduits and ducts are underground, underfloor, embedded in concrete or otherwise in unaccessible locations, accurately record with respect to structure column lines or walls and elevations with respect to finished floor levels or grades referenced to the centre line of components.

90.12 Accurately record any components which will be in inaccessible locations for Consultant's review before the component is covered, or buried, or made inaccessible.

91 OPERATION AND MAINTENANCE MANUALS

91.1 Hand over to the Consultant two (2) copies of a comprehensive operations and maintenance manual and material suitable for the Owner's maintenance employees. Manuals shall cover all Products supplied and installed under the Contract.

91.2 Submit draft of the operation and maintenance manuals for the Consultant's review at least 15 days before testing systems and equipment. Incorporate alterations and additions, as found to be necessary during testing, and prepare the final version of the manual from the corrected draft.

91.3 Submit final version of operation and maintenance manuals prior to Contract Completion.

91.4 Testing of systems and equipment will not be deemed to be complete until the requisite number of copies of the final version of the manuals has been handed over to the Consultant.

91.5 If standard literature is incorporated into the operations and maintenance manual, any irrelevant information shall be deleted, or suitably noted.

91.6 The manuals shall have sufficient detail in order that the Owner can totally maintain the equipment without outside help.

91.7 Submit all material in English.

91.8 Operation and maintenance manuals shall contain the following minimum information and data:

91.9 Table of contents: Provide title of Contract; names, addresses, and telephone numbers of Consultants and Contractor with name of responsible parties; schedule of Products and systems, indexed to content of the volume.

91.10 For each Product or system: List names, addresses and telephone numbers of Subcontractors, suppliers and service representatives, including local source of replacement supplies and parts including telephone numbers.

91.11 Warranties: Warranties are between the Contractor and Owner. Warranties shall include, as a minimum:

.1 Description of warranty coverage.
.2 Date warranty starts (being date of Contract Completion).
.3 Date warranty expires.
.4 Contact name, address and phone number (the Contractor shall also be responsible for advising the Owner of changes in contact information during the warranty period).
.5 Equipment and components performance curves.
.6 Hydro certificates.

91.12 Reports: For each Product or system provide the following:

.1 Manufacturer’s certified reports
.2 Factory test reports.
.3 Field testing reports.

91.13 Details of design, construction and/or fabrication features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of the installation.

91.14 Technical data, Product data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items and parts lists.

91.15 Schematics, interconnection lists: Manuals shall be complete with schematic and wiring diagrams, wiring interconnection lists and diagrams fully cross referenced and

coordinated, printed circuit board layouts including the component identification, component parts list with electronic substitution equivalent. Provide cross referenced components lists and sequence of operations.

91.16 Trouble shooting and fault location guide: Instructions to facilitate quick return of malfunctioning equipment to operation.

91.17 Routine servicing and preventative maintenance schedule for Products and/or estimated hours required for routine servicing and preventative maintenance tasks.

91.18 List of recommended spare parts and recommended quantity of each item to be stocked based on spare part availability and re-order time.

91.19 Complete set of reviewed shop drawings.

91.20 Product data: Mark each sheet to clearly identify specific Products and component parts, and data applicable to installation; delete inapplicable information.

91.21 Drawings: Supplement Product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams and as required in the Specifications.

91.22 Typed text: As required to supplement Product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions and as required in the Specification.

92 AS-BUILT DRAWINGS

92.1 Prepare all required drawings on CAD (.dwg), using CAD Version 2010 or higher.

92.2 Prepare CAD drawings to meet the requirements of the Owners or Consultant’s CAD Standards and Procedures.

92.3 Supply and hand over to the Consultant one CD of drawings for each final drawing prepared under this Contract, including but not limited to circuit drawings, equipment layout drawings, and shop drawings.

92.4 The final size of drawings shall be 560 mm x 860 mm. Half size reproductions (280 mm x 430 mm) shall also be provided.

92.5 Prior to Contract Completion, supply and hand over to the Consultant, one complete set of .dwg Drawing Files in CAD format on storage media acceptable to Consultant for each final drawing prepared under this Contract, including but not limited to circuit drawings, equipment layout drawings, and shop drawings.

92.6 Text files shall be written in word processing program acceptable to Owner.

92.7 Authorized deviations from drawings shall be marked in red accurately on one set of drawing prints in a neat, legibly printed manner and shall be dated. Prior to final inspection, neatly transfer the recorded information to a second set of drawing prints of the most recent revision to the drawings and submit both sets to the Consultant.

92.8 Maintain as-built drawings up to date as Work progresses. Status of maintained as-built drawings may be considered as a condition for validation of applications for payment.

92.9 Identify each as-built drawing as "As-Built Copy" and maintain the as-built drawings in good condition. Make as-built drawings available to the Consultant at all times.

92.10 As-built drawings shall include accurate dimensioned record of deviations and changes in Work from drawings.

92.11 As-built drawings shall be signed and dated by Contractor.

92.12 Submit as-built drawing to Consultant for review and make corrections as directed by Consultant.

92.13 Record accurately all deviations in the Work.

92.14 Accurately record locations of concealed structure, mechanical and electrical services and similar Work not clearly in view, the location of which is required for maintenance, alteration Work and future additions. Do not conceal such Work until the location has been recorded.

92.15 Accurately record locations of equipment bases, anchors, concrete pads and roof curbs, sleeves, piping, conduits, ducts, maintenance holes and valves, etc. located either below, outside or within structure.

92.16 Where piping, conduits and ducts are underground, underfloor, embedded in concrete or otherwise in inaccessible locations, accurately record with respect to structure column lines or walls and elevations with respect to finished floor levels or grades referenced to the centre line of components.

92.17 Accurately record any components which will be in inaccessible locations for Consultant's review before the component is covered, or buried, or made inaccessible.

92.18 CAD drawings of Contract Drawings can be obtained from Consultant at a cost of $750.00 plus HST per sheet drawing and with a signed CAD Wavier.

92.19 Clearly and prominently mark each drawing “AS-BUILT DRAWING prepared by

_____ (name of Contractor)”

93 TRANSMITTAL

93.1 Transmittal shall contain the list of file names contained on the storage media.

93.2 Data forwarded to the Owner shall contain the following files in addition to the design information:

.1 Library parts/cells used in the design

.2 Level convention used for each design file.
.3 Plotting instructions used to prepare hard copies including colour tables, pen tables and plot scale.
.4 Working units of the design files.
.5 Font library, if the standard is not used.

94 PHASED CONSTRUCTION

94.1 The Work shall be conducted in multiple phases, with each phase focusing on a single room.

94.2 Construction activities shall be planned and executed in phases, with each phase focusing on a single room.

94.3 No subsequent phase shall commence until the current room is fully completed and returned to service.

94.4 The Contractor shall submit a detailed construction schedule indicating the start and completion dates for each room.

94.5 The schedule must be approved by the Consultant and the Owner before any work commences.

94.6 The Contractor shall coordinate with the facility management to ensure that only one room is out of commission at any given time.

94.7 The Contractor shall ensure that access to and from rooms not under construction remains unobstructed.

94.8 Construction materials and debris must be confined to the room under construction and shall not impede the operation of adjacent areas.

94.9 The room will be considered complete when all punch list items are resolved and the room is fully operational.

94.10 Once a room is approved and back in commission, the contractor may commence work on the next room as per the approved schedule.

95 MOVING, STORING, AND REINSTALLING EXISTING FURNITURE AND FITNESS / GYM EQUIPMENT

95.1 **Furniture:** Includes all movable articles within the room such as desks, chairs, tables, cabinets, etc.

95.2 **Fitness or Gym Equipment:** Includes all exercise machines, weights, mats, and other related apparatus.

95.3 Contractor shall coordinate with the Owner to schedule the moving and reinstallation activities to minimize disruption.

95.4 Work shall be conducted in phases, ensuring that each room's furniture and equipment are handled separately.

95.5 No room shall have furniture or fitness equipment moved, stored, or reinstalled without prior approval from the Owner.

95.6 Prior to moving, all furniture and equipment shall be inventoried and documented, including photographs and descriptions.

95.7 Contractor shall be responsible for the unloading of all furniture and equipment supplied to the work site. The Contractor shall be responsible for any damage occurring during these operations.

95.8 Any existing damage shall be noted, documented by photographs and communicated to the Consultant and Owner.

95.9 Furniture and equipment shall be carefully disassembled, if necessary, and moved using appropriate equipment to prevent damage.

95.10 Items shall be labeled clearly to ensure correct reinstallation.

95.11 Contractor is responsible for providing all secured storage containers required for the furniture and equipment.

95.12 A secure, dry, clean and secure storage area shall be designated for the temporary storage of furniture, equipment and stored on the site of the work in a manner satisfactory to the Owner.

95.13 Items shall be stored in an organized manner, with protective coverings to prevent dust and damage.

95.14 Stored items shall be protected from environmental conditions and potential impacts.

95.15 Regular inspections shall be conducted to ensure the integrity of stored items.

95.16 After painting is completed and fully cured, the room shall be prepared for reinstallation.

95.17 Contractor shall verify that the room is clean and free of any debris or dust.

95.18 Furniture and equipment shall be carefully moved back into the room and reassembled as necessary.

95.19 Items shall be positioned according to the original layout unless otherwise directed by the Owner.

95.20 Once reinstallation is complete, the contractor shall conduct a final inspection with the Owner.

95.21 Any issues or discrepancies shall be addressed promptly.

95.22 Upon completion of each phase, a final inspection shall be conducted to ensure all furniture and equipment are properly reinstalled and the room is ready for use.

95.23 Contractor shall provide a final inventory and condition report of all moved items.

95.24 Any damage or issues noted during the process shall be documented and remedied at the Contractor's expense.

95.25 Store all materials and equipment in a secure and protected manner, which will not overload the structure and shall prevent vandalism or unauthorized use.

95.26 Be responsible for the security of all materials and equipment. Make no claims for theft or damage to the Owner.

96 OCCUPIED BUILDING

96.1 This is an occupied building and normal building routine will have to carry on while this work is being done. There may be instances where the Contractor will be asked to complete certain types of work after hours or on weekends. This will not constitute an extra fee.

96.2 Take proper care to avoid unnecessary noise, clutter or obstruction in pedestrian areas, and arrange for storage of materials and tools where they will cause minimum inconvenience.

96.3 Where excessive noise or obstruction is in certain cases unavoidable, advise the Owner ahead of time and make suitable arrangements.

96.4 The Owner will allow access to the building and to the work site at times designated by the Owner.

96.5 The Owner will not assign storage space, for materials and tools. Contactor shall provide secure storage containers on site on designated parking lot space or stored in a location acceptable to the building Owner.

96.6 Perform work which interferes with the public comfort at the times specified by the Owner.

96.7 The Owner to be notified up to 2 weeks in advance of deliveries of any major equipment and materials arriving on site during normal working hours. Otherwise, all deliveries are to be made prior to 8:00 a.m. and after 7:00 p.m.

97 TEMPORARY ENCLOSURE AND PROTECTION

97.1 Provide and maintain, signs, guardrails, barrier, warning lights and other protection as required by authorises having jurisdiction for safety of the Place of the Work. Be responsible for adequacy of protection.

97.2 Plant, Machinery and Scaffolding:

.1 Provide formwork, scaffolding, equipment, tools, machinery and incidental appurtenances necessary for the proper execution of the Work.

.2 Erect plant machinery and scaffolding to permit access to building and the Work.

.3 Use scaffolds in such manner as to interfere as little as possible with other trades' operations

.4 Support scaffolds from finished surfaces only after taking precautions to prevent damage. No supports, clips, brackets, or similar devices shall be welded, bolted, or otherwise affixed to any finished member or surface without prior permission.

97.3 Maintain temporary barriers and enclosures in good condition for the duration of the Work.

97.4 Remove temporary barriers and enclosures from Place of the Work when no longer required.

98 PROTECTION OF THE PUBLIC

.1 Provide fencing, barricades, hoarding, notices and warning boards and maintain lights and signals for protection of workers engaged on the Work, for protection of adjoining property and for protection of the public.

.2 Where any special hazard exists from which it is not possible to protect the public safety by other means, watchpersons shall be employed to preserve public safety until the area of special hazard no longer poses a risk to public safety.

98.2 Fire Routes

.1 Maintain fire access routes, including overhead clearances, for use by emergency response vehicles.

99 COVID-19 SITE PROTOCOL

99.1 the Owner and Authorities having jurisdiction over the project site. Including but not limited to screening and PPE requirements.

99.2 The Owner and Consultant reserves the right to request disclosure from the General Contractor regarding the wellness of all site personnel with respect to the COVID-19 novel coronavirus. The General Contractor should make it known to the Owner and Consultant if any worker or visitor to the site has been placed in self-isolation and/or is in a medical or travel-imposed quarantine.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for demolition and removals Work in accordance with the Contract Documents.

.2 Work included: Requirements for demolishing, salvaging and removing wholly or in part the various items designated on the drawings or required to be removed or partially removed for the receipt of the Work of this Contract, including not necessarily limited to:

.1 Alteration and renovations to existing building.

.2 Cutting and removing of walls, floors, ceilings, doors and frames, in the existing buildings as indicated on Drawings.

.3 Patching, making good openings and chases in walls, floors, ceilings, including the supply and installation of lintels, channels and finishes.

.4 Removal of rubbish, debris, demolished fixtures, fitments and items not scheduled to remain the Owner's property, resulting from the demolition and preparatory work.

.5 Remove abandoned services such as conduits, pipes, wiring, ducts, fixtures, equipment, etc. where required for the work or indicated on the drawings.

.6 Removal of all mechanical items including plumbing fixtures, services etc. where required for the work or indicated on drawings and or where not required to be relocated.

.7 Removal of existing electrical items including fixtures, etc. where required for the work or indicated on the drawings and not required to be relocated.

.8 Dust control during the operations of the work of this Section.

.9 Removal shall mean removal from site and safe disposal in a legal manner

1.2 **REFERENCES**

.1 CSA S350-M, Code of Practice for Safety in Demolition of Structures.

.2 OPSS, Ontario Provincial Standard Specification.

1.3 **SUBMITTALS**

.1 Where required by Authorities having jurisdiction, submit a Fire Plan to local fire department for review and approval.

.2 Submit shop drawings, diagrams and details in accordance with Section 01 10 10.

.3 30 calendar days prior to start of demolition and removals work, submit for review, drawings, diagrams or details showing sequence of disassembly work and shoring of supporting structures in accordance with authorities having jurisdiction.

.4 Submit for approval, a plan showing impacts, interruptions and delays to Owners operations

.5 Submit Dust Control Plan conforming to requirements of the City of Brampton’s Public Health Services.

.6 Have submissions signed and sealed by Professional Engineer licensed in Province of Ontario.

.7 Submit to Consultant, details of where rubble, debris and other materials are to be disposed or reused. Include each disposal/reuse site location, operator's name and business address, type of license under which site operates, and criteria used by site to assess suitability of rubble, debris and other materials for disposal.

.8 Give notice to Utility Authorities controlling services and appurtenances which will be affected by demolition work.

1.4 **QUALITY ASSURANCE**

.1 Prepare waste audits, waste reduction workplans, source separation programs and recycling programs as required by jurisdictional authorities and update programs and implement such programs as required.

.2 Perform the work of this section in accordance with the 'Environmental Protection Act' including Ontario Regulation 102 and the 'Environmental Assessment Act' including Ontario Regulation 103.

.3 Conform to Fire Code, Regulation under the Fire Marshals Act.

.4 The demolition contractor must engage a registered professional engineer who holds a certificate of authorization and an appropriate level of liability insurance to prepare demolition procedures.

.5 As part of the contract requirements, the engineer for the demolition contractor should be required to sign the general review commitment required by city building departments.

1.5 **SITE CONDITIONS**

.1 Interruptions to Owners operations will not be permitted.

.2 Perform operations, machine and equipment movements, deliveries and removals at time or times that will permit uninterrupted operations in and around structures, including parking, deliveries, and Site access and egress.

.3 Take over structures to be demolished based on condition on date that Tenders close.

.4 Contractor shall photo document all existing conditions prior to demolition and make such material available to Cons

2 Products

2.1 **MATERIALS**

.1 All materials requiring removal shall become the Contractor's property and shall be removed and disposed of from the site, as the work progresses, unless indicated otherwise.

.2 Salvaged material:

.1 Salvage and stockpile Products, materials, and equipment as specified herein, indicated on Site or indicated on drawings.

.2 Coordinate items to be salvaged with Owner. Dispose of items Owner deems to be of no further use.

.3 Salvaged materials shall not be chipped, cracked, split, stained or damaged.

.4 Store items off of moist surfaces.

3 Execution

3.1 **GENERAL**

.1 Schedule skylight removal work to coincide with commencement of new roofing system installation.

.2 Clean up rubble and debris, resulting from work promptly and dispose at end of day or place in waste disposal bins. Empty bins on regular basis.

.3 Stockpiling of rubble, debris, and surplus Products on Site will not be permitted.

.4 Remove, handle and transport Products indicated to be salvaged and stored for future use. Transport Products to storage area(s) designated by Consultant. Perform work to prevent any damage to Products during removal and in storage. Products damaged during removal, will be inspected by Consultant. Consultant will determine extent of damage and accept or refuse Products.

.5 List and description of items to be removed and stored or reused:

.1 Items as indicated on the drawings or by the Consultant.

.6 Tag and log all items to be salvaged to the satisfaction of the Consultant. Ensure identification tags do not damage items to be salvaged and are non-permanent, removable and durable.

.7 Communicate Dust Control Plan procedures to all appropriate personnel on site and their head offices and due diligence measures to be maintained to control all fugitive emissions.

.8 Take precautions to guard against movement, settlement or collapse of adjacent services, sidewalks, driveways, or trees. Be liable for such movement, settlement or collapse caused by failure to take necessary precautions. Repair promptly such damage when ordered.

3.2 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

.2 Examine adjacent structures and other installations prior to commencement of demolition and removals work.

3.3 **PRESERVATION OF REFERENCES**

.1 Record location and designation of survey markers and monuments located within demolition area, prior to removal. Store and restore markers and monuments upon completion of Work or relocate as directed by Consultant.

3.4 **PROTECTION**

.1 Prevent movement or damage of adjacent structures, services, walks, paving, trees, landscaping, adjacent grades, and parts of existing structure to remain. Supply and

install bracing and shoring as required. Make good damage caused by demolition to acceptance of Consultant.

.2 Protect adjacent structures and property against damage which might occur from falling debris or other causes. Repair or replace damage caused from work of this Section to acceptance of Consultant.

.3 Do not interfere with use of adjacent structures and Work areas. Maintain free, safe passage to and from adjacent structures and Work areas.

.4 Take precautions to support affected structures. If safety of structure being demolished, adjacent structures or services are endangered, cease demolition operations and take necessary action to support endangered item. Immediately inform Consultant. Do not resume demolition until reasons for endangering have been determined and corrected and action taken to prevent further endangering.

.5 If movement or settlement occurs, install additional bracing and shoring as necessary and make good damage to acceptance of Consultant.

.6 Hang tarpaulins where debris and other materials are lowered. Build in around openings with wood and plywood at locations used for removal of debris and materials.

.7 Prevent debris from blocking surface drainage system, elevators, mechanical, and electrical systems which are required to remain in operation.

.8 Pay particular attention to prevention of fire and elimination of fire hazards which would endanger Work or adjacent structures and premises.

.9 Supply and install adequate protection for materials to be re-used, set on ground and prevent moisture pick-up. Cover stockpiles of materials with tarpaulins.

.10 Close off access to areas where demolition is proceeding by barricades and post warning signs.

.11 Supply, install and maintain legal and necessary barricades, guards, railings, lights, warning signs, security personnel and other safety measures, and fully protect persons and property.

.12 Dust/weather partitions:

.1 Prior to demolition work proceeding in existing structures, temporarily enclose Work areas, access and supply and install dustproof and weatherproof partitions. Design partitions to prevent dust and dirt infiltration into adjoining areas, prevent ingress of water, and to resist loads due to wind.

.2 Prevent dust, dirt and water from demolition operations entering operational areas.

.3 Adjust and relocate partitions as required for various operations of work.

.4 Upon completion of work, remove and dispose of partitions from Site.

.13 Dust protection:

.1 Perform dust control procedures in accordance with approved Dust Control Plan and work of this Section.

.2 Clean water to be applied to hard and soft surfaces and on open excavation faces on Site daily to eliminate dust.

.3 Roadways and sidewalks to be cleaned daily or as required.

.4 A designated truck loading area on granular material or existing asphalt to be used to mitigate tracking of potentially contaminated soil and demolition debris off Site. Contaminated loading points to be cleaned or re-established.

.14 Removed skylights:

.1 Provide temporary protective sheeting over removed skylights.

.2 Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights or temporary fasteners.

.3 Provide for surface drainage from sheeting to roof drains.

.4 Do not permit traffic over unprotected or repaired deck surface.

.15 Blasting is not permitted

3.5 PREPARATION

.1 Disconnect and/or re-route electrical data, communication and telephone service lines entering structures to be demolished. Remove abandoned lines as indicated on Contract Drawings. Post warning signs on electrical lines and equipment which is required to remain energized.

.2 Disconnect and cap designated mechanical services:

.1 Natural gas supply lines: As indicated on drawings, to be removed by qualified workers in accordance with gas company instructions.

.2 Sewer and water lines: Remove and dispose of as indicated on Contract Drawings.

.3 Other underground services: Remove and dispose of as indicated on Contract Drawings.

.3 Disassemble and remove mechanical equipment, ductwork and piping complete with supports and associated components.

.4 Do not disrupt active or energized utilities designated to remain undisturbed

.5 Perform rodent and vermin control to comply with health regulations

3.6 DEMOLITION

.1 Perform demolition with extreme care. Confine effects of demolition to those parts which are to be demolished.

.2 Perform work and prevent inconvenience to persons outside those parts which are to be demolished.

.3 Carry out demolition in accordance with the requirements of CSA S350-M.

.4 Demolish parts of structure to permit remedial work as indicated

.5 Demolition shall proceed safely in systematic manner from roof to grade and as necessary to accommodate remedial work indicated. Work on each floor level shall be

complete before commencing work on supporting structure and safety of its supports are impaired. Parts of building which would otherwise collapse prematurely shall be securely shored. Walls and piers shall not be undermined.

.6 Do not overload floor or wall with accumulations of material or debris or by other loads.

.7 Perform work to minimize dusting. Keep work area wetted down with fog sprays to prevent dust and dirt rising. Supply and install temporary water lines and connections that may be required. Upon completion, remove installed temporary water lines. Use covered chutes, water down.

.8 Do not sell or burn materials on Site.

.9 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as Work progresses.

.10 At end of day's work, leave Work in safe condition with no part in danger of toppling or falling. Protect interiors of parts not to be demolished from exterior elements.

.11 Drainage and sewer system protection:

.1 Ensure that no dust, debris or slurry enters drainage and sewer system on Site.

.2 Remove and dispose of debris and slurry promptly from Site.

.3 Comply with City of Brampton Sewer Use By-Law.

.12 Concrete:

.1 Demolish concrete by methods which avoid impact loads on items which are not to be demolished.

.2 Where only part or parts of a concrete floor, wall, or other items are to be demolished, use saw cuts to isolate areas which are to be demolished except where existing reinforcing steel is to be left in place. Prior to such isolating, install suitable support to prevent premature movement of area(s) being isolated and undesirable transfer of loads as cutting progresses. If necessary, remove area(s) to be demolished by successively isolating small sections.

.3 Where reinforcing steel is to be left in place, use saw cuts from surface of concrete around perimeter(s) of area(s) to be demolished, chip concrete without damaging reinforcing steel. Retouch damaged epoxy coating of existing reinforcing steel.

.13 Steel: Where only part or parts of structure is to be demolished, dismantle and maintain structure stable. Do not place excessive loads on components. Install adequate temporary guys and supports to ensure stability and to prevent excessive loading. Support each component being disconnected from structure, and lower, do not drop, component after it is disconnected.

.14 Cut openings through existing walls, partitions and floors. Establish exact location of steel reinforcing in existing concrete slabs or walls before cutting. Be responsible for damage to existing steel reinforcing and be liable for structural failure. Make good surfaces disturbed with materials to match existing.

.15 Cladding:

.1 Remove cladding, girts, channels, and additional components as indicated or necessary for new cladding work, unless otherwise indicated.

.2 Form openings in cladding such that edges are left straight, clean and not ragged. Where openings abut flashings, ducts or similar items projecting through, or forming integral part of cladding system, preserve and support as required unless otherwise shown.

.3 Take care to not damage existing cladding material that is to remain.

.4 Where doors are scheduled to be removed, include removal of door frames and door hardware.

.5 Remove interior partitions, fittings, fixtures and accessories as indicated on drawings. Partitions and walls shall be removed full height to structure above.

.6 Remove interior finishes, such as ceiling and floor finishes, where new finishes are indicated on Contract Drawings.

.7 Removal of existing ceilings shall include complete removal including bulkheads and suspension system.

.8 Removal of adhesive applied finishes shall include complete removal to substrate including adhesive. Take adequate care to prevent damage to substrate.

.9 Remove existing floor finishes, include mortar bed, underlayment or other cleavage membranes, underpad, base, floor moulding and transition strips.

.16 Demolish all other items indicated or required.

.17 Cut openings through existing walls, partitions, roofs and floors. Establish exact location of steel reinforcing in existing concrete slabs or walls before cutting. Be responsible for damage to existing steel reinforcing and be liable for structural failure. Make good surfaces disturbed with materials to match existing.

.18 Where doors are scheduled to be removed, include:

.1 Removal in re-usable condition of door hardware.

.2 Removal of doors and door frames.

.19 Remove interior partitions, fittings, fixtures and accessories as indicated on drawings. Partitions and walls shall be removed full height to structure above.

.20 Remove interior finishes, such as ceiling and floor finishes, where new finishes are indicated on Room Finish Schedule.

.1 Removal of existing ceilings shall include complete removal including bulkheads and suspension system.

.2 Removal of adhesive applied finishes shall include complete removal to substrate including adhesive. Take adequate care to prevent damage to substrate.

.21 Remove existing floor finishes, include mortar bed, underlayment or other cleavage membranes, base, floor moulding and transition strips.

.22 Demolish all other items indicated or required.

3.7 DISPOSAL OF MATERIALS

.1 Remove from Site, rubble, debris, and other materials resulting from demolition and removals work in accordance with Authorities having Jurisdiction, except where specified or indicated on Contract Drawings to be reused.

.2 Conform to requirements of municipality's Works Department regarding disposal of waste materials.

.3 Materials prohibited from municipality waste management facilities shall be removed from Site and dispose of at recycling companies specializing in recyclable materials.

3.8 RESTORATION

.1 Where demolition removed a structure or installation, rough grade and restore area in accordance with Authorities having Jurisdiction.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products equipment and services necessary for the management of designated substances work in accordance with the Contract Documents.

1.2 **DEFINITIONS**

.1 Hazardous Materials: Designated Substances as covered by the Ontario Occupational Health and Safety Act as well PCBs, CFCs, HCFCs, and Fuel Oil.

.2 PCBs: Polychlorinated Biphenyls.

.3 PCB equipment: Equipment designed or manufactured to operate with PCB liquid or to which PCB liquid was added or drums or other containers used for the storage of PCB liquid.

.4 PCB liquid: Material containing PCBs at a concentration of more than 50 mg/kg

.5 PCB material: Material containing PCBs at a concentration of more than 50 mg/kg whether the material is liquid or not

.6 PCB waste: PCB equipment, PCB liquid, or PCB material, but does not include:

.1 PCB material or PCB equipment after it has been decontaminated pursuant to guidelines issued by the Ministry of Environment or instructions issued by the director.

.2 PCB equipment that is:

.1 An electrical capacitor that has never contained over one kilogram of PCBs.

.2 Electrical, heat transfer of hydraulic equipment or a vapour diffuser pump that is being put to the use for which it was originally designed or is being stored for such use by a person who uses such equipment for the purpose for which was originally designed.

.3 Machinery or equipment referred to in Clause 1.2.6.3.1.

.3 PCB liquid that:

.1 Is at the site of fixed machinery or equipment, the operation of which is intended to destroy the chemical structure of PCB’s by using the PCB’s as a source of fuel or chlorine for purposes other than the destruction of PCB’s or other wastes and with respect to which a certificate of approval has been issued under Section 9 of the Act after the 1st day of January 1981 specifying the manner in which PCB liquid be processed in the machinery or equipment.

.2 Is in PCB equipment referred to in subclause (b) (2) Ontario Regulation 11/82.

.3 HCFC: Hydrochlorofluorocarbons.

.4 CFC: Chlorofluorocarbons.

1.3 **REGULATORY AGENCIES**

.1 Comply with Federal, Provincial, and local requirements pertaining to the handling, management, haulage, and/or disposal fo Hazardous Materials including but not limited to the following:

.1 Ontario Regulation 356, Highway Traffic Act.

.2 R. R. O. 1990, Regulation 347, General - Waste Management.

1.4 **SUBMITTALS**

.1 Submit proof satisfactory to the Consultant that suitable arrangements have been make to dispose of Hazardous Materials in accordance with requirements of authorities having jurisdiction.

.2 Submit notifications to applicable authorities having jurisdiction regarding the handling, storage, haulage, and/or disposal of Hazardous Materials as required by Regulations.

.3 Submit proof satisfactory to the Consultant that the Hazardous Waste materials were appropriately disposed of.

1.5 **EXISTING CONDITIONS**

.1 Information pertaining to the presence of Hazardous Materials to be handled; removed, or otherwise disturbed during this project is identified in the report: Section A1000 Removal and Disposal of Designated Substance dated 2020-07-10 prepared by Fisher Environmental

.2 Assessment:

.1 Employ an Asbestos Abatement Consultant to conform the presence of asbestos in the materials being demolished and to remove hazardous materials in accordance with authorities having jurisdiction.

.2 Submit Asbestos Abatement Consultant's certificate that hazardous materials have been removed in accordance with Authorities having Jurisdiction

1.6 **INSTRUCTION AND TRAINING**

.1 Before commencing work, provide to the Consultant satisfactory proof that every worker has had instruction and training in the hazards of handling and storage of Hazardous Materials, in personal hygiene and work practices, and in the use, cleaning, and disposal, of respirators and protective clothing as required.

.2 Instruction and training related to respirators shall include instruction and training related to:

.1 The limitations of the equipment.

.2 The inspection and maintenance of the equipment.

.3 The fitting of the equipment.

.4 The disinfecting of the equipment.

1.7 **WORKER PROTECTION**

.1 Respirators: Provide workers with personally issued and marked as to efficiency and purpose non-powered reusable or replaceable filter type air purifying respirators suitable for the materials being handled and acceptable to the Provincial Authority having jurisdiction (as required).

.2 Protective Clothing: Provide workers with full body disposable type coveralls (as required).

.3 Eating, drinking, chewing, and smoking are not permitted in the work area.

.4 Store protective clothing in clean plastic bag for reuse or if protective clothing is not to be reused, dispose of as contaminated waste.

.5 Workers shall wash hands and face when leaving the work area and before eating or drinking.

2 Products

2.1 **MATERIALS**

NOT USED

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **ASBESTOS CONTAINING MATERIALS**

.1 Conform to and Manage and dispose of asbestos containing materials in accordance with Regulation Designated Substance - Asbestos on Construction Projects And In Buildings And Repair Operations R.R.O. 1990, Reg. 838, made under Occupational Health and Safety Act as amended by O.Reg. 278/05 and O.Reg 837 as amended by O.Reg. 279/05.

END OF SECTION

1 General

1.1 **DESCRIPTION**

.1 This section provide the elastomeric sealants and their implementation that are used to seal building joint assemblies.

.2 Labour, Products, equipment and services necessary for sealant Work in accordance with the Contract Documents.

.3 Work of this Section does not include sealants in firestopping and smoke sealed assemblies.

.4 Work of this Section does not include sealant work identified in individual specification sections.

1.2 **REFERENCES**

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C 919-[08], Standard Practice for Use of Sealants in Acoustical Applications.

.2 ASTM C834, Specification for Latex Sealants.

.3 ASTM C920, Specification for Elastomeric Joint Sealants.

.4 ASTM C1330, Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 19-GP-5M-[1984], Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).

.2 CAN/CGSB-19.13-[M87], Sealing Compound, One-component, Elastomeric, Chemical Curing.

.3 CGSB 19-GP-14M-[1984], Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).

.4 CAN/CGSB-19.17-[M90], One-Component Acrylic Emulsion Base Sealing Compound.

.5 CAN/CGSB-19.24-[M90], Multi-component, Chemical Curing Sealing Compound.

1.3 **ACTION AND INFORMATIONAL SUBMITTALS**

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Product data: Submit copies of Product data in accordance with Section 01 10 10 describing type, composition and recommendations or directions for surface preparation, material preparation and material installation.

.3 Manufacturer's product to describe:

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.2 Samples:

.1 Submit samples of each type of material and colour.

.2 Cured samples of exposed sealants for each colour where required to match adjacent material.

.3 Two samples of sealant/caulking, for colour selection. Two samples of back-up material and primer for physical characteristics.

.3 Manufacturers' Instructions

.1 Submit instructions to include installation instructions for each product used.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Arrange delivery of materials in original, unopened packages with labels intact, including batch number, and ensure that on-site storage is kept to a minimum. Do not store materials on site where there exists any danger of damage from moisture, direct sunlight, freezing and other contaminants.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.4 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect joint sealants from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.5 QUALITY ASSURANCE

.1 Qualifications: Work of this Section shall be executed by trained applicators approved by sealant manufacturer and having a minimum of 5 years proven experience.

1.6 EXTENDED WARRANTY

.1 Submit an extended warranty for Sealant Work in accordance with General Conditions, except that warranty period is extended to 2 years from date of Substantial Performance of the Work.

.1 Warrant against leakage, cracking, crumbling, melting, shrinkage, running, loss of adhesion and staining adjacent surfaces.

.2 Coverage: Complete replacement including affected adjacent Work.

1.7 SITE CONDITIONS

.1 Do not install materials when ambient air temperature is less than 5 degrees Celsius, when recesses are wet or damp, or to manufacturer's recommendations.

.2 Ambient Conditions:

.1 Proceed with installation of joint sealants only when:

.1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.

.2 Joint substrates are dry.

.3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.3 Joint-Width Conditions

.1 Proceed with installation of joint sealants only where joint widths are as allowed by joint sealant manufacturer for applications indicated.

.4 Joint-Substrate Conditions:

.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

2 Products

2.1 **SEALANT MATERIALS**

.1 All materials under Work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.

.2 Use materials as received from manufacturers, without additives or adulterations. Use one manufacturer's Product for each kind of Product specified.

.3 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.4 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.

.5 Where sealants are qualified with primers use only these primers.

.6 Where exposed the colours shall match the substrate, as approved by the Owner.

2.2 Sealant Type A: ASTM C920, Type S, Grade NS, Class 25; One-part, non-sag type, silicone sealant, in standard colours selected.

.1 ‘DC CWS’ by Dow Corning Inc.

.2 ‘Sikasil 305CN' by Sika.

.3 ‘Tremsil 400' by Tremco.

.4 Preformed compressible and non-compressible back-up materials:

.1 Polyethylene, urethane, neoprene or vinyl foam:

.1 Extruded closed cell foam backer rod.

.2 Size: oversize 30 %.

.2 Neoprene or butyl rubber:

.1 Round solid rod, Shore A hardness 70.

.3 High density foam:

.1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/mü density, or neoprene foam backer, size as recommended by manufacturer.

.4 Bond breaker tape:

.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 **ACCESSORIES**

.1 Primers: Type recommended by material manufacturers for various substrates, primers to prevent staining of adjacent surfaces encountered on project.

.2 Joint backing: ASTM C1330; Round, solid section, closed cell, skinned surface, soft polyethylene foam gasket stock, compatible with primer and sealant materials, 30 to 50% oversized, Shore A hardness of 20, tensile strength 140 to 200 kPa. Bond breaker type surface.

.3 Bond breaker: Type recommended by material manufacturers.

.4 Void filler around the window frames to be one part expanding polyurethane foam.

.5 Cleaning agents: As recommended by material manufacturer, non-staining, harmless to substrates and adjacent finished surfaces.

2.4 **MIXING**

.1 Follow manufacturers instructions on mixing, shelf and pot life.

2.5 **JOINT CLEANER**

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.

.2 Primer: in accordance with sealant manufacturer's written recommendations.

3 Execution

3.1 **EXAMINATION**

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence prior to sealant installation.

.2 Inform the Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied. Proceeding with the installation will be the acceptance of the substrate by the Contractor.

3.2 **SURFACE PREPARATION**

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

.6 Prepare joints to receive sealants to manufacturer's instructions. Ensure that joints are clean and dry and ferrous surfaces are free from rust and oil.

.7 Clean recesses to receive sealant, to be free of dirt, dust, loose material, oil, grease, form release agents and other substances detrimental to sealant's performance.

.1 Remove lacquer or other protective coatings from metal surfaces, without damaging metal finish, using oil-free solvents. Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sand blasting. Ensure recess is dry.

.2 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings. Remove incompatible coatings as required.

.8 Ensure that all materials in contact with sealant are compatible. Test substrate for adhesion.

.9 Depth of recess: Maintain depth to ½ joint width up to a maximum of 13 mm and not less than 6 mm at centre of joint. For greater depth, use joint backing under. Where recess is less than specified depth, cut back surface of recess to specified recess depth.

.10 Install polyethylene backing rod in joints 6 mm or more in width. Roll backing rod into joint. Do not stretch or bend backing rod. Install bond breaker to back of recess.

.11 Prime sides of recess, in accordance with sealant manufacturer's instructions.

.12 Condition products for use in accordance with manufacturer’s recommendations.

3.3 INSTALLATION

.1 Apply sealant immediately after adjoining Work is in condition to receive such Work. Apply sealant in continuous bead using gun with correctly sized nozzle. Use sufficient pressure to evenly fill joint.

.2 Ensure sealant has full uniform contact with, and adhesion to, side surfaces of recess. Superficial painting with skin bead is not acceptable. Tool sealant to smooth surface, free from ridges, wrinkles, sags, air pockets, embedded impurities, dirt, stains or other defects.

.1 At recesses in angular surfaces, finish sealant with flat profile, flush with face of material at each side.

.2 At recesses in flush surfaces, finish compound with concave face, flush with face of material at each side.

.3 Make sealant bead uniform in colour.

.4 Cure sealants in accordance with sealant manufacturer's instructions. Do not cover up sealants until proper curing has taken place.

.5 Immediately remove excess compound or droppings which would set up or become difficult to remove from adjacent finished surfaces, using recommended cleaners, as work progresses. Do not use scrapers, chemicals or other tools which could damage finished surfaces. Remove defective sealant.

.6 Clean recesses and re-apply sealant.

.7 Remove masking tape immediately after joints have been sealed and tooled.

3.4 **PRIMING**

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.5 **BACKUP MATERIALS**

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.6 **APPLICATION**

.1 Sealant:

.1 Apply sealant in accordance with manufacturer's written instructions to achieve the required minimum and maximum sealant depths.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle to achieve a minimum 6mm depth over the joint profile and adhesive to substrate a minimum of 9mm, and 10mm minimum joint width, while maintaining a consistent depth-to-width ratio.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

.8 Remove excess compound promptly as work progresses and upon completion.

.9 Apply multiple application of sealant to build up the required joint-to-width ratio for joints in access of 19mm wide, and within the manufacturer’s recommendations.

.2 Curing:

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

3.7 **CLEANING**

.1 Clean surfaces adjacent to joints, remove sealant smears or other soiling resulting from application of sealants. At metal surfaces, remove residue. Do not mar or damage finishes on materials adjacent to joints. Repair or replace marred or damaged materials.

.2 Leave Work area clean at end of each day.

.3 Clean adjacent surfaces immediately.

.4 Remove excess and droppings, using recommended cleaners as work progresses.

.5 Remove masking tape after initial set of sealant.

.6 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.8 **PROTECTION**

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by joint sealants installation.

3.9 **SCHEDULE OF LOCATIONS**

.1 Following sealant location schedule is included for convenience and may not be complete. Examine Contract Drawings and other specification sections and determine entire extent of Work of this Section. Generally seal following locations:

.1 Concrete, masonry, wood and stone to metal. Wood to masonry, concrete and stone.

.2 Metal to metal.

.3 All dissimilar materials.

.4 Where ‘sealant’ or ‘caulking’ in indicated on drawings.

.2 Sealant Type A:

.1 Exterior joints between masonry and steel or aluminum.

.2 Exterior joints between masonry and shelf angle.

.3 Exterior joints between steel or aluminum and concrete or masonry. Interior and exterior control joints, except in floors.

.4 Protrusions through interior and exterior walls and floors, interior and exterior side, except where fire rated seals are required.

.5 Seal millwork

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment, tools, and services necessary for the metal doors and frames work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or ZincIron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A568/A568M, Specification for General Requirements for Steel, Carbon and High-Strength Low-Alloy, Hot-Rolled Sheet and Cold-Rolled Sheet.

.3 CAN4/ULC-S104M, Standard Method for Fire Test of Door Assemblies.

.4 CAN4/ULC-S105M, Standard Specification for Fire Door Frames, Meeting the Performance Required by CAN4/ULC-S104M.

.5 CAN/CGSB-1.198, Cementitious Primer, (for Galvanized Surfaces).

.6 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.7 CGSB 31-GP-105Ma Zinc Phosphate Conversion Coating for Paint Base

.8 CAN/CSA-G40.21-M92 Structural Quality Steels

.9 CSA W59-M89 Welded Steel Construction (Metal Arc Welding)

.10 NFPA 80 Fire Doors and Windows

.11 NFPA 252-95 Standard Methods of Fire Tests of Door Assemblies

1.3 **DESIGN REQUIREMENTS**

.1 Design exterior frame assemblies to accommodate expansion and contraction when subjected to minimum and maximum surface temperature of -35°C to 35°C.

1.4 **SUBMITTALS**

.1 Product data: Submit manufacturer's Product data in accordance with Section 01 10 10 indicating door and frame construction.

.2 Shop drawings:

.1 Submit shop drawings in accordance with Section 01 10 10 for each type of door and frame indicating:

.1 Thickness and type of steel.

.2 Thickness and type of core.

.3 Thickness and type of steel stiffeners and location of them within the door.

.4 Thickness and type of metal facing on edges of door and method of fastening.

.5 Location of mortises, reinforcement, anchorages, joining, welding, sleeving, exposed fasteners, openings and arrangement for hardware.

.2 Include schedule identifying each unit with door marks and numbers relating to numbering on Contract Drawings and in door schedule

.3 Mill Certification: Submit mill certification on all materials used to fabricate items specified.

1.5 **QUALITY ASSURANCE**

.1 Perform work in accordance with requirements by a member of the Canadian Steel Door and Frame Manufacturers Association.

.2 Label and list fire rated doors and frames by an organization acceptable to authorities having jurisdiction and accredited by the Standards Council of Canada in conformance with CAN4/ULC-S104M and CAN4/ULC-S105M for ratings indicated, labelling shall be in accordance with NFPA 80.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Apex Industries

.2 Daybar Industries Limited

.3 Fleming Doors Products.

.4 Steel-Craft Door Products Ltd

2.2 **MATERIALS**

.1 General:

.1 All materials under work of this Section, including but not limited to, primers are to have low VOC content limits.

.2 Materials used for the door & frame construction in this section to conform to: CAN/CSA-G40.21, Type 44W coating designation to ASTM A653.

.3 Galvanized Steel Sheets: (G90) Mill phosphatize in addition to coating specified at referenced HM standard. Provide at shower, washrooms doors and frames and other doors and frames where indicated as well as at exterior doors and frames.

.4 Supports and Anchors: Same material as frame including gage and galvanizing where indicated.

.5 Inserts, Bolts, and Fasteners: Manufacturer’s standard units. Hot-dip galvanize in compliance with ASTM A 153, Class C or D as applicable at exterior walls and where opening is indicated to be galvanized.

.6 Provide shop primers for security hollow metal doors & frames were welded.

.2 Minimum base steel thickness:

.1	Frames	2.7 mm G90 Galvanized steel
.2	Typical doors	1.91 mm G90 Galvanized steel faces
.3	Lock/strike reinforcements	1.6 mm
.4	Hinge reinforcements	2.7 mm
.5	All other reinforcement	1.6 mm
.6	Top and bottom channels	1.2 mm
.7	Glazing stops	0.9 mm
.8	Guard boxes	0.9 mm
.9	Jamb spreaders	0.9 mm

.3 Top caps and thermal breaks: CGSB 41-GP-19Ma; Rigid PVC extrusions.

.4 Primer: CAN/CGSB 1.198.

.5 Door material:

.1 Interior and Exterior Doors: Provide minimum 1.91 mm (14 gauge) sheet G90 galvanized steel faces.

.2 Stiffeners: Provide 16ga A40 galvanneal stiffeners to extend full height top to bottom and maximum 75 mm(3”) from door sides. Where stiffeners are not continuous between face sheets, weld internal joints 100 mm (4”) o.c. max. Cope at hardware preparations only. Provide one of the following stiffener types:

.3 Edge Channels: Continuously weld to both face sheets.

.4 Flush Closing Channels: Continuously weld to both face sheets.

.5 Insulation: Core mineral fiber 48 kg/cubic meters density minimum.

.6 Hardware Reinforcements and Preparations: Comply with referenced HM standard and the following:

.1 Strike Plate: Do not cut edge channel to receive entire strike or keeper. Provide punched opening to engage bolt in edge channel matching cut-out in strike plate.

.2 Drilling and tapping for surface applied hardware may be done at project site.

.7 Exterior doors: Rigid poly/isocyanurate, closed cell insulation, 32 kg/m3, thermal value: RSI 1.9.

.8 Fire rated doors: Mineral fibre insulation to CAN/ULC S702, Type 1A; 24 kg/m3.

.6 Screws: Stainless steel screws with countersunk flat head.

.7 Door silencers: Type 6-180, black neoprene.

.8 Frame anchors:

.1 Frames in masonry: 1.2 mm minimum, adjustable T-strap jamb anchors.

.2 Frames in steel stud partitions: 0.9 mm minimum steel anchors of suitable design securely welded inside each jamb.

.3 Frames in precast: Countersunk galvanized expansion bolts complete with galvanized anchor, base anchors, and spacers behind hollow metal frame.

.4 Frames in existing masonry/concrete/precast walls: 0.9 mm minimum frame anchors to suit design.

.5 Labeled frames: In accordance with ULC requirements.

.9 Floor anchors: 1.6 mm minimum adjustable floor clip angles with 2 holes for anchorage to floor.

.10 Labels for fire doors and door frame: Brass plate, riveted to door and door frame.

.11 Grilles: Corrosion resistant steel with baked enamel finish. Model 61DG Series by Nailor Industries Inc or approved alternative by Hart and Cooley.

.12 Glass and glazing: In accordance with Section 08 80 00.

2.3 **FABRICATION**

.1 General

.1 Fabricate doors and frames in accordance with reviewed shop drawings.

.2 Welding: CSA W59-M to produce a finished unit with no visible seams or joints, square, true and free of distortion.

.3 Welding: Continuous unless specified otherwise. Execute welding by a firm fully acceptable to the Canadian Welding Bureau to requirements of CSA W47.1.

.4 Form profiles accurately to details shown on Contract Drawings.

.5 Ream and remove burrs from drilled and punched holes.

.6 Grind welded corners and joints to a flat plane and fill with metallic filler and sand to a uniform smooth finish. Apply one coat of primer.

.7 Provide weather strip for exterior doors in accordance with Section 08 70 00 and door manufacturer.

.2 Frames and screens:

.1 Fabricate frames of welded construction. Cut mitres and joints accurately and weld continuously on inside of frame profile. Exterior frames to be thermally broken.

.2 Construct large frame sections with provision for on Site assembly to suit Site conditions.

.3 Blank, reinforce, drill and tap frames for mortised, templated hardware. Protect mortised cut-outs with guard boxes.

.4 Reinforce frames where required for surface mounted hardware.

.5 Reinforce frames over 1200 mm wide with roll formed steel channels or hollow structural sections specified in Section 05 50 00 and as indicated on drawings.

.6 Furnish exterior door frames with a continuously welded integral steel weather drip at head of frame.

.7 Prepare each door opening for single stud rubber door silencers, 3 for single door openings located in strike jamb, and 2 for double door openings located in head.

.8 Install 2 channel or angle spreaders per frame, to ensure correct frame alignment. Install stiffener plates or spreaders between frame trim where required, to prevent bending of trim and to maintain alignment when setting in place.

.9 Form channel glazing stops minimum 16 mm height, accurately cut, mitred, fitted and fastened to frame sections with stainless steel counter-sunk, flat head screws spaced at maximum 450 mm throughout and 50 mm from each end.

.10 Frame Fill: Prepare heads, jambs, and sills abutting structure, walls, or floors for solid anchorage with full grout fill. Exclude grout from mullions except where otherwise indicated.

.1 Grout Guards: At frames to be grouted, tightly weld 0.45 mm(0.018”) minimum steel grout guards at screw holes, cut outs, and hardware preparations including those for removable glazing stops, locksets, pushbuttons, strike plates, hinges, etc. Additionally at hinge preparations Contractor to provide polyurethane or polystyrene foam fill or otherwise tightly seal grout guards to keep screw holes grout free.

.3 Anchorage:

.1 Anchor units to floor and wall construction. Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb, minimum number of anchors for each jamb:

.1	Frames up to 2285 mm	3 anchors.
.2	Frames from 2285 mm to 2440 mm	4 anchors.

.2 Where frames are to be set in masonry or concrete, supply adjustable anchors to trade installing frame.

.3 Fabricate frames for installation in steel stud partitions with steel anchors of suitable design, minimum number of anchors for each jamb:

.1 Frames up to 2285 mm height 4 anchors.

.2 Frames 2285 mm to 2440 mm 5 anchors.

.4 Frames in previously placed concrete, masonry, precast or structural steel:

.1 Anchors located at 150 mm maximum from top and bottom of each jamb, and intermediate anchors at maximum 660 mm o.c.

.4 General Door Requirements:

.1 Hollow steel construction, flush swing type, of sizes to conform to details, schedules and reviewed shop drawings with provisions for cut-outs for glass and grilles and reinforced to receive hardware fastenings.

.2 Blank, reinforce, drill and tap doors for mortised, templated hardware. Where required, reinforce doors for surface mounted hardware and door closers.

.3 Reinforce oversized doors with steel channels and plates specified in Section 05 50 00 and as indicated on drawings.

.4 Where openings are required, form integral cut-outs with framing, glass stop moldings and division bars.

.5 Install grilles to fit tight and secure into openings.

.6 Bevel both stiles of single doors 1 in 16.

.7 Reinforce doors with galvanized metal stiffeners at 150 mm o.c.

.5 Interior Doors:

.1 Supply and install inverted, recessed, mechanically interlocked with tack welded channels at top and bottom of doors.

.2 Fabricate doors with joints between front and back panels meeting on stile edges. Make joints mechanically interlocked and tack welded for entire height of door. After welding has been completed, grind joints smooth to match metal. Ensure that no filler is used in joints.

.3 Fill hollow space within door and vertical stiffeners from top to bottom with mineral fibre batt insulation.

.6 Exterior Doors:

.1 Supply and install inverted, recessed, mechanically interlocked with tack welded channels at top and bottom of doors. Supply and install PVC top caps.

.2 Fabricate doors with joints between front and back panels meeting on stile edges. Make joints mechanically interlocked and tack welded for entire height of door. After welding has been completed, grind joints smooth to match metal. Ensure that no filler is used in joints.

.3 Fill hollow space within door from top to bottom with rigid polyisocyanurate insulation.

.7 Fire Rated Doors:

.1 Supply and install inverted, recessed, spot welded channels at top and bottom of doors. Supply and install steel flush top caps on exterior doors.

.2 Fabricate doors with joints between front and back panels meeting on stile edges. Make joints continuously welded for entire height of door. After welding has been completed, grind joints smooth to match metal. Ensure that no filler is used in joints.

.3 Fabricate doors to achieve fire rating as indicated on drawings and in accordance with ULC. Provide ULC label plate on door at hinged edge midway between top hinge and head of door.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **HOLLOW METAL DOOR AND FRAME INSTALLATION**

.1 Install hollow metal doors and frames plumb, square, level, secure, and at correct elevation.

.2 Install doors clear of floor finishes, and with the correct rebate opening for the door installation. Install door silencers.

.3 Secure anchorages and connections to adjacent construction. Brace frames rigidly in position while building-in. Remove temporary steel shipping jamb spreaders. Install wood spreaders at third points of frame rebate height to maintain frame width. Supply and install vertical supports as indicated on drawings for openings over 1200 mm in width. Remove wood spreaders after frames have been built-in.

.4 Allow for structural deflection and prevent structural loads from being transmitted to hollow metal frames.

.5 Touch-up areas where galvanized coating has been removed or damaged with primer.

.6 Fire rated doors: Install fire rated doors and frames in accordance with requirements of NFPA 80.

3.3 **ADJUSTING AND CLEANING**

.1 Adjust doors for smooth and balanced door movement.

.2 Clean doors and frames.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for gypsum board work.

1.2 **REFERENCES**

.1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-coated (Galvanized) or ZincIron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM C475, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.3 ASTM C645, Specification for Nonstructural Steel Framing Members.

.4 ASTM C665, Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.5 ASTM C754, Specification for Steel Framing Members to Receive Screw-Attached Gypsum Board.

.6 ASTM C834, Standard Specification for Latex Sealants.

.7 ASTM C840, Specification for Application and Finishing of Gypsum Board.

.8 ASTM C1002, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.9 ASTM C1178, Specification for Glass Mat Water-Resistant Gypsum Backing Board.

.10 ASTM C1278, Specification for Fiber-Reinforced Gypsum Panel.

.11 ASTM C1396, Specification for Gypsum Board.

.12 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 **DESIGN REQUIREMENTS**

.1 Design ceiling suspension system in accordance with manufacturer's printed directions and ASTM C754.

.2 Design ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

.3 Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.

.4 Design suspension system to support weight of mechanical and electrical items such as air handling boots and lighting fixtures, and with adequate support to allow rotation/relocation of light fixtures.

.5 Design subframing as necessary to accommodate, and to circumvent, conflicts and interferences where ducts or other equipment prevent the regular spacing of hangers.

.6 Design wall framing system and reinforce as necessary to accommodate and support items attached to and supported by wall framing system.

.7 Design wall framing system for wall assemblies with a height greater than 3000 mm and those assemblies incorporating non-standard gypsum board assemblies

including, but not limited to, abuse resistant gypsum board, large format tile applications, etc.

1.4 **REGULATORY REQUIREMENTS**

.1 Provide fire separations and fire protection exactly as specified in test design specification that validates the specified rating. Verify that work specified in other Sections, as a part of the entire assembly, meets applicable validating test design specification.

1.5 **SUBMITTALS**

.1 Product data:

.1 Submit copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:

.1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.

.2 Product transportation, storage, handling and installation requirements.

.2 Shop Drawings:

.1 Submit Shop Drawings in accordance with Section 01 10 10 indicating:

.1 Wall assemblies, suspension systems, adjacent construction, elevations, sections and details, dimensions, thickness, finishes and relationship to adjacent construction.

.2 Framing and blocking for items being supported of wall systems.

.3 Certifications: Submit written certification stating that suspended ceiling system is designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

1.6 **QUALITY ASSURANCE**

.1 Qualifications: Execute the work of this Section by skilled, qualified, and experienced workers trained in the installation of the work of this Section.

.2 Retain a Professional Engineer, licensed in Province of Ontario, with experience in work of comparable complexity and scope, to perform following services as part of work of this Section:

.1 Design of wall systems with height greater than 3000 mm and at nonstandard gypsum board assemblies including, but not limited to, assemblies incorporating abuse resistant gypsum board, large format tile applications, etc.

.2 Design of suspended gypsum board assemblies.

.3 Review, stamp, and sign Shop Drawings and design calculations.

.4 Conduct shop and on-site inspections, prepare and submit written inspection reports verifying that this part of Work is in accordance with Contract Documents and reviewed Shop Drawings.

1.7 **SITE CONDITIONS**

.1 Do not begin work of this Section until:

.1 Mechanical and electrical work above the ceiling is complete.

.2 Substrate and ambient temperature is above 15 degrees Celsius.

.3 Relative humidity is below 80%.

.4 Ventilation is adequate to remove excess moisture.

.2 Install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements 24 h before, during, and 24 h after installation.

2 Products

2.1 **MATERIALS**

.1 General:

.1 All materials under work of this Section, including but not limited to, sealants, adhesives, and primers are to have low VOC content limits.

.2 Steel framing: ASTM C754; ASTM A653/A653-M, Z275; cold rolled, galvanized steel sheet.

.1 Bailey Metal Products Limited

.2 Corus Metal Profiles

.3 Steel studs and track runners: ASTM C645; Galvanized steel studs and runners, 32 mm wide x depth as indicated on Contract Drawings. Formed from galvanized steel sheet, thicknesses as follows:

.1 Studs less than 3000 mm: Minimum 0.53 mm (25 ga.).

.2 Studs greater than 3000 mm and non-standard assemblies: Minimum 0.91 mm (20 ga.), unless stud thickness of greater thickness is required to accommodate intended loading, spans, or conditions.

.3 Track runners and ancillary components to match stud thickness.

.4 Main carrying channels: ASTM C645; Formed from galvanized steel sheet, 38 x 19 mm cold rolled, channels.

.5 Resilient channel: ASTM C645; 0.5 mm thick galvanized metal, 57 mm wide x 12 mm deep for walls and ceiling to reduce sound transmission.

.6 Furring channels: ASTM C645; Formed from galvanized steel sheet, 22 mm winged flange type, cold rolled.

.7 Furring channels (hat type): ASTM C645; 0.5 mm base steel thickness, galvanized. 70 mm wide x 22 mm deep hat shaped channel.

.8 Heavy duty furring channels: ASTM C645; 0.9 mm steel thickness, galvanized hat shaped channel with a wider and deeper size as required by manufacturers.

.9 Hanger wires: 4.1 mm minimum diameter galvanized pencil rod.

.10 Tie wire: 1.6 mm thick minimum diameter, soft annealed, galvanized steel wire.

.11 Corner bead, casing bead, and special shapes: Formed from 0.6 mm thick minimum, galvanized steel sheet, designed to be concealed by joint compound.

.12 Deflection track: ASTM C 645 top runner with 50.8-mm- deep flanges, in thickness indicated for studs and in width to accommodate depth of studs.

.13 Deflection track (fire rated): Provide 25 mm deep leg deflection track where indicated on rated walls. 'Fire Trak Shadowline' by Fire Trak Corporation or approved alternative.

.14 Ceiling clips: Hot dip galvanized partition attachment clips, in square and reveal edge; 'PAC 15 Series' to match grid system by CGC Inc. or approved alternative.

.15 Gaskets (acoustic partitions): Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 3.2 mm thick, in width to suit steel stud size.

.16 Control joint strip: Roll formed from galvanized steel sheet, with a tape protected recess, 6 mm wide x 11 mm deep.

.17 Screw fasteners: ASTM C1002 Type S; Corrosion resistant.

.18 Concrete anchors: tie wire sleeve anchors, 'Redi-Drive Anchors' by ITW Red Head or approved alternative.

.19 Acoustic/Fire insulation: ASTM C665, Paperless, semi-rigid, spun mineral fibre mats, of thickness as indicated on Contract Drawings, 'Sustainable Insulation, NoiseReducer' by CertainTeed, 'EcoTouch Quiet Zone Pink Fiberglas Acoustic Insulation' by Owens Corning Inc. or 'Roxul AFB' by Roxul Inc.

.20 Sealants:

.1 Acoustic sealant (non-rated): Non-hardening acoustic sealant for use at nonrated assemblies, ASTM C834; Acrylic, mould resistant sealant, paintable. 'Smoke and Acoustic Sealant CP506' by Hilti or approved alternative.

.2 Sealant (fire-rated): Non-hardening sealant for use at fire-rated assemblies: ASTM E84; Acrylic based firestop sealant, colour: red or white as selected by Consultant. 'Flexible Firestop Sealant CP606' by Hilti or approved alternative.

.3 Standard sealants: In accordance with Section 07 91 00.

.21 Moisture / Abuse resistant board (GB-1): 15.9MM thick of maximum practical lengths to minimize end joists, unless indicated otherwise; moisture and abuse resistant board "Fiberock Aquatough Interior Panel" by CGC Inc. or 'DensArmor Plus" by Georgia-Pacific Canada LP.

.22 Primer: Where indicated by board manufacturer, provide primer as required to achieve finishes as defined in ASTM C840.

.23 Joint reinforcing tape:

.1 Standard gypsum board: ASTM C475; 50 mm wide x 0.25 mm thick, perforated paper, with chamfered edges.

.2 Moisture resistant and tile backer boards: ASTM C475; fibreglass mat joint tape as recommended by board manufacturer to suit location.

.24 Bonding adhesive: Type for purpose intended and as recommended and approved by manufacturer.

.25 Joint and patching compound: ASTM C475; Asbestos-free, supplied by manufacturer of gypsum board used.

.26 Fast setting patching compound: ASTM C475; Asbestos-free, Sheetrock or Durabond by CGC Inc., 'Moisture and Mold Resistant Setting Compound with M2Tech' by Certainteed Gypsum Canada or approved alternative.

.27 Access doors: Supplied by other Sections for installation as part of the work of this Section

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **SUSPENSION FRAMING**

.1 Install ceiling systems in accordance with reviewed Shop Drawings and manufacturer's written instructions.

.2 Install hanger wires plumb and securely anchored to the building structural framing, independent of walls, pipes, ducts, and metal deck; install additional framing and hangers to bridge interference items.

.3 Install hanger wires at 1200 mm maximum centres along carrying channels, not less than 25 mm, and not more than 150 mm from channel ends.

.4 Install additional hangers at lighting fixture and ductwork locations. Do not attach hanger wires to mechanical or electrical equipment. Do not support mechanical and electrical fixtures and fitting on ceiling without the ceiling manufacturer's written acceptance.

.5 Install main carrying channels transverse to structural framing members. Lap main carrying channels 200 mm minimum at splices and wire each end with two loops and prevent clustering or lining-up of splices.

.6 Install furring channels at 400 mm o.c., not less than 25 mm, and not more than 150 mm from perimeter walls, at openings, at interruptions in ceiling continuity, and at change in plane. Install furring channels to a tolerance of 3 mm maximum in 3600 mm.

.7 Install additional main carrying and furring channels to frame and to reinforce openings such as recessed lighting fixtures, access hatches, ceiling grilles, outlet boxes, ventilating outlets and similar items.

3.3 **STEEL STUDS AND FURRING**

.1 Install steel studs and furring in accordance with reviewed Shop Drawings and manufacturer's written instructions.

.2 Install steel stud partitions to underside of structure unless indicated otherwise.

.3 Install track runners at floors, ceilings, and underside of structure; align track runners accurately and secure to structure at 600 mm centres maximum.

.4 Install double top track runner assembly to prevent the transmission of structural loads to steel studs.

.5 Install steel studs vertically at 400 mm o.c., unless otherwise indicated, and not more than 50 mm from abutting walls, at openings, and at each side of corners. Install studs securely to track runners.

.6 Schedule and coordinate steel framing installation with mechanical and electrical services installation.

.7 Install full height, double studs at door and service openings, fastened together and stiffened back to the structure to prevent vibration when doors close.

.8 Provide double studs boxed together at all openings, sill, head and jambs and at door jambs, fastened together and stiffened back to the structure to prevent vibration. At each opening exceeding 900 mm in width, double studs shall be 20 ga. extending to structure above, and adequately anchored at each end. Provide steel studs above and below openings spaced at 400 mm oc maximum. All metal stud partitions above doors and screens over 1220 mm wide shall be secured to structure over and reinforced with sway bracing to stabilize walls to prevent lateral movement.

.9 Erect three studs at corner and intermediate intersections of partitions. Space 50 mm apart and brace together with wired 19 mm channels.

.10 Stiffen partitions over 2440 mm high or 3000 mm long, or both, with horizontal bracing extended for full length of partitions. Provide one line of bracing in partitions. Space lines to provide equal unbraced panels. Provide bracing for portions of partitions over door openings in partitions over 3000 mm high, and bracing both above and below openings in partitions located no greater than 150 mm from top and bottom of opening, and extending two stud spaces beyond each edge of opening for both doors and windows. Wire tie or weld bracing to studs.

.11 Frame control joints using back to back double studs at abutting structural elements, at dissimilar backup interface, at dissimilar walls and ceilings, at structural expansion and control joints, at door and other openings, and at 9000 mm maximum spacing in continuous runs. Install control joint strips and secure in place.

.12 Install additional support framing at openings and cutouts for built-in equipment, upper cabinet support, access panels and similar items.

.13 Attach to framing adequate steel reinforcing members or a 1.2 mm (18 ga.) steel stud mounted horizontally and notched around furring members to support the load of, and to withstand the withdrawal and shear forces imposed by, items installed upon the work of this Section. Such items include, but are not restricted to, miscellaneous metals, coat hooks, washroom accessories, handrail anchors, rub rails, grab bars, guards, wall-hung cabinets and fitments, shelving, curtain and drape tracks, miscellaneous specialties; Owner supplied equipment; and minor mechanical and electrical work. Heavy mechanical and electrical equipment shall be selfsupporting in Divisions 21, 22, 23 and 26.

.14 Provide for support and incorporation of flush-mounted and recessed mechanical and electrical equipment and fixtures only after consultation and verification of methods with those performing the work of Divisions 21, 22, 23 and 26.

.15 Install cross bracing in accordance with the steel stud manufacturer's recommendations.

3.4 **FIRE RATED ASSEMBLIES**

.1 Install Products in fire rated assemblies in strict accordance with applicable ULC tested and approved designs.

.2 Stiffen fire rated walls over 3.66 m high, where linear length of wall is greater than 2.44 m between perpendicular wall supports, with diagonal bracing above the ceiling extending perpendicular to wall at a 45E angle to structure above. Locate diagonal bracing at maximum 2.44 m o.c.

.3 Where double layers of gypsum board are shown, and required for fire rating, screw first layer to studs and furring and laminate the second layer to the first using joint filler as an adhesive. Stagger joints between first and second layers.

3.5 **ACOUSTICAL INSULATION**

.1 Install acoustic insulation in partitions, between steel studs, and as indicated on Contract Drawings and in accordance with the manufacturer's instructions. Fill stud cavities to full height of partitions and carefully cut and fit acoustic insulation around services and protrusions.

3.6 **ACOUSTICAL SEALANT**

.1 Install acoustical sealant to acoustically insulated partitions in accordance with the manufacturer's instructions and Contract Drawings.

.2 Install acoustical sealant under floor runner track, at partition perimeter both sides and at openings, cut-outs, and penetrations, concealed from view in the final installation.

.3 Install firestop fill material behind fire rated acoustical sealant and provide firestop identification tag.

.4 Smooth acoustical sealant with trowel prior to skin forming.

3.7 **BUILT-IN CORNER GUARDS**

.1 Install built-in corner guards in accordance with manufacturer’s written instructions level, secure and rigid.

3.8 **GYPSUM BOARD**

.1 Comply with ASTM C840. Install gypsum board in accordance with reviewed Shop Drawings and manufacturer's written instructions.

.2 Install gypsum board vertically or horizontally, whichever results in fewer end joints. Locate end joints over supporting members.

.3 Install gypsum board in lightly butted contact at edges and ends and with 1.6 mm maximum open space between boards; do not force gypsum board into place. Do not install imperfect, damaged or damp boards.

.4 Install gypsum board butting paired tapered edge joints, and mill-cut or field-cut end joints; do not place tapered edges against cut edges or ends.

.5 Install vertical joints minimum 300 mm from the jamb lines of openings and stagger vertical joints over different studs on opposite sides of partitions.

.6 Do not locate joints within 200 mm of corners or openings, except where control joints occur at jamb lines or where openings occur adjacent to corners. Where necessary, place a single vertical joint over the centre of wide openings.

.7 Cut, drill and patch gypsum board as may be necessary to accommodate the work of other trades.

.8 Fire Separations:

.1 Construct gypsum board assemblies, where located, in accordance with tested assemblies to obtain required or indicated fire rated assemblies. As a minimum fire separations shall consist of metal framing covered on both sides by fire-rated gypsum board.

.2 Install assemblies tightly to enclosing constructions to maintain integrity of the separations. Install casing beads at all perimeter edges.

3.9 CORNER, CASING BEADS AND TRIM

.1 Corner reinforcing bead: Install along all external angles, erect plumb, level and with a minimum of joints. Secure with screws at 225 mm o.c. apply filler over flanges flush with nose of the bead and extending at least 75 mm onto surface of board each side of corner. When filler dries, apply a thin coat of topping cement and blend onto adjoining surfaces.

.2 Casing bead: Install where wallboard butts against a surface having no trim concealing the juncture and where shown on drawings. Erect casing beads plumb or level, with minimum joints, and secure with screws at 300 mm o.c. apply filler over flange flush with bead and extending at least 75 mm onto surface of board. When dry, apply a thin coat of topping cement and blend onto adjoining surfaces.

.3 Recess channels and trim: Install recess channels and special metal trim where shown. Secure to substrate. Provide casing beads full height on wallboard edges at recess channels and metal trim.

3.10 JOINT TAPING AND FINISHING

.1 Install reinforcing tape and a minimum of 3 coats of joint compound over gypsum board joints, metal trim and accessories, and screw fasteners in accordance with the gypsum board manufacturer's instructions.

.2 Fill gaps between, and any imperfections in, gypsum boards with joint compound, allow to dry, and sand smooth ready for painting.

.3 Install finished gypsum board work smooth, seamless, plumb, true, flush, and with square, plumb, and neat corners.

.4 Finish gypsum board in accordance with ASTM C840 to the following grades:

.1 Level 0: No taping, finishing, or accessories required. Use above suspended ceilings and within other concealed spaces, unless the assembly is fire rated,

sound rated, sound or smoke controlled, or unless the space serves as an air plenum.

.2 Level 1: At joints and interior angles embed tape in joint compound. Leave surface free of excess joint compound. Tool marks and ridges are acceptable. Use above suspended ceilings and within other concealed spaces if the gypsum board assembly is fire rated, sound rated, sound or smoke controlled, or the space serves as an air plenum.

.3 Level 2: At joints and interior angles embed tape in joint compound with one separate coat of joint compound applied over joints, angles, fastener heads, and accessories. Use for water resistant gypsum board indicated for use as a substrate for ceramic tile.

.4 Level 3: At joints and interior angles embed tape in joint compound with two separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply joint compound smooth and free of tool marks and ridges. Use where heavy grade wall coverings are the final decoration.

.5 Level 4: At joints and interior angles embed tape in joint compound with three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply joint compound smooth and free of tool marks and ridges. Use for all locations except those indicated for other finish levels.

.6 Level 5: At joints and interior angles embed tape in joint compound with three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply a thin skim coat of joint compound, or a material manufactured especially for this purpose, to the entire surface. Leave surface smooth and free of tool marks and ridges. Use where semi-gloss or gloss finish coatings are the final decoration.

3.11 ACCESS DOORS

.1 Install access doors, supplied as part of other parts of the work, in accordance with manufacturer's written instructions. Access Doors by SECTION 10 95 00.

3.12 SITE TOLERANCES

.1 Install metal support systems to ensure that, within a tolerance of +3 mm and -1.5 mm for plaster thickness, finish surfaces will be flat within 3 mm under a 3 m straightedge, and with no variation greater than 1.5 mm in any running 300 mm, and that surface planes shall be within 3 mm of dimensioned location.

3.13 WORK IN EXISTING AREAS

.1 In existing areas, where existing gypsum board work has been demolished and/or damaged and repair work is required, provide new gypsum board finish.

.2 Thoroughly prepare areas to be repaired. Provide neat, clean and straight cuts.

.3 Finish all repair work as specified for new work.

.4 In existing areas where existing openings are to be filled in with gypsum board, provide new gypsum board wall and ceiling construction. Ensure new board faces are flush with faces of abutting existing walls and ceilings.

3.14 REPAIR

.1 Make good cut-outs for services and other work, fill in defective joints, holes and other depressions with joint compound.

.2 Make good defective work, and ensure that surfaces are smooth, evenly textured and within specified tolerances to receive finish treatments.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for tile work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ANSI A108/A118/A136.1, Installation of Ceramic Tile.

.2 ANSI A137.1, Specifications for Ceramic Tile.

.3 ASTM C144, Specification for Aggregate for Masonry Mortar.

.4 ASTM C920, Specification for Elastomeric Joint Sealants.

.5 CAN/CSA A3000, Cementitious Materials Compendium.

.6 CGSB 71-GP-22M, Organic Adhesive for Installation of Ceramic Wall Tile.

.7 ISO 23599, Assistive Products for Blind and Vision-Impaired Persons - Tactile Walking Surface Indicators.

.8 TTMAC Specification Guide 09300 Tile Installation Manual.

.9 TTMAC, Maintenance Guide.

1.3 **SUBMITTALS**

.1 Product data:

.1 Submit copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:

.1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations and warranties.

.2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:

.1 Submit shop drawings in accordance with Section 01 10 10 indicating:

.1 Tile layout, patterns, and colour arrangement.

.2 Perimeter conditions, junctions with dissimilar materials.

.3 Setting details

.3 Samples:

.1 Submit following sample panels in accordance with Section 01 10 10.

.1 Each colour, texture, size, and pattern of tile.

.2 Adhere tile samples to 400 x 400 x 12.5 mm thick cement board complete with selected grout colour in joints.

.4 Certificates: Submit manufacturer's certificates stating that materials supplied are in accordance with this specification.

.5 Closeout submittals: Submit recommended maintenance instructions and listing of recommended maintenance Products for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10.

1.4 **QUALITY ASSURANCE**

.1 Perform work of this Section by a company with proven, acceptable experience on installations of similar complexity and scope.

1.5 **DELIVERY, STORAGE AND HANDLING**

.1 Deliver materials in adequate crates or containers with manufacturer’s name and product description clearly marked.

.2 Handle and store tiles in a manner to avoid chipping, breakage or the instruction of foreign matter. Take precautions to protect the mortar and grout admixtures from freezing or from excessive heat.

1.6 **SITE CONDITIONS**

.1 Do not install work of this Section outside of the following environmental ranges without the Consultant's and Product manufacturer's written acceptance:

.1 Ambient air and surface temperature: 15 degree Celsius to 45 degree Celsius.

.2 Precipitation: None.

.2 Install temporary protection and facilities to maintain the Product manufacturer's, and specified, environmental requirements for 7 Days before, during, and 7 Days after installation.

1.7 **MAINTENANCE**

.1 Submit extra tile amounting to 3% of gross area covered, allowing proportionately for each pattern and type specified and which are part of the same Production run as installed Products. Store maintenance Products as directed by the Consultant.

2 Products

2.1 **MATERIALS**

.1 General: All materials under work of this Section, including but not limited to, sealants, adhesives, and sealers are to have low VOC content limits.

.2 Tile:

.1 To ANSI A137.1.

.2 Supply coves, caps, inside and outside corners and bullnose tile as required.

.3 Where unfinished tile edge is exposed, supply cap to Consultant’s selection.

.4 Tile Types:

.1 Porcelain tile (POR-1): Porcelain floor tile, sized at 2” x 2” mosaic tile. 'Keystones D208 - Suede Gray Speckle’ by Daltile or approved alternative.

.2 Ceramic tile (CT-1): Ceramic tile size 3” x 6, ‘ Biscuit K175’ by Daltile or approved alternative from Centura, or Stone Tile International.

.3 Porcelain Tile Base (POR-1): Cove porcelain base tile, sized at 2” x 2” mosaic tile. 'Keystones D208 - Suede Gray Speckle’ by Daltile or approved alternative.

.4 Porcelain Tile Base (POR-2): Cove porcelain base tile, sized at 2” x 2” mosaic tile. 'Keystones D200 – Desert Gray Speckle' by Daltile or approved alternative.

.5 Floor transitions:

.1 Tile to adjacent floor finish with flush condition: Schluter ‘SCHIENE’, anodized aluminium finish.

.2 Tile to adjacent floor finish at lower elevation not exceeding 13 mm (1/2”): Schluter ‘RENO-U’, anodized aluminium finish.

.3 Tile to adjacent floor finish at lower elevation exceeding 13 mm (1/2”) or to finished concrete: Schluter ‘RENO-RAMP/-K’, anodized aluminium finish. Wall edge protection: Aluminium edge protection with trapezoid-perforated anchoring leg and an anodized finish, continuous at all exposed tile edges, depth as required to suit tile thickness. ‘Jolly’ by Schluter Systems or approved alternative.

.6 POR-1 OR POR-2 Baseboard edge protection: Aluminium edge protection with trapezoid-perforated anchoring leg and an anodized finish, continuous at all exposed tile edges, depth as required to suit tile thickness. ‘Jolly’ by Schluter Systems or approved alternative.

2.2 **ACCESSORIES**

.1 Cement: CAN/CSA A3000, Type GU.

.2 Sand: ASTM C144.

.3 Water: Potable and free of minerals and other contaminants which are detrimental to mortar and grout mixes.

.4 Polymer additive: Keralastic by Mapei Inc or approved alternative by Ardex, Flextile Ltd. or Laticrete International.

.5 Thin-set mortar: 2 component to ANSI A108/A118/A136.1:

.1 ‘Kerabond with Keralastic Latex Additive’ by Mapei Inc., ‘Ardex X77 Microtec' by Ardex, ‘56SR/51 w/44' by Flextile Ltd., or ‘254/255' by Laticrete International.

.2 White coloured mortar shall be provided at appropriate tile types including, but not limited to; glass tile, light coloured marble, green marble and light coloured granite.

.6 Medium bed mortar: to ANSI A118.4:

.1 ‘Ultraflex LFT’ by Mapei Inc., or approved alternative by Ardex, Flextile Ltd., or Laticrete International.

.2 White coloured mortar shall be provided at appropriate tile types including, but not limited to; glass tile, light coloured marble, green marble and light coloured granite

.7 Thick bed sloped topping: Factory mixed blend of portland cement and aggregates with latex admix. ‘Ardex X32 Microtec’ by Ardex, ‘226 thick bed mortar with 3701 admix’ by Laticrete, or ‘Topcem with Planicrete AC Admixture’ by Mapei Inc.

.8 Primer: To meet specified requirements of adhesive manufacturer.

.9 Cleaner: In accordance with TTMAC’s requirements and as recommended by tile manufacturer.

.10 Organic adhesive (walls): CGSB 71-GP-22M, Type 1.

.11 Grout:

.1 Floors and bases (below 3 mm joint width): ‘Keracolor U’ by Mapei Inc. or approved alternative by Ardex, Flextile Ltd. or Laticrete International.

.2 Floors and bases (3 mm to 10 mm joint width): ‘UltraColor Plus’ by Mapei Inc. or approved alternative by Ardex, Flextile Ltd. or Laticrete International.

.3 Walls (1.5 mm to 3 mm joint width): ‘Keracolor U' by Mapei Inc. or approved alternative by Ardex, Flextile Ltd. or Laticrete International.

.4 Walls (over 3 mm joint width): ‘Ultracolour Plus’ by Mapei Inc. or approved alternative by Ardex, Flextile Ltd. or Laticrete International.

.5 Grout colour:

.1 POR-1 – ‘613 513 Silver Grey’ by Flextile Ltd or approved equivalent.

.2 POR-2 – ‘612 512 Bone’ by Flextile Ltd. or approved equivalent.

.3 CT-1 – ‘686 586 Harvest’ by Flextile Ltd. or approved equivalent.

.12 Tile sealant: In accordance with Section 07 91 00.

2.3 **MIXES**

.1 Levelling bed mix:

.1 1 part Portland cement.

.2 4 parts sand.

.3 1 part water (including polymer additive), adjusted for water content of sand

.4 1/10 part polymer additive.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **SURFACE PREPARATION**

.1 Clean and dry surfaces thoroughly. Remove oil, wax, grease, dust, dirt, paint, tar, primers, form release agents, curing compound, and other foreign material from substrate surfaces which may prevent or reduce adhesion.

.2 Neutralize any trace of strong acids or alkali from the substrate.

3.3 **CONTROL JOINTS**

.1 Provide control, expansion and isolation joints in accordance with TTMAC specification 301MJ and as indicated on drawings. Install in locations indicated on drawings and specified herein.

.2 Continue control, construction, and cold joints in the structural substrate up through the tile finish, and align with mortar joints where possible. Review joint locations on Site with the Consultant.

.3 Install joint widths to match grout joint widths, except where a minimum width is indicated.

.4 Install control joints in the following typical locations:

.1 Aligned over changes in type of substrate.

.2 At the restraining perimeters such as walls and columns.

.3 Interior areas (not subject to sunlight): 6 mm minimum width, at 7320 mm o.c. maximum.

.4 Interior areas (subject to sunlight): 6 mm minimum width, at 3660 mm o.c maximum.

.5 As indicated on the Contract Drawings.

.5 Seal control joints in accordance with Section 07 91 00.

3.4 **LEVELLING BED**

.1 Install a levelling bed on uneven substrate surfaces, level and plumb substrates in accordance with the following tolerances:

.1 Vertical surfaces: 3 mm in 2.4 m maximum.

.2 Horizontal surfaces: 6 mm in 3 m from finished levels of the surface, or better.

.2 Clean structural substrate control joints and blow-clean with compressed air. Grout fill control joints flush to slab with levelling bed.

3.5 **SHOWER AREA SYSTEM**

.1 Install mortar bed over thin set adhesive on uneven substrate surfaces, level and plumb substrates in accordance with manufacturer’s written instructions and having the following tolerances:

.1 Vertical surfaces: 3 mm in 2.4 m maximum.

.2 Horizontal surfaces: 6 mm in 3 m from finished levels of the surface, or better.

.2 Provide slopes to drains as indicated on drawings.

.3 Apply waterproofing with a spray applicator on prepared substrate to a total dry film thickness of 0.8 mm in accordance with manufacturer's printed directions. Carry up walls to 50 mm high.

.4 Install finish materials after site inspection by manufacturer, ensuring that materials have been installed correctly and in accordance with manufacturers written instructions. Provide written inspection report verifying manufacturers warranty of system.

.5 Apply grout for shower area system in accordance with epoxy grout manufacturer's directions to produce watertight, filled joints without voids, cracks and excess grout. Thoroughly compact and tool grout. Finish grout flush to edge thickness of tile and remove excess grout with soft burlap or sponge moistened with clean water.

3.6 GENERAL INSTALLATION REQUIREMENTS

.1 Install tiles in accordance with manufacturer's instructions and TTMAC Specification Guide 09300 Tile Installation Manual. Manufacturer's installation instructions govern over TTMAC Installation Manual.

.2 Lay out work to produce a symmetrical pattern with minimum amount of cutting. Ensure cut tile at room perimeter and at joints is not less than ½ full size.

.3 Install trim to be placed under tile in locations indicated on Drawings.

.4 Set tiles in place and rap or beat with a beating block as necessary to ensure a proper bond and to level surface. Align tile for uniform joints and allow to set until firm. Clean excess mortar from surface of tile with a wet cloth or sponge while mortar is fresh.

.5 Ensure following minimum mortar contact coverage to back of tiles. Contact must be evenly distributed to give full support of the tile.

.1 98% for large format (305 mm x 305 mm or greater) interior applications.

.2 90% for non-large format interior applications.

.3 100% for shower applications.

.4 100% for exterior applications.

.6 Adjust joints between units uniform, plumb, straight, even, and true, with adjacent tile flush. Align grout joints in both directions unless indicated otherwise.

.7 Align floor, base and wall grout joints.

.8 Install tile accessory fittings for a complete and fully coordinated tile assembly.

.9 Install wall tile full height unless indicated otherwise.

.10 Do not place tile, trim, and accessories over control, expansion, or isolation joints. Stop materials in either side on joints and provide control, expansion and isolation joints as specified.

.11 Cut and fit tile neatly around piping, fittings, joints, projections and around recesses items e.g. washroom accessories. Where surface mounted equipment and accessories are installed on tile surfaces, extend tile over surfaces. Cut edges smooth, even, and free from chipping; chipped and broken edges are not acceptable.

.12 Do not proceed with grouting until minimum 48 hours after tile has set, to prevent displacement of tiles.

.13 Apply grout in accordance with grout manufacturer's directions to produce watertight, filled joints without voids, cracks and excess grout. Thoroughly compact and tool floor grout. Finish grout flush to edge thickness of tile and remove excess grout with soft burlap or sponge moistened with clean water.

3.7 **CLEANING**

.1 Clean off excess grout with soft burlap or sponge moistened with clean water.

.2 Polish floor and wall tile after grout has cured in accordance with TTMAC recommendations in the Maintenance Guide; do not use acid for cleaning.

.3 Re-point joints after cleaning as required to eliminate imperfections, then re-clean as necessary. Avoid scratching tile surfaces.

3.8 **JOINT BACKING AND TILE SEALANT**

.1 Install joint backing under sealant as necessary.

.2 Install tile sealant around piping and fittings extending through tiled surfaces.

.3 Seal tile control joints.

.4 Seal internal tile to tile junctions. Tool to a smooth, flush surface, free from air bubbles and contamination.

3.9 **PROTECTION**

.1 Prevent traffic over tiled areas, and protect tiled assemblies from weather, freezing, and water immersion, for 72 hours minimum, after final installation.

.2 Prevent direct impact, vibration and heavy hammering on adjacent and opposite walls for 24 hours minimum, after final installation.

.3 Cover work temporarily with building paper properly lapped and taped at joints until work has been approved by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for resilient sheet flooring Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM D2047, Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.

.2 ASTM F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

.3 ASTM F970, Standard Test Method for Static Load Limit.

.4 ASTM F1516, Standard Practice for Sealing Seams of Resilient Floor Products by the Heat Weld Method.

.5 ASTM F1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Cloride.

.6 ASTM F 2170, Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes.

.7 ASTM F2034, Standard Specification for Sheet Linoleum Floor Covering.

.8 CAN/ULC-S102.2-M, Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.

.9 ISO 717-2, Acoustics - Rating of Sound Insulation in Buildings and of Building Elements - Part 2: Impact Sound Insulation.

1.3 **SUBMITTALS**

.1 Product data:

.1 Submit copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:

.1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.

.2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings indicating seam layout and welding procedures in accordance with Section 01 10 10.

.3 Samples:

.1 Submit samples in accordance with Section 01 10 10:

.1 Submit two 250 x 200 mm samples of each type of sheet material and colour.

.2 Submit two 150 mm x 150 mm samples of resilient base. Flash cove base samples must be representative of riser height and toe lengths specified, and shall represent one completed inside corner and one completed outside corner, with seams sealed and finished. Produce flash cove base samples in specified flooring materials and selected colours.

.4 Closeout submittals: Submit maintenance and cleaning data for incorporating into Operations and Maintenance Manuals in accordance with Section 01 10 10.

1.4 QUALITY ASSURANCE

.1 Installers qualifications (prefabricated flash cove bases): Perform Work of this Section by a company that has a minimum of five years proven experience in the installation of prefabricated flash cove bases of a similar size and nature and that is approved by manufacturer. Submit to Consultant, installer’s current certificate of approval by the material manufacturer as proof of compliance.

1.5 SITE CONDITIONS

.1 Maintain air temperature and structural base temperature at flooring installation area above 20°C for 48 hr before, during and 48 hr after installation.

.2 Store materials for 2 days prior to installation in area of Work to achieve temperature stability.

.3 Do not lay flooring in conditions of high humidity or where exposed to cold drafts. In hot weather, protect from direct sunlight.

.4 Provide adequate ventilation during installation.

1.6 EXTENDED WARRANTY

.1 Manufacturer’s warranty:

.1 Resilient flooring: Provide flooring manufacturer’s warranty naming Owner as beneficiary, covering excessive wear for a period of 5 years from the date work is certified as Substantially Performed.

.2 Prefabricated flash cove base: Warrant prefabricated flash cove base for lifetime against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to punctures through aluminum backing at cove radius provided prefabricated flash cove base was installed professionally in accordance with manufacturer's written specifications.

1.7 **MAINTENANCE**

.1 Submit extra 5% or to nearest full roll of each colour, pattern and type of flooring material and bases required for maintenance use. Identify each roll. Store where directed. Submit maintenance material in one piece and of same production run as installed materials.

2 Products

2.1 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, primers and adhesives are to have low VOC content limits.

.2 Vinyl Resilient Sheet Flooring (LINO-1):

.1 Conforming to ASTM F2034, Type 1, 2.5 mm thick, homogeneous resilient flooring, made from natural ingredients, mixed and calendared onto a natural jute backing.

.2 Flame spread: 150 to CAN/ULC-S102.2-M.

.3 Smoke developed: 160 to CAN/ULC-S102.2-M.

.4 Impact sound reduction: when tested to ISO 717/2, 6 dB.

.5 Slip resistance: Static coefficient of slip resistance meets or exceeds 0.6 when tested in accordance with ASTM D2047.

.6 Static load limit: 450 pounds per square inch when tested in accordance with ASTM F970.

.7 Acceptable products and manufacturers: LVT Textured Woodgrains 4.5mm “Resilient” by Interface or approved alternative by Forbo Flooring.

.8 Colours:

.1 LINO-1: ‘LVT Textured Woodgrains 4.5mm by Interface sized 25cm x 1m. Colour: ‘A00406 - Antique Light Oak’.

.3 Welding rod: type recommended by flooring manufacturer to complement flooring.

.4 Primers and adhesives: Low VOC, waterproof, of types recommended by flooring and base manufacturer for specific material on applicable substrate, above, on or below grade.

.5 Accessories and wheel transition strips: PVC, conforming to NFPA 101, colour and accessory type selected by Consultant from manufacturer’s full range; ‘Specialty Floor Finishing Accessories’ by Johnsonite. Adhesive recommended by Accessories manufacturer.

.6 Concrete skim coat compound: High-performance, rapid-setting cement based skim coating compound. 'Ultra SkimCoat' by Mapei or approved alternative for filling minor voids and leveling existing substrate.

.7 Stain sealer and polish: Type recommended by flooring manufacturer.

2.2 **FLOOR BASE**

.1 Resilient base type (B-1):

.1 Acceptable Products/manufacturers:

.1 Forbo

.2 Johnsonite

.3 Roppe ‘Pinnacle Rubber Base’.

.2 Rubber wall base, 3.2 mm (1/8”) thick, 101.6 mm (4”) high, with cove profile. Colour: Traditional Wall Base 63 Burnt Umber B. Coved profile, in lengths as long as possible including premoulded end stops and inner and outer corners.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Ensure concrete floors meet the following minimum requirements and requirements of the flooring manufacturer. If there is a conflict between these requirements and those of the flooring manufacturer, the more stringent shall apply.

.1 Internal Relative Humidity Test: Perform internal relative humidity testing in accordance with ASTM F2170. Results shall not exceed 80% RH.

.2 Moisture Test: Moisture emissions from concrete subfloors (cured for a minimum of 28 days) must not exceed 3 lbs per 1000sf per 24 hours (1.4 kg H2O/24 hr/93 m2) for acrylic adhesive and 5lbs for polyurethane adhesive via the Calcium Chloride Test Method (ASTM F1869).

.3 The pH level of the subfloor surface shall not be higher than 9.9. If higher, subfloor must be neutralized.

.3 Ensure that sub-floors have been provided as specified without holes, protrusions, cracks, depressions or other major defects.

.4 Ensure that control joints have been filled and levelled.

.5 Defective Work resulting from application to unsatisfactory surfaces will be considered the responsibility of those performing the Work of this Section.

3.2 SUBFLOOR TREATMENT

.1 Refer to the cementitious specification for the subfloor treatment of the existing tile flooring surface to remain.

.2 Flooring shall be installed over subfloors conforming to ASTM F710 for concrete.

.3 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.4 Apply sub-floor filler to low spots and cracks to achieve floor level to a tolerance of 1:1000, allow to cure.

.5 Meet ASTM F710 Standard for Concrete or other monolithic floors.

.6 Clean and remove all deleterious materials from surfaces to receive this Work in accordance with the adhesive manufacturer's recommendations.

.7 Prime concrete to flooring manufacturer's printed instructions.

3.3 RESILIENT SHEET FLOORING APPLICATION

.1 Install resilient sheet flooring in accordance with manufacturer’s written instructions.

.2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturers instructions. Do not spread more adhesive that can be covered by flooring before initial set takes place.

.3 Run sheets in direction of traffic. Double cut sheet joints and continuously seal according to manufacturer's printed instructions. Remove adhesive seepage of seams or surface while adhesive is still wet.

.4 Heat weld seams in accordance with ASTM F1516 and manufacturer's printed instructions.

.5 As installation progresses and after installation, roll flooring with minimum 45 kg roller to ensure full adhesion.

.6 Cut flooring neatly around fixed objects.

.7 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

.8 Install reducing edge strips at unprotected or exposed edges where flooring terminates or where there are two finishes of different thicknesses.

3.4 PREFABRICATED FLASH COVE BASE APPLICATION

.1 Install prefabricated flash cove base in accordance with manufacturer’s written instructions.

.2 Provide integral coved base at room perimeter and at built-in fitment locations complete with accessories as required for complete and secure installation.

.3 Dry-fit prefabricated flash cove base; cut and fit material to required lengths. Mitre-cut inside and outside corners.

.4 Dry-fit and cut cove cap prior to prefabricated flash cove base installation.

.5 Scribe glue line on walls and floor at edge of prefabricated flash cove base material.

.6 Apply adhesive in full spread (100% coverage on 2 surfaces) for full length of prefabricated flash cove base material. Apply prefabricated flash cove base to wall surface straight and level.

.7 Slide base cap behind prefabricated flash cove base material.

.8 Hand roll prefabricated flash cove base material onto wall and floor surface removing bumps, ripples and fishmouths. Remove excess adhesive.

.9 Heat weld seams (vertical and horizontal) in prefabricated flash cove base material.

3.5 ACCESSORIES AND WHEELED TRANSITION APPLICATION

.1 Install accepted adaptors between different flooring materials in accordance with manufacturer’s instructions.

.2 Ensure that adaptors have been clipped into place properly to provide a smooth, gradual transition between floors of different height.

.3 Install accessories in accordance with manufacturer’s written instructions.

3.6 CLEANING AND SEALING

.1 Forty-eight hours after installation, clean sheet flooring surfaces with a mild soap solution approved by finish manufacturer. Rinse clean and allow to dry.

3.7 PROTECTION OF FINISHED WORK

.1 Protect floors and bases from time of final set of adhesive until accepted by Consultant.

.2 Protect prefabricated flash cove bases from scratches, gouges, scuff marks and other damage from time initial surface protection application until final inspection.

.3 Prohibit traffic on floor for 48 hours after installation.

.4 Cover cleaned surfaces with fibre reinforced, clean, non-staining clean, kraft paper. Secure in position with gummed tape to prevent drifting. Remove covering when directed by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, products, equipment, and services necessary for sheet floor overlay on existing porcelain tile flooring in accordance with the Contract Documents.

.2 Application: Over existing porcelain tiles installed on floor slabs.

1.2 **REFERENCES**

.1 ANSI A118.4 - American National Standards for Modified Dry-Set Cement Mortar

.2 ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

.3 ISO C2TES1P1 - Classification for ceramic tile adhesives

1.3 **SUBMITTALS**

.1 Product data:

.1 Manufacturer's technical information for each product specified.

.2 Installation Instructions: Manufacturer's printed instructions for each product.

.3 Maintenance Data: Include recommended cleaning methods, cleaning materials, and maintenance procedures.

1.4 **QUALITY ASSURANCE**

.1 To ensure single-source warranty requirements and compatibility of products: Provide cleaners, sealing and maintenance products as well as tile grout, setting materials, underlayments, additives, accessories and factory-prepared dry-set mortars from the same manufacturer.

.2 Installer Qualifications:

.1 Engage an experienced installer who has completed mortar installations similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance. Installer to have a minimum of 5 years’ experience.

.2 Installer is a Five-Star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors’ Association of America.

.3 Installer’s supervisor for the project holds the International Masonry Institute’s Foreman Certification.

.4 Installer employs Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.

.5 Mockups: Build mockups to verify selections made under sample submittals and to demonstrate set quality standards for materials and execution.

.3 Mock-ups:

.1 Install each product for acceptance by the Consultant. The accepted mock-up shall form the basis of the standard of workmanship for the remainder of the work. The mock-up shall consist of a floor/wall/base corner intersection, with 600mm of finish product on each face.

.2 All work related to the project is to be carried out by a single Contractor who is to be responsible for the complete installation of the system from the concrete surface to the completed finished installation.

1.5 PRE-INSTALLATION CONFERENCE

.1 Convene one week prior to commencing work of this section.

.2 Require attendance of installation material manufacturer, sheet flooring supplier, and installers of related work. Review installation procedures and coordination required with related work.

.3 Meeting agenda includes but is not limited to:

.1 Flooring and installation material compatibility.

.2 Maintenance and cleaning products and methods.

.3 Surface preparation.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or contamination to materials by water, freezing, foreign matter and other causes.

.2 Protect setting materials from freezing and overheating in accordance with manufacturer's instructions.

.3 Store tile and setting materials on elevated platforms, under cover and in a dry location and protect from contamination, dampness, freezing and overheating.

.4 Do not use frozen materials unless specifically allowed by manufacturer.

.5 Deliver and store materials on site at least 24 hours before work begins.

.6 Provide heated and dry storage facilities on site.

1.7 **ENVIRONMENTAL REQUIREMENTS**

.1 Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during, and after installation.

.2 Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

.3 For interior applications:

.1 Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

.2 Vent temporary heaters to exterior to prevent damage to tilework from carbon dioxide build-up.

2 Products

2.1 **MATERIALS**

.1 **ACCEPTABLE MANUFACTURERS:**

.1 Basis of Design: 254 Platinum by Laticrete

.2 Or approved equivalent by MAPEI Corporation

2.2 **SURFACE PREPARATION MATERIALS AND INSTALLATION**

.1 When underlayment, patching, leveling and rendering materials are needed, they must be from the supplier of the setting materials. For improved warranty and single-source responsibility.

.2 Over existing tile installed over concrete floor slabs repair any loose tile using latex portland cement mortar.

.3 Remove and clean any existing polishes and waxes over existing tile

.4 Skim coat 1/8” or 3.18 mm using latex portland cement mortar

.5 Set sheet flooring on top of skim coat as per vinyl manufacturers recommendations

.6 Modified Dry-Set Cement Thin Bed Mortar for thin set and slurry bond coats to be weather, frost, shock resistant, non-flammable, UL GREENGUARD Gold certified, conform to ISO C2TES1P1, and meet the following physical requirements:

.1	Bond strength (ANSI A118.4):	>450 psi (3.1 MPa)
.2	Smoke & Flame Contribution (ASTM E84 Modified):	0
.3	VOC Content:	0.00 g/L
.4	Total VOC Emissions:	≤0.22 mg/m^3

.7 Application on tiled hallway floor, tiled stair runs, tiled stair risers and tiled baseboards and as indicated on the drawings

2.3 **FLOORING PRODUCT**

.1 Refer to SECTION 09 65 16 – Resilient Sheet Flooring

.2 Refer to SECTION 09 65 66 – Resilient Athletic Flooring

3 Execution

3.1 **EXAMINATION**

.1 Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

.2 Do not proceed with mortar work until surfaces and conditions comply with requirements indicated in reference installation standard and manufacturer's printed instructions.

.3 When underlayment, patching, leveling and rendering materials are needed, they must be from the supplier of the setting materials. For improved warranty and single-source responsibility.

3.2 **PROTECTION**

.1 Floors: Protect from all traffic for at least 72 hours after installation.

.2 Do not step on floor for at least 24 hours; if traffic is unavoidable after that, use plywood stepping boards.

.3 Protect from heavy traffic for at least 7 days after installation.

.4 When fast-setting materials are used to allow faster occupancy, comply with the manufacturer's recommendations.

.5 Walls: Protect from impact, vibration and heavy hammering on adjacent and opposite walls for at least 14 days after installation, unless manufacturer's instructions allow a shorter period.

.6 Protect from stain-causing food products and chemicals for at least 14 days.

.7 SPEC NOTE:: When dealing with cement-based products, it should be noted that temperature and humidity during and after installation of tile affect final curing time. That is, low temperatures -- 60°F (15°C) and under -- and high humidity -- 70% and above -- will delay final cure time.

.8 Protect from freezing and total water immersion for at least 21 days after installation.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for resilient athletic flooring Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM D412: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.

.2 ASTM D2047: Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as measured by the James Machine.

.3 ASTM D2240: Standard Test Method for Rubber Property (Durometer Hardness).

.4 ASTM D3389: Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader).

.5 ASTM E648: Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

.6 ASTM E662: Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

.7 ASTM E1643: Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

.8 ASTM E1745: Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

.9 ASTM F386: Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces.

.10 ASTM F410: Standard Test Method for Wear Layer Thickness of Resilient Floor Coverings by Optical Measurement.

.11 ASTM F710: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

.12 ASTM F925: Standard Test Method for Resistance to Chemicals of Resilient Flooring.

.13 ASTM F970: Standard Test Method for Static Load Limit.

.14 ASTM F1514: Standard Test method for Measuring Heat Stability of Resilient Flooring by Color Change.

.15 ASTM F1515: Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change.

.16 ASTM F1869: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

.17 ASTM F2170: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

.18 ASTM F2199: Standard Test Method for Determining Dimensional Stability of Resilient Floor Tile after Exposure to Heat.

1.3 **SUBMITTALS**

.1 Product data:

.1 Submit copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:

.1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.

.2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings indicating seam layout and welding procedures in accordance with Section 01 10 10.

.3 Samples:

.1 Submit samples in accordance with Section 01 10 10:

.1 Submit two 250 x 200 mm samples of each type of sheet material and colour.

.2 Submit two 150 mm x 150 mm samples of resilient base.

.4 Closeout submittals: Submit maintenance and cleaning data for incorporating into Operations and Maintenance Manuals in accordance with Section 01 10 10.

1.4 **QUALITY ASSURANCE**

.1 Manufacturer must be certified ISO 9001.

.2 Manufactured Product must have undergone a vulcanization process; factory lamination should not be accepted as equivalent.

.3 Manufacturer must have a minimum of fifteen (15) years of experience in the manufacturing of prefabricated resilient athletic flooring.

.4 Installer must have performed installations of the same scale in the last three (3) years.

.5 Installer to be recognized and approved by the Manufacturer.

1.5 **DELIVERY, STORAGE AND HANDLING**

.1 Products Supplied must be delivered in Manufacturer's original, unopened and undamaged packaging with identification labels intact.

.2 Products Supplied must be protected from exposure to harmful weather conditions and must be safely stored on a clean, dry, flat surface. Store rolls of resilient athletic flooring upright; store tiles of resilient athletic flooring on a flat surface, carefully protecting corners and edges.

.3 Climate controlled storage is recommended. Storage temperature must not be below 55°F (13°C) and must not exceed 100°F (38°C).

.4 Avoid storing Manufactured Product for extended periods of time or additional material trimming may be required.

.5 Products Supplied need not suffer damage during handling (i.e. dents/scratches, edge chipping, excessive warping, etc.).

1.6 **SITE CONDITIONS**

.1 The General Contractor or Construction Manager shall be responsible for ensuring all site conditions meet the requirements of the Manufacturer, as referenced herein at sections 3.2 and 3.3.

.2 Concrete subfloors, on or below grade, must be installed over a permanent effective vapor retarder, respecting current versions of the standard practice ASTM E1643 and the standard specification ASTM E1745. The vapor retarder must be placed directly underneath the concrete slab, above the granular fill, as per Manufacturer's instructions. The vapor retarder must have a perm rating of 0.1 or less and must have a minimum thickness of 10 mil (0.010in).

.3 No concrete sealers or curing compounds are applied or mixed with the subfloors.

.4 Installation of the resilient athletic flooring to be carried out no sooner than the specified curing time of concrete subfloor (normal density concrete curing time is approximately 28 days for development of design strength). Refer to current version of ASTM F710.

.5 The subfloor surface must be free of any paint, wax, oil, grease, sealer, curing compound, solvent or any other contaminants that may inhibit bond. All contaminants must be removed from the surface via mechanical abatement. Use of abatement chemicals is not recommended.

.6 Concrete to have smooth, dense finish, and be highly compacted with a tolerance of 1/8'' in a 10ft radius (3.2mm in 3.05m radius). Floor Flatness (FF) and Floor Levelness (FL) numbers are not recognized.

.7 Moisture and alkalinity tests must be performed on all concrete substrates, under in-service conditions. It is recommended to turn on the HVAC unit prior to performing moisture testing, in order to ensure stable testing conditions and accurate results. The concrete's surface pH should be between 7 and 10. Relative humidity of the concrete slab must not exceed 85%, in accordance with ASTM F2170 (in situ

probes). Moisture vapor emissions from the concrete slab must not exceed the tolerance of the adhesive specified, in accordance with ASTM F1869 (anhydrous calcium chloride).

.8 Maintain a stable room and subfloor temperature within the recommended range of 65oF to 86°F (18°C to 30°C), 48 hours prior to installation, during the installation, and 48 hours after the installation. Recommended ambient humidity control level is between 35 to 55%.

.9 Installation of resilient athletic flooring will not commence until the building is enclosed and all other trades have completed their work. It is the General Contractor or Construction Manager's responsibility to maintain a secure

1.7 **EXTENDED WARRANTY**

.1 The resilient athletic flooring is warranted to be free from manufacturing defects for a period of two (2) years from the date of shipment from the Manufacturer.

.2 Refer to current copy of Manufactured Product's Limited Warranty for all terms and conditions

2 Products

2.1 **ACCEPTABLE PRODUCTS:**

.1 Fitness & Rec Recycled rubber (8mm) by LSI Flooring Capri Collection, Colour: Rock Bottom RTL4035.

.2 Ramflex (10mm) by Mondo, Colour: Consultant to select from a standard full range of colours.

.3 Triumph Rubber Sport Flooring (9.5mm) by Tarkett North America, Colour: Consultant to select from a standard full range of colours.

2.2 **MATERIALS**

.1 Provide adhesive certified by Manufacturer: Gold Series MW 3012 Modified Silane Resilient Flooring Adhesive by Capri Collection or approved equivalent

.2 For suitability, recommendations and use please refer to Manufacturer's current printed adhesive guidelines.

.3 Patching or leveling compound to be supplied or recommended/approved by Manufacturer.

.4 Phthalate-free, halogen-free, heavy metal-free, formaldehyde-free, isocyanate-free and BPA-free.

.5 Minium Flooring Thickness: 0.315'' (8mm).

.6 Colors: Provided in standard, solid background colors with random marbleization throughout wear layer.

.7 Surface Texture: Hammered.

.8 Formats: Available in nominal Interlocking tiles that are 24” x 24” (60.96cm x 60.96cm).

2.3 **FLOOR BASE AT RESILIENT ATHLETIC FLOORING**

.1 Resilient base type (B-1):

.1 Acceptable Products/manufacturers:

.1 Johnsonite Traditional Wall Base

.2 Forbo

.3 Roppe ‘Pinnacle Rubber Base’.

.2 Rubber wall base, 3.2 mm (1/8”) thick, 101.6 mm (4”) high, with cove profile. Colour: ’63 Burnt Umber B’ by Johnsonite or approved equivalent. Coved profile, in lengths as long as possible including premoulded end stops and inner and outer corners.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Ensure that concrete subfloors, on or below grade, are installed over a permanent effective vapor retarder, respecting current versions of the standard practice ASTM E1643 and the standard specification ASTM E1745. The vapor retarder must be placed directly underneath the concrete slab, above the granular fill, as per Manufacturer’s instructions. The vapor retarder must have a perm rating of 0.1 or less and must have a minimum thickness of 10 mil (0.010in).

.3 Installation of the resilient athletic flooring to be carried out no sooner than the specified curing time of concrete subfloor (normal density concrete curing time is approximately 28 days for development of design strength). Refer to current version of ASTM F710.

.4 Ensure that no concrete sealers or curing compounds have been applied to or mixed into the concrete.

.5 Subfloor surface must be free of any paint, wax, oil, grease, sealer, curing compound, solvent or any other contaminants that may inhibit bond. All contaminants must be removed from the surface via mechanical abatement. Use of abatement chemicals is not recommended.

.6 Confirm concrete has smooth, dense finish, and is highly compacted with a tolerance of 1/8’’ in a 10ft radius (3.2mm in 3.05m radius). Floor Flatness (FF) and Floor Levelness (FL) numbers are not recognized.

.7 Moisture and alkalinity tests must be performed on all concrete substrates, under in-service conditions. It is recommended to turn on the HVAC unit prior to performing moisture testing, in order to ensure stable testing conditions and accurate results. The concrete's surface pH should be between 7 and 10. Relative humidity of the concrete slab must not exceed 85%, in accordance with ASTM F2170 (in situ probes). Moisture vapor emissions from the concrete slab must not exceed the tolerance of the adhesive specified, in accordance with ASTM F1869 (anhydrous calcium chloride).

.8 If installing over wood subfloors, ensure exterior grade plywood with at least one good side, such as: APA (Engineered Wood Association) Exterior grade plywood (A-A Exterior, A-B Exterior or A-C Exterior) and CANPLY (Canadian Plywood Association) Exterior certified plywood (Canada: Grade G2S A-A or G1S A-C. USA: G2S A-A, A-B, B-B, or G1S A-C, B-C). There must be proper underfloor ventilation, plywood must be dry and should have a moisture content ranging between 6 and 12%, when measured with a quality wood moisture meter (electronic hygrometer).

.9 Maintain a stable room and subfloor temperature within the recommended range of 65°F to 86°F (18°C to 30°C), 48 hours prior to installation, during the installation, and 48 hours after the installation. Recommended ambient humidity control level is between 35 to 55%.

.10 Installation of resilient athletic flooring will not commence until the building is enclosed and all other trades have completed their work. Ensure a secure and clean working area before, during and after the installation of the resilient athletic flooring.

3.2 **SUBFLOOR TREATMENT**

.1 Refer to the cementitious specification for the subfloor treatment of the existing tile flooring surface to remain.

.2 Prepare subfloor in accordance with Manufacturer's current printed guidelines.

.3 Ensure floor surfaces are smooth, clean and cured, with trowel finish, free from curing compounds or surface coatings, in accordance with flooring manufacturer's printed installation instructions.

.4 Remove adhesives, coatings, dirt and foreign matter, excessive dusting, broken or loose concrete, and moisture which would impair bond.

.5 Substrate to be prepared in accordance with ASTM F710-11 "Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring".

.6 All concrete subfloors must be tested for moisture, pH (alkalinity), and proper adhesive bond:

.7 Moisture tests shall be conducted in accordance with ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride" or ASTM F 2170 "Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs using in situ Probes". Three

tests should be conducted for areas up to 1,000 sq. ft. and one additional test should be conducted for each additional 1,000 sq. ft. of flooring.

.8 Results must not exceed 5 lbs. per 1,000 sq. ft. in 24 hours when tested to ASTM F 1869, or exceed 80% when tested to ASTM F 2170.

.9 If the tests results exceed the limitations, the installation must not proceed until the problem has been corrected.

.10 A pH test for alkalinity must be conducted. Results should range between 7 and 9. If the test results are not within the acceptable range of 7 to 9, the installation must not proceed until the problem has been corrected.

.11 An adhesive bond test should be performed using the actual flooring materials and adhesive to be installed. The test areas should be a minimum of 36" x 36" and remain in place for at least 72 hours and then evaluated for bond strength to the concrete.

.12 Fill cracks, grooves, voids and /or construction joints with levelling compound as approved by manufacturer. High spots on the floor shall be removed by grinding them down.

.13 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.14 Apply sub-floor filler to low spots and cracks to achieve floor level to a tolerance of 1:1000, allow to cure.

.15 Clean and remove all deleterious materials from surfaces to receive this Work in accordance with the adhesive manufacturer's recommendations.

.16 Prime concrete to flooring manufacturer's printed instructions.

3.3 **RESILIENT ATHLETIC FLOORING APPLICATION**

.1 Install tiles of resilient athletic flooring following Manufacturer’s current printed guidelines.

.2 Install all accessories following Manufacturer’s current printed guidelines.

.3 Dry-lay entire floor tile area. Check tiles for possible imperfections or defects including trim, thickness and colour. Replace any defective material prior to adhesion.

.4 Install flooring to entire area indicated or scheduled, including coverplates occurring within finished floor areas. Maintain overall continuity of colour and pattern with pieces of flooring installed on cover plates. Tightly butt edges to perimeter of floor around cover plates and to cover plates. Do not install flooring to floor drains occurring within finished floor areas.

.5 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's written instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.6 Remove any excessive adhesive from surfaces of the floor and base as work progresses.

.7 Lay tiles in pattern as selected by Consultant. Do not pressure fit tile joints.

.8 Trim and fit neatly around fixed objects.

.9 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar, unless otherwise indicated.

.10 Protect laid flooring from construction traffic for a period as recommended by manufacturer. At the end of this time, thoroughly clean all surfaces with a neutral cleaner as approved by manufacturer of flooring materials.

.11 Protect floors from time of final set of adhesive until final inspection. Install suitable protection sheeting, lap joints of material by 150 mm (6") and seal with non-asphaltic tape.

.12 Install floor protection in areas where work of other sections, repairs and installation of equipment, and foot traffic will occur.

.13 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

.14 Install reducing edge strips at unprotected or exposed edges where flooring terminates or where there are two finishes of different thicknesses.

.15 Trowel: porous and non-porous substrate: 1/8" x 1/8" x 1/16" 'V' notch Determine subfloor porosity and follow the adhesive label instructions regarding porous and non-porous substrate drying times prior to the installation of the rubber floor tiles.

.16 Square the area and establish reference points on substrate.

.17 Lay out the tile so that a minimum of one-half of a tile forms the border along the perimeter.

.18 Apply the adhesive to the substrate. Follow directions on adhesive label for proper adhesive use.

.19 Use established reference points and install the flooring.

.20 Lay tiles with the directional arrow (found on back of each tile) pointing in the same direction.

.21 Pattern tiles may be 'quarter turned' to create a checkerboard pattern.

.22 Tiles should be lightly butted together when placing the flooring into the adhesive.

.23 Do not force tiles together creating a ledge condition at the seams and corners. Sliding tiles will result in forcing the adhesive out between the seams.

.24 Work off the flooring when using adhesive or use kneeling boards.

.25 Periodically, lift the corner of an installed tile to ensure proper transfer of adhesive.

.26 Roll floor in both directions with a 100 pound three-section roller. Use a hand roller in areas that cannot be reached with a large roller.

.27 Inspect the floor surface, especially seams, and remove any adhesive on the surface.

3.4 **TRAFFIC**

.1 No traffic for 24 hours after installation.

.2 No heavy traffic, rolling loads, or furniture placement for 72 hours after installation.

3.5 **REPAIR**

.1 Repair material must come from the same original dye lot as original the Manufactured Product initially installed.

.2 Repairs are to be performed by qualified installers/technicians only.

3.6 **CLEANING AND SEALING**

.1 Always wait at least a minimum of 72 hours after the resilient athletic flooring has been completely installed before performing initial maintenance.

.2 Always maintain the resilient athletic flooring following Manufacturer’s current printed guidelines.

3.7 **PROTECTION OF FINISHED WORK**

.1 As needed, protect resilient athletic flooring with 1/8” Masonite during and after the installation, prior to acceptance by the Owner.

.2 Protect exposed edges of resilient flooring, where finished and unfinished areas adjoin, by means of a reducing strip butting to and flush with the finished surface of the flooring covering material and securely adhered to the substrate material.

.3 Install reducing strips where flooring terminates. Set flush with adjacent floor finishes.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for painting work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 CAN/CGSB 85.10, Protective Coatings for Metals.

.2 CAN/CGSB-85.100, Painting.

.3 Master Painters Institute (MPI), Painting Specification Manual.

.4 SSPC Steel Structures Painting Council, Standards.

1.3 **SUBMITTALS**

.1 Product data:

.1 copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:

.1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.

.2 Product transportation, storage, handling and installation requirements.

.2 Submit listing of manufacturer's Product types, Product codes, and Product names, number of coats, and dry film thicknesses, corresponding to each Painting Schedule code; submit listing minimum of 8 weeks before materials are required.

.2 Samples:

.1 Submit following samples in accordance with Section 01 10 10.

.1 Four 300 x 150 mm draw downs of each colour minimum 4 weeks before paints are required.

.2 Identify each sample with Contract number and title, colour reference, sheen, date, and name of applicator.

.3 Certificates:

.1 Submit certification from paint manufacturer, on company letterhead, indicating each product proposed for use is Manufacture's premium grade, first line Product.

.2 Submit certified documentation to confirm each airless spray painter has minimum of 5 years experience on applications of similar complexity and scope.

.3 Submit certified documentation to confirm each worker has Provincial Tradesman Qualification certificate of proficiency.

.4 Reports:

.1 Submit written field inspection and test report results after each inspection.

.2 Submit Field Quality Control test result reports for alkali content, substrate moisture, and dry film thickness.

.3 Submit electronic moisture meter manufacturer's specifications including tolerances. Submit record of latest meter calibration to meet manufacturer's recommendations.

1.4 QUALITY ASSURANCE

.1 Finishing work: Perform work to MPI requirements for premium grade.

.2 Supervision: Have work supervised by a full-time qualified foreperson who has 10 years minimum experience on Contracts of similar complexity and scope

.3 Mock-up:

.1 Construct three 2m2 mock-ups of different Paint Schedule code systems, selected by Consultant, in locations acceptable to Consultant to demonstrate installation workmanship, colour, and hiding power of Products.

.2 Obtain Consultant's acceptance in writing before proceeding with the work of this Section.

.3 Mock-ups may remain as part of the Work if acceptable to Consultant and will serve as a standard for similar code systems.

.4 Repaint over mock-ups which do not form part of the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Install correct, safe temporary storage for paint, thinner, solvents, and other volatile, corrosive, hazardous, and explosive materials in accordance with requirements of authorities having jurisdiction.

.2 Post hazard warning signage in areas of storage and mixing. Install and maintain sufficient CO2 fire extinguishers of minimum 9 kg capacity, accessible in each storage mixing and storage areas.

.3 Maintain storage enclosures at minimum 10 degrees Celsius ambient temperature and to manufacturer's instructions.

1.6 SITE CONDITIONS

.1 Apply coatings under the following conditions:

.1 Exterior coatings (except Latex): 5 degrees Celsius minimum.

.2 Exterior latex coatings: 10 degrees Celsius minimum.

.3 24 hours minimum after rain, frost, condensation, or dew.

.4 When no condensation is possible (unless specifically formulated against condensation).

.5 Interior coatings: 7 degrees Celsius minimum.

.6 Relative humidity: 85% maximum.

.7 Not in direct exposure to sun light.

.2 Maintain temperature conditions indicated above for 24 hours before, during and 24 hours after painting.

.3 Install clean plywood sheets to protect floors and walls in storage and mixing areas, from paint drips, spatters, and spills.

.4 Apply sufficient masking, clean drop cloths, and protective coverings for full protection of work not being painted including, but not limited to, the following:

.1 Light fixtures, fire and smoke detectors.

.2 Sprinkler heads.

.3 Prepainted diffusers and registers.

.4 Prepainted equipment.

.5 Fire rating labels and equipment specification plates.

.6 Finished surfaces.

1.7 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

.1 Provide paint products meeting MPI "Green Performance Standard GPS-1-05".

1.8 MAINTENANCE

.1 Deliver to Owner's place of storage on completion of work, sealed containers of each finish painting material applied, and in each colour. Label each container as for original, including mixing formula. Provide the following:

.1 1 L of extra materials when less than 50 L are used for Project;

.2 3.78 L of extra stock when 50 to 200 L are used;

.3 7.57 L of extra stock when over 200 L are used.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Ensure emptied containers are sealed and stored safely.

.4 Unused paint, coating materials must be disposed of at official hazardous material collections site as approved by Owner.

.5 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal.

.6 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

.7 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.8 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:

.1 Retain cleaning water for water-based materials to allow sediments to be filtered out.

.2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.

.3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.

.4 Dispose of contaminants in approved legal manner in accordance with hazardous waste regulations.

.5 Empty paint cans are to be dry prior to disposal or recycling (where available).

1.10 **SCHEDULE OF WORK**

.1 Submit work schedule for various phases of painting to Consultant for approval. Submit schedule minimum of 1 week in advance of proposed operations.

.2 Obtain written authorization from Consultant for any changes in work schedule.

.3 Schedule painting operations to prevent disruption of occupants in and about the building.

2 Products

2.1 **MATERIALS**

.1 Paint:

.1 All materials under work of this Section, including but not limited to, primers, stains, and paints are to have low VOC content limits.

.2 Products in accordance with the MPI Painting Specification Manual, Exterior and Interior Systems;

.1 For each MPI paint code, manufacture's premium grade, first line Products is to be use.

.2 Uniform dispersion of pigment in a homogeneous mixture.

.3 Ready-mixed and tinted whenever possible.

.2 Products within each MPI paint system code: From single manufacturer.

.3 Acceptable manufacturers:

.1 Benjamin Moore.

.2 Dulux Paints/PPG.

.3 Sherwin Williams.

2.2 **COLOUR SCHEDULE**

.1 Consultant will select choice of colours and gloss when compiling a Colour Schedule after award of Contract; allow for colour selection beyond paint manufacturer's standard colour range.

.2 Second coat in a three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

.3 Refer to Colour Schedule for selected colour references. Allow for 12 different colours, an additional deep and ultra-deep colours; 4 coats may be required.

.4 Conform to gloss reflectance definitions listed in MPI Specification Manual.

2.3 **PAINTING AND FINISHING SCHEDULE**

.1 Refer to Table 1, MPI Painting and Finishing Schedule coded systems, comply with MPI Painting Specification Manual.

Table 1: Painting and Finish Schedule				
INTERIOR SUBSTRATES	Typical substrates (Including but not limited to)	MPI Manual Ref.	MPI Finish System Code	Topcoat
Galvanized Metal/ Aluminum	HM Doors & Frames, Window Frames & Mullions, Toilet Partitions - All Areas	RIN 5.3	RIN 5.3J	Spot Prime – PPG Pitt-Tech Plus EP Acrylic Primer 90-1912 Topcoat – PPG Pitt-Glaze WB1 Precatalyzed Acrylic Epoxy Semi-Gloss 16-1510
Gypsum Board	Walls & ceilings – Common Areas (Corridors, Offices, Gyms, Community Rooms)	RIN 9.2	RIN 9.2A	Spot Prime – Dulux Ultra Interior Latex Primer/ Sealer 976000 Topcoat- Dulux Ultra Interior Latex Eggshell 949000
Gypsum Board	Walls & ceilings – Wet Areas (Janitor Room, Change rooms)	RIN 9.2	RIN 9.2F	Spot Prime – Dulux Gripper Universal Acrylic Primer/ Sealer 60000A Topcoat- PPG Aquapon WB EP Epoxy Semi-Gloss
Concrete Masonry Units	Concrete walls – Wet Areas (Washrooms, Restrooms, Change rooms)	RIN 4.2	RIN 4.2F	Spot Prime – PPG Aquapon WB EP Epoxy Semi-Gloss Topcoat- PPG Aquapon WB EP Epoxy Semi-Gloss

Concrete Masonry Units	Concrete walls	RIN 4.2	RIN 4.2A	Spot Prime – Dulux Gripper Universal Acrylic Primer/ Sealer 60000A Topcoat- Dulux Ultra Interior Latex Eggshell 949000

3 Execution

3.1 **EXAMINATION**

.1 Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **CONDITION OF SURFACES:**

.1 Prior to commencement of repainting work, thoroughly examine (and test as required) all interior conditions and surfaces scheduled to be repainted and report in writing to the Consultant any conditions or surfaces that will adversely affect work of this section.

.2 The degree of surface deterioration (DSD) shall be assessed using the assessment criteria indicated in the MPI Maintenance Repainting Manual. In general, the MPI DSD ratings and descriptions are as follows:

CONDITION	DESCRIPTION
DSD-0	Sound Surface (may include visual (aesthetic) defects that do not affect film's protective properties).
DSD-1	Slightly Deteriorated Surface (may show fading; gloss reduction, slight surface contamination, minor pin holes scratches, etc.) / Minor cosmetic defects (runs, sags, etc.).
DSD-2	Moderately Deteriorated Surface (small areas of peeling, flaking, slight cracking, staining, etc.).
DSD-3	Severely Deteriorated Surface (heavy peeling, flaking, cracking, checking, scratches, scuffs, abrasion, small holes and gouges).
DSD-4	Substrate Damage (repair or replacement of surface required by Contractor).

.3 Other than the repair of DSD-1 to DSD-3 defects included under this scope of work, structural and DSD-4 substrate defects discovered prior to and after surface preparation or after first coat of paint shall be made good and sanded by others

ready for painting, unless otherwise agreed to by the Consultant and painter to be included in this Work.

.4 No repainting work shall commence until all such DSD-4 adverse conditions and defects have been corrected and surfaces and conditions are acceptable to the Painting Subcontractor. The Painting Subcontractor shall not be responsible for the condition of the substrate or for correcting defects and deficiencies in the substrate, which may adversely affect the painting work except for minimal work normally performed by the Painting Subcontractor and as, indicated herein. It shall always, however, be the responsibility of the Painting Subcontractor to see that surfaces are properly prepared before any paint or coating is applied. It shall also be the Painting Subcontractor's responsibility to paint the surface as specified providing that the Wwner accepts responsibility for uncorrected DSD-4 substrate conditions.

3.3 PREPARATION

.1 General:

.1 Clean substrate surfaces free from, dust, grease, soiling, or extraneous matter, which are detrimental to finish.

.2 Patch, repair, and smoothen minor substrate defects and deficiencies e.g. machine, tool and sand paper marks, shallow gouges, marks, and nibs.

.3 Clean, sweep, and vacuum floors and surfaces to be painted, debris and dustfree prior to painting.

.4 Refer to MPI Painting Specification Manual for surface preparation requirements of substrates not listed here.

.2 Where finish hardware has been installed remove, store, re-install finish hardware, to accommodate painting. Do not clean hardware with solvent that will remove permanent lacquer finishes.

.3 Alkali Content tests and neutralization:

.1 Test for ph level using litmus paper on dampened substrate.

.2 Neutralize surfaces over 8.5 ph with 4% solution of Zinc Sulphate for solvent based systems and tetrapotassium pyrophosphate for latex based systems, to below 8.0 ph, and allow to dry.

.3 Brush-off any residual Zinc Sulphate crystals.

.4 Coordinate paint system primer / sealer to be alkali-resistant.

.4 Substrate moisture tests:

.1 Test for moisture content over entire surface to be painted, minimum one test/2 m2 in field areas and one test/600 mm along inside corners including at ceiling to wall juncture.

.2 If any test registers above 10% allow entire substrate surfaces, within the plane, to dry further before paint system application. Install temporary drying fans if necessary.

.3 Re-test employing same criteria.

.5 Mildew removal: Scrub with solution of trisodium phosphate and sodium hypochlorite (Javex) bleach, rinse with water, and allow to dry completely.

.6 Cementitious and masonry (existing): Clean existing surfaces by pressure washing where indicated on drawings with a TSP solution and pressure range of 1500 - 4000 PSI at 150 mm - 300 mm. Rinse areas with clean water and allow to throughly dry. Provide for collection and disposal of water.

.7 Cementitious and masonry (Concrete, block):

.1 Allow 28 days cure before painting.

.2 Coordinate repair of protrusion-chipping and grinding, and honeycomb filling with responsible trades.

.3 Remove dirt, loose mortar, scale, powder, efflorescence, and other foreign matter.

.4 Remove form oil and grease with trisodium phosphate, rinse, and allow to dry thoroughly.

.5 Prepare surfaces in accordance with CAN/CGSB-85.100.

.6 Remove rust stains with solution of sodium metasilicate after thorough wetting;

.1 allow to dry thoroughly.

.8 Metal Fabrications (existing): Scrape and either hand or power wire brush surfaces to remove mill and scale.

.9 Galvanized steel sheet:

.1 Z275 (Satin & Spangled Sheet): SSPC SP7 brush blast.

.2 ZF075 (Wiped Coat): Remove contamination, wash with Xylene solvent.

.3 Touch-up damaged galvanized areas with organic zinc rich primer.

.10 Galvanized iron and steel: Prepare galvanized and ungalvanized metal surfaces as

.1 Z275 (Satin & Spangled Sheet): SSPC SP7 brush blast.

.2 ZF075 (Wiped Coat): Remove contamination, wash with Xylene solvent.

.3 Touch-up damaged galvanized areas with organic zinc rich primer.

.11 Galvanized iron and steel: Prepare galvanized and ungalvanized metal surfaces as follows:

.1 Unpassivated, unweathered and weathered: Remove contamination, wash with Xylene or Toluol solvent, allow to dry thoroughly. Make paint system primer/sealer an etching type primer.

.2 Manufacturer pre-treated (including passivated): SSPC SP7.

.3 Touch-up damaged galvanized areas with organic zinc rich primer.

.12 Factory primed surfaces:

.1 Touch up damaged areas.

.2 Clean as required for top coat.

.13 Gypsum board (existing):

.1 Remove dust, dirt, oil, grease, glue and all foreign material. Clean with stiff fibre brush prior to applying primer coat.

.2 Coordinate repairs and touch-ups with the responsible trade.

.3 Lightly sand surface to smooth out ridges and provide neat smooth surface.

.14 Gypsum board:

.1 Apply primer/sealer paint to reveal defects and deficiencies and to equalize absorption areas.

.2 Coordinate repairs and touch-ups with the responsible trade.

.3 Re-prime repairs.

.15 Coordinate with other trades to prevent:

.1 Damage, and inadvertent activation of fire and smoke detectors.

.2 Odour and dust distribution by permanent HVAC systems including fouling of ducts and filters.

.16 Field-mix Products in accordance with manufacturer's written instructions.

3.4 APPLICATION

.1 Apply painting systems in accordance with the MPI Painting Specification Manual. Apply each Product to manufacturer's recommended dry film thickness.

.2 Method of application to be as approved by Consultant. Apply paint by brush, roller, air sprayer, airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.

.3 Brush and Roller Application:

.1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple.

.4 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.5 Remove runs, sags and brush marks from finished work and repaint.

.4 Spray application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in a uniform layer, with overlapping at edges of spray pattern.

.4 Brush out immediately all runs and sags.

.5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.

.5 Painting systems listed are required minima, apply additional coats if necessary to obtain substrate hiding acceptable to the Consultant.

.6 Tint intermediate coats lighter than final top coats for identification of each succeeding coat and to facilitate inspections. Include only manufacturer's recommended reducing and tinting accessories. Do not add adulterants.

.7 Primer to be specialized primer coating system as required by manufacturer for selected colour. Standard primer being tinted shall be tinted to a maximum of 1.5% by volume.

.8 Sand lightly between coats to achieve a tooth or anchor for subsequent coats.

.9 Apply paint uniformly in thickness, colour, texture, and gloss, as determined by the Consultant under adequate illumination and viewed at a distance of 1500 mm. Apply finishes free of defects in materials and application which, in the opinion of the Consultant, affect appearance and performance. Defects include, but are not limited to:

.1 Improper cleaning and preparation of surfaces.

.2 Entrapped dust, dirt, rust.

.3 Alligatoring, blisters, peeling.

.4 Scratches, blemishes.

.5 Uneven coverage, misses, drips, runs, and poor cutting in.

.10 Do not apply coatings on substrates which are not sufficiently dry. Unless indicated otherwise, allow each painting system coat to cure dry and hard before following coats are applied.

.11 Repaint entire areas of damaged or incompletely covered surfaces, to the nearest inside or outside corner; patching will not be permitted.

.12 Miscellaneous painting requirements:

.1 Paint projecting ledges, and tops, bottoms and sides of doors both above and below sight lines to match adjacent surfaces.

.2 Paint door frames, access doors and frames, door grilles, prime coated butts, and prime coated door closers to match surface in which they occur.

.3 Finish closets and alcoves as specified for adjoining rooms.

.4 Paint light coves white whether a light lense is installed or not, unless otherwise indicated.

.5 Paint interior columns to match walls of room.

.6 Allow for:

.1 2 wall colours per room, one ceiling colour per room.

.2 Different door colours in each functionally different area.

.3 Different colours on both sides of same door.

.13 Mechanical, electrical, refrigeration and other painting coordination:

.1 Coordinate painting of pipes, ducts, and coverings with the work to precede pipe colour banding, flow arrows, and other pipe identification labeling installation.

.2 Paint exposed conduit, pipes, hangers, ductwork, grilles, gratings, louvres, access panels, fire hose cabinets, registers, convector and radiator covers, enclosures, and other mechanical and electrical equipment including services concealed inside cupboard and cabinet work; apply colour and sheen to match adjacent surfaces, except as noted otherwise.

.3 Paint portions of surfaces such as duct interiors, piping, ductwork, hangers, insulation, walls, and similar items, visible through grilles, louvres, convector covers etc., colour as noted on drawings.

.4 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.5 Remove the following to accommodate painting, carefully store, clean, then reinstall on completion of each area and when dry:

.1 Switch and receptacle plates, fittings and fastenings, grilles, gratings, louvres, access panels, convector covers, and enclosures.

.6 Unless otherwise specified, paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise.

.7 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.8 Paint fire protection piping red.

.9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.10 Paint natural gas piping yellow.

.11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

3.5 FIELD QUALITY CONTROL

.1 Dry film thickness tests:

.1 Test for film thickness over entire surface to be painted, minimum one test 2m2 in field areas and one test/600 mm along inside corners including at ceiling to wall juncture.

.2 If any test registers below specified thickness, re-apply paint to entire surface to nearest inside and outside corners.

.3 If test registers more than 50% above specified thickness, consult with paint manufacturer, determine if problem exists, offer solutions to Consultant, and repair as directed.

.4 Re-test employing same criteria after repair.

3.6 RESTORATION

.1 Clean and re-install all door hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Consulant. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

3.7 CLEANING

.1 Remove spilled, splashed, and spattered paint promptly as work proceeds and on completion of work. Clean surfaces soiled by paint spillage and paint spatters. Repair or replace damaged work, as directed by Consultant.

3.8 PROTECTION

.1 Post Wet Paint signs during drying and restrict or prevent traffic where necessary.

.2 Post sign, after Consultant's inspection and acceptance of each room, reading: PAINTING COMPLETE - NO ADMITTANCE WITHOUT CONTRACTOR'S PERMISSION.

END OF SECTION

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Section 22 05 00
Common Work Results for Mechanical

Part 1 General

1.1 Action and informational submittals

1. Submit in accordance with Section 01 33 00 - Submittal Procedures.
2. Product Data:
    2.1. Submit manufacturer's instructions, printed product literature and data sheets for equipment, components and include product characteristics, performance criteria, physical size, finish and limitations.
3. Shop Drawings:
    3.1. Indicate on drawings:
        3.1.1. Mounting arrangements.
        3.1.2. Operating and maintenance clearances.
    3.2. Shop drawings and product data accompanied by:
        3.2.1. Detailed drawings of bases, supports, and anchor bolts.
        3.2.2. Acoustical sound power data, where applicable.
        3.2.3. Points of operation on performance curves.
        3.2.4. Manufacturer to certify current model production.
        3.2.5. Certification of compliance to applicable codes.

1.2 Closeout submittals

1. Operation and Maintenance Data: submit operation and maintenance data sheets for incorporation into manual.
    1.1. Operation data to include:
        1.1.1. Control schematics for systems including environmental controls.
        1.1.2. Description of systems and their controls.
        1.1.3. Description of operation of systems at various loads together with reset schedules and seasonal variances.
        1.1.4. Operation instruction for systems and component.
        1.1.5. Description of actions to be taken in event of equipment failure.
        1.1.6. Valves schedule and flow diagram.
        1.1.7. Colour coding chart.
    1.2. Maintenance data to include:
        1.2.1. Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
        1.2.2. Data to include schedules of tasks, frequency, tools required and task time.
    1.3. Performance data to include:

1.3.1. Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

1.3.2. Equipment performance verification test results.

1.3.3. Special performance data as specified.

1.4. Additional data:

1.4.1. Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

1.5. Site records:

1.5.1. Consultant will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

1.5.2. Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

1.5.3. Use different colour waterproof ink for each service.

1.5.4. Make available for reference purposes and inspection.

1.6. As-built drawings:

1.6.1. Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

1.6.2. Submit to Consultant for approval and make corrections as directed.

1.6.3. Perform testing, adjusting and balancing for HVAC using as-built drawings.

1.6.4. Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

1.7. Submit copies of as-built drawings for inclusion in final TAB report.

Part 2 Products

2.1 Not used

1. Not used.

Part 3 Execution

3.1 Examination

1. Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for mechanical installation in accordance with manufacturer's written instructions.

1.1. Visually inspect substrate in presence of Consultant.

1.2. Inform Consultant of unacceptable conditions immediately upon discovery.

1.3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 Painting repairs and restoration

1. Prime and touch up marred finished paintwork to match original.

2. Restore to new condition, finishes which have been damaged.

3.3 System cleaning

1. Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.4 Field quality control

1. Manufacturer's Field Services:
   1.1. Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
   1.2. Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.5 Demonstration

1. Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
2. Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
3. Instruction duration time requirements as specified in appropriate sections.

3.6 Cleaning

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

3.7 Protection

1. Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

End of Section

Section 22 10 00
Plumbing Piping

Part 1 General

1.1 Section includes

1. Pipe, pipe fittings, valves, and connections for piping systems sanitary sewer, domestic water].

1.2 Reference standards

1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
3. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.
4. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
5. ASME B16.29 - Wrought Copper And Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
6. ASME B16.50 - Wrought Copper and Copper Alloy Braze-Joint Pressure Fittings.
7. ASME B31.1/B31.3 - Power Piping and Process Piping (Set).
8. ASME B31.2 - Fuel Gas Piping.
9. ASME B31.9 - Building Services Piping.
10. ASME Boiler and Pressure Vessels Code, Section I - Rules for Construction of Power Boilers.
11. ASME Boiler and Pressure Vessels Code, Section IV - Rules for Construction of Heating Boilers.
12. ASME Boiler and Pressure Vessel Code, Section IX - Welding and Brazing Qualifications.
13. ASTM A53/A53M-22 Standard specification for pipe, steel, black and hot-dipped, zinc-coated, welded and seamless
14. ASTM A74-21 Standard specification for cast iron soil pipe and fittings
15. ASTM A234/A234M-23a Standard specification for piping fittings of wrought carbon steel and alloy steel for moderate and high temperature service
16. ASTM A312/A312M-22a Standard specification for seamless, welded, and heavily cold worked austenitic stainless steel pipes
17. ASTM A774/A774M-14(2019) Standard specification for as-welded wrought austenitic stainless steel fittings for general corrosive service at low and moderate temperatures
18. ASTM B32-20 Standard specification for solder metal
19. ASTM B75/B75M-20 Standard specification for seamless copper tube
20. ASTM B88M-20 Standard specification for seamless copper water tube (metric)
21. ASTM B88-22 Standard specification for seamless copper water tube
22. ASTM B280-23 Standard specification for seamless copper tube for air conditioning and refrigeration field service
23. ASTM B306-20 Standard specification for copper drainage tube (DWV)
24. ASTM B837-19 Standard specification for seamless copper tube for natural gas and liquified petroleum (LP) gas fuel distribution systems
25. ASTM C14M-20 Standard specification for nonreinforced concrete sewer, storm drain, and culvert pipe (metric)

26. ASTM C14-20 Standard specification for nonreinforced concrete sewer, storm drain, and culvert pipe
27. ASTM C443M-21 Standard specification for joints for concrete pipe and manholes, using rubber gaskets (metric)
28. ASTM C443-21 Standard specification for joints for concrete pipe and manholes, using rubber gaskets
29. ASTM C564-20a Standard specification for rubber gaskets for cast iron soil pipe and fittings
30. ASTM C1053-00(2015) Standard specification for borosilicate glass pipe and fittings for drain, waste, and vent (DWV) applications (Withdrawn 2019)
31. ASTM D2235-22 Standard specification for solvent cement for acrylonitrile-butadiene-styrene (ABS) plastic pipe and fittings
32. ASTM D2241-20 Standard specification for poly(vinyl chloride) (PVC) pressure-rated pipe (SDR series)
33. ASTM D2464-23 Standard specification for threaded poly(vinyl chloride) (PVC) plastic pipe fittings, Schedule 80
34. ASTM D2513-20 Standard specification for polyethylene (PE) gas pressure pipe, tubing, and fittings
35. ASTM D2564-20 Standard specification for solvent cements for poly(vinyl chloride) (PVC) plastic piping systems
36. ASTM D2683-20 Standard specification for socket-type polyethylene fittings for outside diameter-controlled polyethylene pipe and tubing
37. ASTM D3138-21 Standard specification for solvent cements for transition joints between acrylonitrile-butadiene-styrene (ABS) and poly(vinyl chloride) (PVC) non-pressure piping components
38. ASTM E814-23a Standard test method for fire tests of penetration firestop systems
39. ASTM F708-92(2018)e1 Standard practice for design and installation of rigid pipe hangers
40. ASTM F1281-23a Standard specification for crosslinked polyethylene/aluminum/crosslinked polyethylene (PEX-AL-PEX) pressure pipe
41. ASTM G17-07(2020) Standard test method for penetration resistance of pipeline coatings (blunt rod)
42. Specification A5.8M/A5.8:2019 Specification for filler metals for brazing and braze welding
43. AWWA C105/A21.5-18 Polyethylene encasement for ductile-iron pipe systems
44. AWWA C651-14 Disinfecting water mains
45. CSA B70:19 Cast iron soil pipe, fittings, and means of joining
46. CSA B1800:21 Thermoplastic nonpressure piping compendium
47. CAN/ULC-S102.2 - Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.
48. ANSI Z21.22-2015/CSA 4.4:R2020 Relief valves for hot water supply systems
49. STD SP-110-2010 Ball valves threaded, socket-welding, solder joint, grooved and flared ends
50. STD SP-58-2018 Pipe hangers and supports - materials, design, manufacture, selection, application, and installation
51. STD SP-67-2022 Butterfly valves
52. STD SP-70-2011 Gray iron gate valves, flanged and threaded ends
53. STD SP-71-2018 Gray iron swing check valves, flanged and threaded ends
54. STD SP-78-2011 Gray iron plug valves, flanged and threaded ends
55. STD SP-80-2019 Bronze gate, globe, angle, and check valves
56. STD SP-85-2011 Gray iron globe and angle valves, flanged and threaded ends
57. NFPA 54/ANSI Z223.1 - National Fuel Gas Code.

58. NFPA 58 - Liquefied Petroleum Gas Code.
59. UL 1479 - Standard for Fire Tests of Through-Penetration Firestops.

1.3 Action submittals

1. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.

Part 2 Products

2.1 Description

1. Regulatory Requirements:
    1.1. Perform Work to applicable plumbing code.
    1.2. Conform to applicable code for installation of backflow prevention devices.
    1.3. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

2.2 Sanitary sewer piping, buried, inside building

1. Cast Iron Pipe: CAN/CSA-B70.
    1.1. Fittings: Cast iron, FSWW-P-401, hubless cast iron pipe fittings.
    1.2. Joints: ASTM C564, rubber or compression gaskets.
2. PVC Pipe: CAN/CSA-B1800, SDR 35 pipe.
    2.1. Fittings: ASTM D2468, ABS socket type, Schedule 40.
    2.2. Joints: ASTM D2564 solvent cement and primer.
3. Copper Tube: ASTM B306, DWV.
    3.1. Fittings: ASME B16.23, cast bronze.
    3.2. Joints: ASTM B32, soldered.

2.3 Domestic water piping, above ground

1. Copper Tubing: ASTM B88M, Type L, H (drawn) temper.
    1.1. Fittings: ASME B16.18 cast copper alloy.
    1.2. Joints: ASTM B32, soldered.

2.4 Flanges, unions, and couplings

1. Copper Tube and Pipe Size 75 mm and Under: Class 150 bronze unions with soldered joints.
2. Copper Tube and Pipe Size Over 25 mm: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.5 Pipe hangers and supports

1. Plumbing Piping - Drain, Waste, and Vent:

1.1. Conform to ASME B31.9.

1.2. Hangers for Pipe Sizes 13 to 38 mm: Malleable iron, adjustable swivel, split ring.

1.3. Hangers for Pipe Sizes 50 mm and Over: Carbon steel, adjustable, clevis.

1.4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

1.5. Wall Support for Pipe Sizes to 75 mm: Cast iron hook.

1.6. Wall Support for Pipe Sizes 100 mm and Over: Welded steel bracket and wrought steel clamp.

1.7. Vertical Support: Steel riser clamp.

1.8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

1.9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2. Plumbing Piping - Water:

2.1. Conform to ASME B31.9.

2.2. Hangers for Pipe Sizes 13 to 38 mm: Carbon steel, adjustable swivel, split ring.

2.3. Hangers for Cold Pipe Sizes 50 mm and Over: Carbon steel, adjustable, clevis.

2.4. Hangers for Hot Pipe Sizes 50 to 100 mm: Carbon steel, adjustable, clevis.

2.5. Hangers for Hot Pipe Sizes 150 mm and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.

2.6. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.

2.7. Multiple or Trapeze Hangers for Hot Pipe Sizes 150 mm and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.

2.8. Wall Support for Pipe Sizes to 75 mm: Cast iron hook.

2.9. Wall Support for Pipe Sizes 100 mm and Over: Welded steel bracket and wrought steel clamp.

2.10. Wall Support for Hot Pipe Sizes 150 mm and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.

2.11. Vertical Support: Steel riser clamp.

2.12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.13. Floor Support for Hot Pipe Sizes to 100 mm: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.

2.14. Floor Support for Hot Pipe Sizes 150 mm and Over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.

2.15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

Part 3 Execution

3.1 Examination

1. Section : Verify existing conditions before starting work.
2. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 Preparation

1. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
2. Remove scale and dirt, on inside and outside, before assembly.
3. Prepare piping connections to equipment with flanges or unions.

3.3 Installation

1. Install to manufacturer's written instructions.
2. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
3. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
4. Install piping to maintain headroom, conserve space, and not interfere with use of space.
5. Group piping whenever practical at common elevations.
6. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
7. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 31 13.
8. Install valves with stems upright or horizontal, not inverted.
9. Install water piping to ASME B31.9.

3.4 Application

1. Install unions downstream of valves and at equipment or apparatus connections.
2. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
3. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.5 Erection tolerances

1. Establish invert elevations, slopes for drainage to 1% minimum. Maintain gradients.
2. Slope water piping minimum 0.25% and arrange to drain at low points.

End of Section

Section 22 42 00
Commercial Plumbing Fixtures

Part 1 General

1.1 Section includes

1. Service sinks.

1.2 Related requirements

1. Section 07 92 00 - Joint Sealants: Seal fixtures to walls and floors.
2. Section 22 10 00 - Plumbing Piping.

1.3 Reference standards

1. ASME A112.6.1M - Floor Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use.
2. ASME A112.18.1-2012/CSA-B125.1-12 - Plumbing Supply Fittings.
3. ASME A112.19.1/CSA B45.2 - Enamelled Cast Iron and Enamelled Steel Plumbing Fixtures.
4. ASME A112.19.2/CSA-B45.1 - Ceramic Plumbing Fixtures. Includes Errata 10/2018.
5. ASME A112.19.3/CSA-B45.4 - Stainless Steel Plumbing Fixtures.
6. ASME A112.19.5-2017/CSA-B45.15-2017 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks.
7. STD Z124-2022 Plastic plumbing fixtures
8. ANSI/ISEA Z358.1-2014 American national standard for emergency eyewash and shower equipment
9. NFPA 70 - National Electrical Code (NEC).
10. CSA (Canadian Standards Association).
11. UL (Underwriters Laboratories Inc.).

1.4 Action submittals

1. Product Data: Provide catalogue illustrations of fixtures, sizes, rough-in dimensions, trim, utility sizes, finishes.

1.5 Informational submittals

1. Manufacturer's Instructions: Indicate installation methods and procedures.

1.6 Closeout submittals

1. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
2. Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.7 Delivery, storage, and handling

1. Accept fixtures on site in factory packaging. Inspect for damage.

2. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

Part 2 Products - Not Used

Part 3 Execution

3.1 Examination

1. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

3.2 Preparation

1. Rough-in fixture piping connections to minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 Installation

1. Install to manufacturer's written instructions.
2. Install each fixture with trap, easily removable for servicing and cleaning.
3. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
4. Install components level and plumb.
5. Install and secure fixtures in place with wall supports and bolt, washer, nut fasteners.
6. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, colour to match fixture.
7. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.4 Interface with other products

1. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 Adjusting

1. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 Cleaning

1. Clean plumbing fixtures and equipment.

3.7 Protection

1. Do not permit use of fixtures.

End of Section

Section 23 05 93
Testing, Adjusting, and Balancing for HVAC

Part 1 General

1.1 Section includes

1. Testing, adjustment, and balancing of air systems.
2. Measurement of final operating condition of HVAC systems.

1.2 Related requirements

1. Section 01 78 00 - Closeout Submittals:
   1.1. Starting of Systems.
   1.2. Testing, Adjusting, and Balancing of Systems.

1.3 Reference standards

1. National standards for total system balance
2. ADC 1062: GRD - Test Code for Grilles, Registers and Diffusers.
3. ASHRAE 111:2008 Testing, adjusting, and balancing of building HVAC systems (ANSI approved)
4. Procedural standard for testing adjusting and balancing of environmental systems

1.4 Administrative requirements

1. Section 01 31 00: Project management and coordination procedures.
2. Sequencing: Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.

1.5 Informational submittals

1. Section 01 33 00: Submission procedures.
2. Submit name of adjusting and balancing agency for approval within thirty (30) days after award of Contract.
3. Field Reports: Submit procedures for submitting Field Reports.
   3.1. Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   3.2. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.
   3.3. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Consultant and for inclusion in operating and maintenance manuals.
   3.4. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

3.5. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty prior to commencing system balance.

4. Test Reports: Indicate data on AABC National Standards for Total System Balance forms. Submit data in SI (metric) units.

1.6 Closeout submittals

1. Section 01 78 00: Submission procedures.
2. Record Documentation: Record actual locations of balancing valves and rough setting.

1.7 Quality assurance

1. Perform total system balance to AABC National Standards for Field Measurement and Instrumentation, Total System Balance.
2. Agency Qualifications: Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum three (3) years documented experience certified by AABC.
3. Perform Work under supervision of AABC Certified Test and Balance Engineer.

Part 2 Products - Not Used

Part 3 Execution

3.1 Examination

1. Section 01 71 00: Verify existing conditions before starting work.
2. Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance.
3. Beginning of work means acceptance of existing conditions.

3.2 Preparation

1. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Consultant to facilitate spot checks during testing.
2. Provide additional balancing devices as required.

3.3 Installation tolerances

1. Air Handling Systems: Adjust to within plus or minus 5% of design for supply systems and plus or minus 10% of design for return and exhaust systems.
2. Air Outlets and Inlets: Adjust total to within plus 10% and minus 5% of design to space. Adjust outlets and inlets in space to within plus or minus 10% of design.

3.4 Adjusting

1. Ensure recorded data represents actual measured or observed conditions.
2. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

3. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
4. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
5. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
6. Check and adjust systems approximately six months after final acceptance and submit report.

3.5 Air system procedure

1. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
2. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
3. Measure air quantities at air inlets and outlets.
4. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
5. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
6. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
7. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

End of Section

Section 23 37 00
Air Outlets and Inlets

Part 1 General

1.1 Section includes

1. Registers/grilles.

1.2 Reference standards

1. ADC 1062: GRD-84 - Test Code for Grilles, Registers and Diffusers.
2. STD 500-L-12 ANSI/AMCA Standard 500-L-12 Laboratory methods of testing louvers for rating
3. STD 500-D-18 ANSI/AMCA Standard 500-D-18 Laboratory methods of testing dampers for rating
4. STD 70:2006 Method of testing the performance of air outlets and air inlets (ANSI approved)
5. NFPA 90A -Standard for Installation of Air Conditioning and Ventilating Systems, 2018 Edition.
6. HVAC duct construction standards - metal and flexible

1.3 Action submittals

1. Section 01 33 00: Submission procedures.
2. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.4 Informational submittals

1. Installation Data: Manufacturer's special installation requirements.

1.5 Closeout submittals

1. Record Documentation: Record actual locations of air outlets and inlets.

Part 2 Products - Not Used

Part 3 Execution

3.1 Installation

1. Install to manufacturer's written instructions.
2. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
3. Install diffusers to duct work with air tight connection.
4. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

End of Section

Section 26 05 00
Common Work Results for Electrical

Part 1 General

1.1 Definitions

1. Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined byIEEE SP1122.

1.2 Reference standards

1. CSA Group
   1.1. CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.
   1.2. CAN/CSA-C22.3 No.1-10, Overhead Systems.
   1.3. CAN3-C235-83(R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
2. Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
   2.1. IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.
3. OESC-2021 - Ontario Electrical Safety Code, 28th Edition - 2021

1.3 Action and informational submittals

1. Product Data:
   1.1. Submit manufacturer's instructions, printed product literature and data sheets for equipment and include product characteristics, performance criteria, physical size, finish and limitations.
2. Submit for review single line electrical diagrams under plexiglass and locate as indicated.
   2.1. Electrical distribution system in main electrical room.
3. Submit for review fire alarm riser diagram, plan and zoning of building under plexiglass at fire alarm control panel and annunciator.
4. Shop drawings:
   4.1. Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
   4.2. Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
   4.3. Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
5. Certificates:
   5.1. Provide CSA certified equipment and material.
   5.2. Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction for special approval before delivery to site.
   5.3. Submit test results of installed electrical systems and instrumentation.
   5.4. Permits and fees: in accordance with General Conditions of contract.

5.5. Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.

5.6. Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Consultant.

6. Manufacturer's Field Reports: submit to Consultant manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 Closeout submittals

1. Operation and Maintenance Data: submit operation and maintenance data for equipment for incorporation into manual.

1.1. Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

1.2. Operating instructions to include following:

1.2.1. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

1.2.2. Start up, proper adjustment, operating, lubrication, and shutdown procedures.

1.2.3. Safety precautions.

1.2.4. Procedures to be followed in event of equipment failure.

1.2.5. Other items of instruction as recommended by manufacturer of each system or item of equipment.

1.3. Print or engrave operating instructions and frame under glass or in approved laminated plastic.

1.4. Post instructions where directed.

1.5. For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

1.6. Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

Part 2 Products

2.1 Design requirements

1. Operating voltages: to CAN3-C235
2. Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

2.1. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

3. Language operating requirements: provide identification nameplates and for control items in English.

2.2 Materials and equipment

1. Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.
2. Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
3. Factory assemble control panels and component assemblies.

2.3 Electric motors, equipment and controls

1. Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.
2. Control wiring and conduit: in accordance with Section 26 except for conduit, wiring and connections below 50 V which are related to control systems specified in mechanical sections.

2.4 Warning signs

1. Warning Signs: in accordance with requirements of authority having jurisdiction.
2. Decal signs, minimum size 175 x 250 mm.

2.5 Wiring terminations

1. Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.6 Finishes

1. Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

Part 3 Execution

3.1 Examination

1. Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for the installation in accordance with manufacturer's written instructions.
   1.1. Visually inspect substrate in presence of Consultant.
   1.2. Inform Consultant of unacceptable conditions immediately upon discovery.
   1.3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 Installation

1. Do complete installation in accordance with CSA C22.1 except where specified otherwise
2. Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise

3.3 Nameplates and labels

1. Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed

3.4 Mounting heights

1. Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
2. If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3.5 Co-ordination of protective devices

1. Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.6 Cleaning

1. Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

   1.1. Leave Work area clean at end of each day.

2. Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

End of Section

Section 26 05 33.16
Boxes for Electrical Systems

Part 1 General

1.1 Section includes

1. Wall and ceiling outlet boxes.

1.2 Related requirements

1. Section 26 27 26 - Wiring Devices: Wall plates in finished areas floor box service fittings.

1.3 Reference standards

1. CSA C22.1:24 Canadian electrical code, Part I (26th edition), safety standard for electrical installations
2. STD C22.2 NO. 18.1-13 Metallic outlet boxes (Tri-national standard, with UL 514A and ANCE NMX- J-023/1)
3. CSA C22.2 NO. 85:14 Rigid PVC boxes and fittings
4. CSA (Canadian Standards Association).
5. UL (Underwriters Laboratories Inc.).
6. OESC-2021 - Ontario Electrical Safety Code, 28th Edition - 2021

1.4 Administrative requirements

1. Section 01 31 00: Project management and coordination procedures.
2. Coordination:
    2.1. Coordinate with other work having a direct bearing on work of this section.
    2.2. Coordinate installation of outlet box for equipment connected under Section 26 05 83.

1.5 Closeout submittals

1. Record Documentation: Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

Part 2 Products

2.1 Description

1. Regulatory Requirements:
    1.1. Provide products listed and classified by CSA as suitable for the purpose specified and indicated.

2.2 Outlet boxes

1. Sheet Metal Outlet Boxes: CSA-C22.2 No. 18.1, galvanized steel.
    1.1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.

1.2. Concrete Ceiling Boxes: Concrete type.

2. Non-metallic Outlet Boxes: CSA-C22.2 No. 85 .
3. Cast Boxes: CSA-C22.2 No. 18.1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.
4. Wall Plates for Finished Areas: As specified in Section 26 27 26.

Part 3 Execution

3.1 Installation

1. Install boxes to OESC-21.
2. Install in locations as shown on drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
3. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
4. Electrical boxes are shown on drawings in approximate locations unless dimensioned. Adjust box location up to 3 m if required to accommodate intended purpose.
5. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.
6. Maintain headroom and present neat mechanical appearance.
7. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
8. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
9. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
10. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
11. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
12. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
13. Use flush mounting outlet box in finished areas.
14. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
15. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.
16. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
17. Use stamped steel bridges to fasten flush mounting outlet box between studs.
18. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
19. Use adjustable steel channel fasteners for hung ceiling outlet box.
20. Do not fasten boxes to ceiling support wires.
21. Support boxes independently of conduit.
22. Use gang box where more than one device is mounted together. Do not use sectional box.
23. Use gang box with plaster ring for single device outlets.
24. Use cast outlet box in exterior locations exposed to the weather and wet locations.

25. Set floor boxes level.
26. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

3.2 Adjusting

1. Adjust floor box flush with finish flooring material.
2. Adjust flush-mounting outlets to make front flush with finished wall material.
3. Install knockout closures in unused box openings.

3.3 Cleaning

1. Section 01 74 10: Cleaning installed work.
2. Clean interior of boxes to remove dust, debris, and other material.
3. Clean exposed surfaces and restore finish.

End of Section

Section 26 05 33.23
Surface raceways for Electrical Systems

Part 1 General

1.1 Section includes

1. Surface metal raceways.

1.2 Reference standards

1. CSA C22.1:24 Canadian electrical code, Part I (26th edition), safety standard for electrical installations
2. CSA C22.2 NO. 62-93 Surface raceway systems
3. CSA C22.2 NO. 62.1:15 Nonmetallic surface raceways and fittings (Bi-national standard with UL 5A)
4. CSA (Canadian Standards Association).
5. UL (Underwriters Laboratories Inc.).
6. OESC-2021 - Ontario Electrical Safety Code, 28th Edition - 2021

1.3 Action submittals

1. Section 01 33 00: Submission procedures.
2. Product Data: Provide dimensions, knockout sizes and locations, materials, fabrication details, finishes, and accessories.

1.4 Informational submittals

1. Installation Data: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

Part 2 Products

2.1 Description

1. Regulatory Requirements:
   1.1. Provide products listed and classified by CSA as suitable for purpose specified and shown.

2.2 Surface metal raceway

1. Description: Sheet metal channel with fitted cover, suitable for use as surface metal raceway.
2. Fittings, Boxes, and Extension Rings: Provide manufacturer's standard accessories.

Part 3 Execution

3.1 Installation

1. Install products to manufacturer's written instructions.

2. Use flat head screws, clips, and straps to fasten raceway channel to surfaces. Mount plumb and level.
3. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.

End of Section

Section 26 05 83
Wiring Connections

Part 1 General

1.1 Section includes

1. Electrical connections to equipment specified under other sections.

1.2 Reference standards

1. CSA C22.1:24 Canadian electrical code, Part I (26th edition), safety standard for electrical installations
2. ANSI/NEMA WD 6-2021 Wiring devices - dimensional specifications
3. NEMA WD 1-1999 General color requirements for wiring devices
4. NFPA 70 - National Electrical Code (NEC).
5. CSA (Canadian Standards Association).
6. UL (Underwriters Laboratories Inc.).
7. OESC-2021 - Ontario Electrical Safety Code, 28th Edition - 2021

1.3 Administrative requirements

1. Coordination:
    1.1. Coordinate with other work having a direct bearing on work of this section.
    1.2. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment provided under other sections.
    1.3. Determine connection locations and requirements.
2. Sequencing:
    2.1. Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.
    2.2. Sequence electrical connections to coordinate with start-up schedule for equipment.

1.4 Action submittals

1. Product Data: Provide wiring device manufacturer's catalogue information showing dimensions, configurations, and construction.

1.5 Informational submittals

1. Installation Data: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

Part 2 Products

2.1 Description

1. Regulatory Requirements:

1.1. Provide products listed and classified by CSA as suitable for purpose specified and shown.

Part 3 Execution

3.1 Examination

1. Section 01 71 00: Verify existing conditions before starting work.
2. Verify that equipment is ready for electrical connection, wiring, and energization.

3.2 Electrical connections

1. Make electrical connections to equipment manufacturer's written instructions.
2. Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit with watertight connectors in damp or wet locations.
3. Make wiring connections using wire and cable with insulation suitable for temperatures encountered in heat producing equipment.
4. Provide receptacle outlet where connection with attachment plug is indicated. Provide cord and cap where field-supplied attachment plug is indicated.
5. Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
6. Install disconnect switches, controllers, control stations, and control devices as indicated.
7. Modify equipment control wiring with terminal block jumpers as indicated.
8. Provide interconnecting conduit and wiring between devices and equipment where indicated.
9. Coolers and Freezers: Cut and seal conduit openings in freezer and cooler walls, floor, and ceilings.

End of Section

Section 26 27 26
Wiring Devices

Part 1 General

1.1 Section includes

1. Wall switches.
2. Receptacles.
3. Device plates and decorative box covers.

1.2 Related requirements

1. Section 26 05 33.16 - Boxes.

1.3 Reference standards

1. CSA C22.1:24 Canadian electrical code, Part I (26th edition), safety standard for electrical installations
2. CSA C22.2 NO. 42:10 General use receptacles, attachment plugs, and similar wiring devices
3. CSA C22.2 NO. 42.1:13 Cover plates for flush-mounted wiring devices (Bi-national standard, with UL 514D)
4. CSA C22.2 NO. 55:15 Special use switches
5. CAN/CSA C22.2 NO. 111-18 General-use snap switches (Trinational standard with UL 20 and NMX-J-005-ANCE)
6. CSA C22.2 NO. 184.1:15 Solid-state dimming controls (Bi-national standard with UL 1472)
7. CSA (Canadian Standards Association).
8. UL (Underwriters Laboratories Inc.).
9. OESC-2021 - Ontario Electrical Safety Code, 28th Edition - 2021

1.4 Action submittals

1. Product Data: Provide manufacturer's catalogue information showing dimensions, colours, and configurations.

1.5 Informational submittals

1. Installation Data: Submit manufacturer's installation instructions.

Part 2 Products

2.1 Description

1. Regulatory Requirements:
    1.1. Provide products listed and classified by CSA as suitable for the purpose specified and indicated.

2.2 Wall switches

1. Manufacturers:

1.1. Hubbell

1.2. Leviton

1.3. Legrand

2. Description: CSA-C22.2 No. 111, Heavy-Duty, AC only general-use snap switch.
3. Body and Handle: while plastic with rocker handle.
4. Ratings: Match branch circuit and load characteristics.

2.3 Receptacles

1. Manufacturers:

1.1. Hubbell

1.2. Leviton

1.3. Legrand

2. Description: CSA-C22.2 No. 42, Heavy-Duty general use receptacle.
3. Device Body: white plastic, unless otherwise indicated.
4. Configuration: Type as specified and indicated.
5. Convenience Receptacle: Type 5-20.
6. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

2.4 Wall plates

1. As indicated. Where not indicated, brushed stainless steel.

Part 3 Execution

3.1 Examination

1. Section 01 71 00: Verify existing conditions before starting work.
2. Verify that outlet boxes are installed at proper height.
3. Verify that wall openings are neatly cut and will be completely covered by wall plates.
4. Verify that floor boxes are adjusted properly.
5. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
6. Verify that openings in access floor are in proper locations.

3.2 Preparation

1. Provide extension rings to bring outlet boxes flush with finished surface.
2. Clean debris from outlet boxes.

3.3 Installation

1. Install to OESC-21.
2. Install devices plumb and level.

3. Install switches with OFF position down.
4. Install wall dimmers to achieve full rating specified and indicated after de-rating for ganging as instructed by manufacturer.
5. Do not share neutral conductor on load side of dimmers.
6. Install receptacles with grounding pole on bottom.
7. Connect wiring device grounding terminal to device box and branch circuit bonding conductor.
8. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
9. Connect wiring devices by wrapping conductor around screw terminal.
10. Use jumbo size plates for outlets installed in masonry walls.
11. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
12. Install protective rings on active flush cover service fittings.

3.4 Field quality control

1. Inspection and Testing:
    1.1. Inspect each wiring device for defects.
    1.2. Operate each wall switch with circuit energized and verify proper operation.
    1.3. Verify that each receptacle device is energized.
    1.4. Test each receptacle device for proper polarity.
    1.5. Test each GFCI receptacle device for proper operation.

3.5 Adjusting

1. Adjust devices and wall plates to be flush and level.

3.6 Cleaning

1. Clean exposed surfaces to remove splatters and restore finish.

End of Section

Section 26 51 13
Interior Lighting

Part 1 General

1.1 Section includes

1. Interior luminaires and accessories.
2. Lighting controls.

1.2 Reference standards

1. CSA C22.1:21 Canadian electrical code, Part I (25th edition), safety standard for electrical installations
2. STD C22.2 NO. 9.0-96 General requirements for luminaires
3. CSA C22.2 NO. 141:15 Emergency lighting equipment
4. CSA C22.2 NO. 250.0:21 Luminaires (Trinational standard with UL 1598 and NMX-J-307/1-ANCE)
5. CAN/CSA E920-98 Ballasts for tubular fluorescent lamps - general and safety requirements (Adopted IEC 920:1990, first edition, including Amendment 1:1993 and Amendment 2:1995, with Canadian deviations)
6. CAN/CSA E61347-2-3A-03 Amendment 1:2005 to CAN/CSA-E61347-2-3-03, lamp controlgear - Particular requirements for A.C. applied electronic ballasts for fluorescent lamps (adopted amendment 1:2004 to CEI/IEC 61347-2-3:2000)
7. NEMA WD 6-2016 Wiring devices - dimensional specifications
8. STD C78.379:2006 Electric lamps - classification of the beam patterns of reflector lamps
9. CSA (Canadian Standards Association).
10. OESC-2021 - Ontario Electrical Safety Code, 28th Edition - 2021

1.3 Action submittals

1. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
2. Product Data: Provide dimensions, ratings, and performance data.

1.4 Informational submittals

1. Installation Data: Submit data indicating application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.5 Closeout submittals

1. Operation and Maintenance Data: Submit manufacturer's operation and maintenance instructions for each product.

1.6 Quality assurance

1. Products of This Section: Manufactured to ISO 9000 certification requirements.

2. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

Part 2 Products

2.1 Description

1. Regulatory Requirements:
   1.1. Conform to requirements of CSA-C22.1.
   1.2. Products: Listed and classified by CSA as suitable for the purpose specified and indicated.

2.2 Luminaires

1. As indicated.

Part 3 Execution

3.1 Installation

1. Install luminaires to manufacturers instructions
2. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
3. Install accessories provided with each luminaire.
4. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
5. Bond products and metal accessories to branch circuit equipment grounding conductor.

3.2 Cleaning

1. Clean electrical parts to remove conductive and deleterious materials.
2. Remove dirt and debris from enclosures.
3. Clean photometric control surfaces as recommended by manufacturer.
4. Clean finishes and touch up damage.

3.3 Closeout activities

1. Demonstration: Demonstrate luminaire operation for minimum two (2) hours.

End of Section