HWDSB

P01957 Hill Park Learning Centre Boiler Room Renovation and HVAC Upgrades

465 East 16th Street, Hamilton, ON

AMRA J
ARCHITECTS INC.

Pages

INTRODUCTORY INFORMATION

Hamilton Wentworth District School Board – Front End Documents

Division 01 – General Requirements

.

Division 02 – Existing Conditions

Division 03 – Concrete

Division 04 – Masonry

Division 08 – Metal

Division 09 – Finishes

Commissioning – CFMS WEST Consulting Inc.

Pages

Appendix A

DRAWINGS

END OF THIS SECTION

1. Designated Substance Audit Report

1. A copy of the following report with respect to the identified portion of the Work is being made available as part of the Bid Documents; files titled as follows:

.1 Titled: Hill Park Learning Center

Boiler Room Renovation and HVAC Upgrades

Prepared by: Premier Environmental Services Inc.

File No.: 22074.CE Task 4

Dated: FEBRUARY 27, 2025

No. of Pages: 37

.2 Abatement Specifications (#pages 33)

3. These reports provide detailed descriptions of the assessment criteria, findings, recommendations and limitations with respect to toxic or hazardous materials present at the identified property.

4. The reports, by their nature, cannot reveal all conditions that exist or can occur. Should conditions, in the opinion of the Consultant, be found to vary substantially from the report, changes in the scope of Work will be made, with resulting credits or expenditures to the Contract Price accruing to the Owner.

5. *HWDSB Construction School Specific Information Sheet*

1. Refer to attached HWDSB Appendix A instructions and information sample sheet, of construction site specific protocols the contractor will be required to follow. (6 pages)

End of Section

PREMIER
ENVIRONMENTAL SERVICES

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www.premiercorp.ca

February 27, 2025

Premier Project Number: 622074.CE Task 4
HWDSB Project Number: PO1957

Sent via e-mail: jmccardle@hwdsb.on.ca

Hamilton-Wentworth District School Board
20 Education Court, P.O. Box 2558
Hamilton, ON
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Attention: Jil McCardle
Project Supervisor, Capital Projects

RE: PO1957 – DESIGNATED SUBSTANCES SURVEY
HILL PARK LEARNING CENTRE HVAC RENOVATION
465 EAST 16TH STREET, HAMILTON, ONTARIO

1.0 INTRODUCTION

Premier Environmental Services Inc. (Premier) was retained by the Hamilton-Wentworth District School Board (HWDSB) to conduct a Designated Substances Survey (DSS) of project-specific work areas at the Hill Park Learning Centre, located at 465 East 16th Street in Hamilton, Ontario (the Site). We understand that this assessment work is required for regulatory compliance purposes as part of the pending redesign of the HVAC boiler system and domestic hot water systems project (the Project).

The planned Project includes the replacement of the existing boilers, domestic hot water heaters and associated infrastructure located throughout the entire school. The work area (Survey Area) is as depicted on Figures 1, 2, and 3. Photographs taken at the Site are presented in Appendix B.

Premier conducted the DSS at the Site on January 15 and 16, 2025. The DSS work was conducted in accordance with the DSS requirements outlined under Ontario Regulation 490/09, Designated Substances of the Ontario Occupational Health and Safety Act (OHSA) and Ontario Regulation 278/05, Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations (O. Reg. 278/05).

The following substances have been "designated" under O. Reg. 490/09: acrylonitrile, arsenic, asbestos, benzene, coke oven emissions, ethylene oxide, isocyanates, lead, mercury, silica, and vinyl chloride. Four (4) of these eleven (11) substances may be encountered in structures such as those found on the Site and include:

- Asbestos in building materials;
- Lead in surface coatings, batteries, and in solder used in joints of copper pipe;
- Mercury in thermometers, thermostats, pressure gauges, electrical switches and relays; and
- Silica in brick, ceramic, concrete, masonry, and stone.

Premier also inspected accessible areas of the Survey Area for visible evidence of the following hazardous materials:

- Benzene;
- Polychlorinated biphenyls (PCBs);
- Ozone-depleting substances (ODS);
- Urea formaldehyde foam insulation (UFFI);
- Mould impacted building materials;
- Bulk chemical storage; and
- Radioactive materials.

PCBs are regulated under federal regulations of the Canadian Environmental Protection Act. These are commonly found in electrical equipment such as transformers and light ballasts.

Under Section 30 (1) of the OHSA the owner shall determine whether any designated substances are present at the project site. If present, a list of these substances must be compiled and provided to all bidders at the tendering stage prior to demolishing or renovating a building. A DSS identifies the designated substances present, their locations, concentrations, and approximate quantities. This information allows contractors involved in demolition or renovation activities to take the appropriate steps in controlling the exposure of workers and the general public to the designated substances that are present.

During the DSS, Premier staff typically collect representative samples of any potential asbestos-containing materials (ACMs) and lead surface coatings (if found) for laboratory analysis. Premier also made observations of any potential designated and/or hazardous substances, including mercury, silica, benzene, PCBs, ODS, UFFI, mould impacted building materials, bulk chemical storage, and radioactive materials for the purpose of identifying additional substances which may be considered hazardous.

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2.0 SITE REVIEW

At the request of the HWDSB, Premier completed a visual review for designated substances. Mr. Jason Garrett of Premier visited the Survey Area, prior to the school opening, on January 15 and 16, 2025.

2.1 Site Description

The Hill Park Learning Centre was first constructed in 1955 and has undergone many renovations and expansions. The two-storey brick building operated as a secondary school until its closure in 2012 where it was repurposed as an adult education centre.

2.2 Previous Reports

Premier previously completed one (1) separate DSS and one (1) Asbestos Inventory within the Site building to support previous projects:

- "PO1820 – Designated Substance Survey Roof Replace – Hill Park Secondary School 465 E 16th Street, Hamilton, Ontario", dated February 13, 2023. Prepared by Premier; and
- "Hill Park Secondary Asbestos Inventory Updated Jan. 2024" dated January 2024. Prepared by Regulated Substances Team – HWDSB.

The work area for this Project does not overlap with the work area for the previous projects surveyed. All suspected ACM tested previously were found to be negative for asbestos.

Premier noted the locations of ACMs identified in the Asbestos Inventory updated in January 2024. No suspected ACM samples were collected from material already identified as ACMs in the Asbestos Inventory report.

3.0 ASBESTOS

Asbestos use, maintenance, and removal within buildings is regulated under O. Reg. 278/05 of the *Occupational Health and Safety Act* which outlines requirements relating to the definition of asbestos, air quality, asbestos bulk sampling, asbestos management, and asbestos removal.

Minimum bulk sample requirements are specified in Table 1 of O. Reg. 278/05. As per O. Reg. 278/05, the definition of an ACM is a material containing 0.5% or more of asbestos by dry weight. The regulation also sets out requirements for asbestos abatement.

When conducting a DSS, certain materials are considered to be asbestos without verification by bulk sampling. This assumption is undertaken for one or more of the following reasons:

- The material is considered to be homogeneous (same texture, age and colour) as a material that was previously sampled, or the material is visually identifiable as asbestos;

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- The material is inaccessible and generally known or suspected to be present;
- There is an inherent danger in sampling the material (e.g., energized equipment);
- Sampling the material would cause significant damage to a mechanical component (e.g., Transite piping);
- Sampling the material would cause significant damage to a structural component or breach a water barrier; and
- Time constraints or access restrictions (i.e., interpolating the presence of a material to inaccessible units/spaces in a building or inside a boiler).

Therefore, for the purpose of this Survey, the following materials are assumed to contain asbestos, if encountered, and are not considered to be within the Project area:

- Transite Piping;
- Fire stop; and
- High voltage wiring.

3.1 Asbestos Laboratory Results

Materials suspected of containing asbestos were delineated in each respective homogenous area for sampling. A total of twenty-two (22) bulk samples of potential ACMs were collected and submitted to Paracel Laboratories Limited (Paracel) on January 16th, 2025 for Polarized Light Microscopy (PLM) analysis. Upon completion of the analyses, Paracel provided Premier with the laboratory results. Table 1 in Appendix C presents the results of the laboratory bulk asbestos analysis, and a copy of the laboratory certificate of analysis is provided in Appendix D.

Floor Plans depicting the bulk sampling locations are presented as Figures 1, 2, and 3 in Appendix A.

The following provides a brief summary of all suspect ACMs identified, examined, and sampled on the Site:

- White drywall plaster located in rooms 1024 and 1050B (PL1 1-3);
- 9" x 9" floor tile, cream with brown streaks located in front of the east stage fire exit (FT1 1-3);
- 9" x 9" floor tile, beige with maroon located in the 2nd floor hallway (FT2 1-3);
- 9" x 9" floor tile, brown/grey located in the storage room from room 2013 (FT3 1-3);
- Grey spray foam insulation located in rooms 2009 and 2018 (SF1 1-3); and
- Grey cinderblock mortar located in room 1026E, 1024 and the 1st and 2nd floor hallways (MTR1 1-5).

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The laboratory results indicate that beige and maroon 9" x 9" floor tiles (FT2 1-3) collected from the 2nd floor hallway and the brown/grey 9" x 9" floor tiles (FT3 1-3) collected from storage room from room 2013 were both found to contain 2% Chrysotile. These tiles are therefore considered an ACMs. Both tiles appeared to be in generally good condition.

All other suspected ACM samples collected tested negative for asbestos and are not considered to be ACM.

Insulated pipes observed in the boiler room appeared to contain fibreglass insulation. Cream 2' x 4' acoustic ceiling tiles appeared to be manufactured in 2004 or 2017 and are therefore considered not to be asbestos-containing.

It should be noted that ACMs (such as transite ceiling tiles) already described in the Asbestos Inventory updated in January 2024, were noted during Premier's visual review but were not sampled.

Three (3) boilers are present in the boiler room which includes: one (1) large primary boiler which was installed in 2001; one (1) large, decommissioned boiler which is no longer in use; and one (1) auxiliary boiler which was installed at approximately the same time as the primary boiler. The 2024 Asbestos Inventory reported that the decommissioned boiler, as containing ACM and/or silica, with analytical result from the boiler door rope gasket and the boiler shield insulation containing 80% and 70% chrysotile respectively. The remaining boilers installed in 2001 are unlikely to contain ACMs based on their reported date of installation.

4.0 LEAD

The Surface Coating Materials Regulations (SOR/2016-193) under the Canada Consumer Product Safety Act limits the amount of lead in surface coating materials to 0.009% by dry weight. O. Reg. 490/09 also provides a time weighted average occupational exposure limit of 0.05 mg/m^3 for airborne lead. This regulation also sets out the requirements for respiratory protection and a lead control program.

The Ministry of Labour, Immigration, Training and Skills Development (MOL) Guideline for *Lead on Construction Projects* (April 2011) and the Environmental Abatement Council of Canada (EACC) *Lead Guideline for Construction, Renovation, Maintenance or Repair* (October 2014) provide additional guidance for controlling exposure to lead. These guidance documents should be referenced by employers and construction managers prior to initiating any work involving lead surface coatings.

The EACC Guidance document defines lead-containing paints and surface coatings as those containing greater than 0.1% (or 1,000 ppm) lead. Lead-based paints and surface coatings are those that contain greater than 0.5% (or 5,000 ppm) lead.

A lead content of 0.1 % (or 1,000 ppm) or less is considered a de minimis (virtually safe) level of lead in paint or surface coatings, provided that aggressive disturbance or heating does not occur. Construction operations involving lead-based paints or surface coatings should always

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be completed in accordance with the procedures listed in the EACC guidance document that corresponds to the appropriate classification of work operation.

Premier identified four (4) suspect paints within the Survey Area which may be affected by the planned Project. The following samples were collected and analyzed for laboratory analysis by atomic absorption spectroscopy (AAS):

- Light blue wall paint located on the walls of the boiler room (PT1);
- White wall paint located on the walls of the boiler (PT2);
- White wall paint located on the walls of room 1024 (PT3); and
- Turquoise wall paint located on the walls of the storage room for room 2015 (PT4).

The laboratory results indicated that lead was detected at a concentration of 1.06% in paint sample PT1 and 0.23% for paint sample PT2, therefore indicating that these paints are considered to be lead-based and lead-containing, respectively. All other tested paint samples (PT3 and PT4) were found to have lead concentration <0.1% and are therefore not considered lead-containing.

Table 2 in Appendix C presents the results of the laboratory lead testing on the paint sample collected from the Survey Area. A copy of the laboratory certificate of analysis is provided in Appendix D.

Lead is likely present in the batteries associated with the emergency generators, emergency lighting batteries, and may be present in the solder used in joints of the copper pipes within the on-Site building. None of these materials are likely to be affected during the planned Project.

5.0 BENZENE

No potential sources of benzene were observed during a visual review of the Survey Area.

6.0 MERCURY

The light bulbs located throughout the on-Site building are considered to be mercury-containing until proven otherwise. Mercury vapour is still present in many light bulbs manufactured today. If the Project work requires these materials to be disturbed, proper removal and disposal methods must be used, which include removing the bulbs intact and transporting them to a recycling facility that accepts mercury bulbs. Best Management Practices for this may be found in the Code of Practice for the Environmentally Sound Management of End-of-life Lamps Containing Mercury, published by Environment and Climate Change Canada in February 2017.

No other potential sources of mercury were observed within the Survey Area.

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7.0 SILICA

Brick, concrete, concrete block, and mortar used in the construction of the on-Site building are assumed to contain silica. No other assumed or potential sources of silica were observed during the visual review of the Survey Area.

8.0 PCBs

No potential sources of PCBs were observed within the Survey Area.

9.0 MOULD

No evidence of mould growth was observed within the Survey Area.

10.0 OZONE DEPLETING SUBSTANCES (ODS)

No potential sources of ODS that would be affected by the proposed undertaking were observed within the Survey Area.

11.0 UREA FORMALDEHYDE FOAM INSULATION (UFFI)

Urea Formaldehyde Foam Insulation (UFFI) is composed of a mixture of urea-formaldehyde resin, a foaming agent, and compressed air. It was used by injecting foam into exterior wood frame and masonry walls in order to insulate difficult to reach cavities. It was primarily in use in residential construction from 1975 to 1978, though it was in-use in commercial and industrial developments to a lesser degree. During the mixing and curing of the insulation, as well as during its eventual deterioration, quantities of formaldehyde gas would be released into the air causing accumulation within the building. UFFI was banned in Canada in December 1980 as a precautionary measure to evaluate health concerns due to the off gassing of the formaldehyde gas. Recent studies performed in structures containing UFFI reported non-significant levels of interior formaldehyde gas.

UFFI is not suspected to be present within the Survey Area.

12.0 BULK CHEMICAL STORAGE

No evidence of bulk chemical storage was observed within the Survey Area. Minor amounts of solvent and paints in manufacturer-supplied containers were stored within the Maintenance Shop area.

13.0 RADIOACTIVE MATERIALS

No potential sources of radioactive materials were observed within the Survey Area.

14.0 SUMMARY

Based on the findings of this DSS, the following may be concluded:

- Laboratory results indicated that the beige and maroon 9” x 9” floor tiles (FT2 1-3) collected from the 2nd floor hallway and the brown/grey 9” x 9” floor tiles (FT3 1-3) collected from storage room from room 2013, were both found to contain 2%

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Chrysotile. These tiles are therefore considered an ACMs. Both tiles appeared to be in generally good condition;

- Laboratory results indicated that lead was detected at a concentration of 1.06% in paint sample PT1 (light blue wall paint) and 0.23% for paint sample PT2 (white), therefore indicating that these paints are considered to be lead-based and lead-containing, respectively;
- Lead is likely present in the emergency generator batteries, emergency lighting batteries located throughout the Site and may also be present in the solder used in joints of the copper pipes;
- Light bulbs used throughout the building are considered to contain mercury; and
- Brick, concrete, concrete block, and mortar used in the construction of the on-Site building are assumed to contain silica.

15.0 RECOMMENDATIONS

Based on the results of this DSS, the following measures are recommended at the Site:

- The decommissioned boiler is suspected to contain ACMs and/or silica will require removal under a Type 3 abatement procedure in accordance with O. Reg. 278/05 prior to any disturbance (e.g., drilling, cutting, hammering, etc.);
- ACM floor tiles FT2 and FT3 will require removal under a Type 1 abatement procedure in accordance with O. Reg. 278/05 prior to any disturbance (e.g., drilling, cutting, hammering, etc.);
- The light blue lead-based paint (PT1) lead-based wall paint and white lead-containing paint (PT2) located on the walls of the boiler room will require a Type 1 abatement, following EACC guidelines prior to any disturbance (e.g., drilling, cutting, hammering, etc.);
- The Project will likely involve demolition and repair of concrete materials with the removal of the boilers. In which case, a qualified contractor must control renovation activities in accordance with the MOL guideline Silica on Construction Projects (April 2011). Recycling of silica-based materials removed from any work areas should be conducted in accordance with Ontario Regulation 102/94 and Ontario Regulation 103/94 under the Ontario Environmental Protection Act;
- It is not anticipated that this Project will involve the removal of any light fixtures; however, if this is not the case, any mercury-containing light fixtures within the renovation/demolition areas should be disposed of in a safe manner keeping the bulbs intact. The materials should also be shipped off-site for disposal as hazardous waste or to be recycled;

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- Any decommissioning of plumbing, electrical equipment, fire systems, etc. must be completed by those respective trades. As such, they will be properly trained in the safe handling and disposal of any associated chemicals, products and materials; and
- Monitoring during any abatement activities, demolition and/or renovation work should be conducted by a qualified engineering firm.

16.0 CLOSURE

The use of this report is subject to the Statement of Limitations presented in Appendix E of this report. The reader's attention is specifically drawn to the Statement of Limitations as it is considered essential that they be followed for the proper use and interpretation of this report.

If you have any questions regarding this report, please contact the undersigned.

Sincerely,

Premier Environmental Services Inc.

Jason Garrett, M.Sc.
Environmental Scientist

Troy Jones, BA, CRSP
Manager of Canadian Operations

Attachments (5):
Appendix A – Figures
Appendix B – Photographic Log
Appendix C – Tables
Appendix D – Certificate of Analysis
Appendix E – Statement of Limitations

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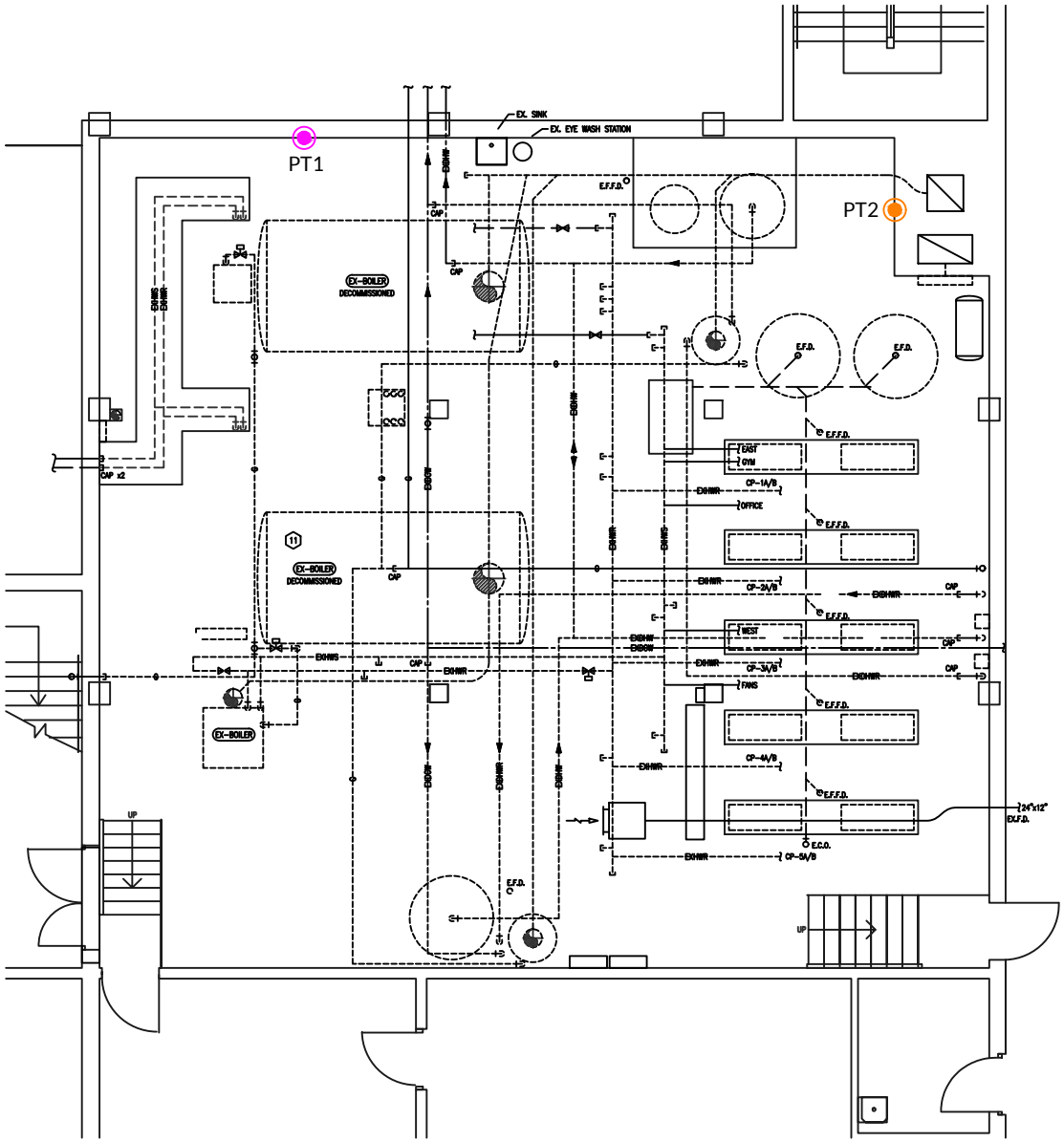
APPENDIX A – Figures



LEGEND

- PAINT SAMPLE TESTED POSITIVE FOR LEAD-BASED PAINT
- PAINT SAMPLE TESTED POSITIVE FOR LEAD-CONTAINING PAINT

REFERENCE: ARC ENGINEERING INC., HILL PARK LEARNING CENTRE - HVAC AND PLUMBING UPGRADES. 465 EAST 16TH STREET, HAMILTON, ONTARIO. PROJECT NO.: 24-127-110. BOILER ROOM UPGRADES - DEMOLITION . DRAWING NO.: M-300. ISSUED FOR 70% COMPLETE NOV 29, 2024.

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NOTE: LOCATIONS OF BUILDINGS, UNDERGROUND UTILITIES, ETC. ARE FOR REFERENCE ONLY AND SHOULD NOT BE RELIED UPON FOR DETAILED DESIGN, EXCAVATION, OR CONSTRUCTION PURPOSES

CLIENT: HWDSB

SITE: 465 EAST 16TH STREET, HAMILTON, ONTARIO

TITLE: BOILER ROOM SHOWING SAMPLE LOCATIONS

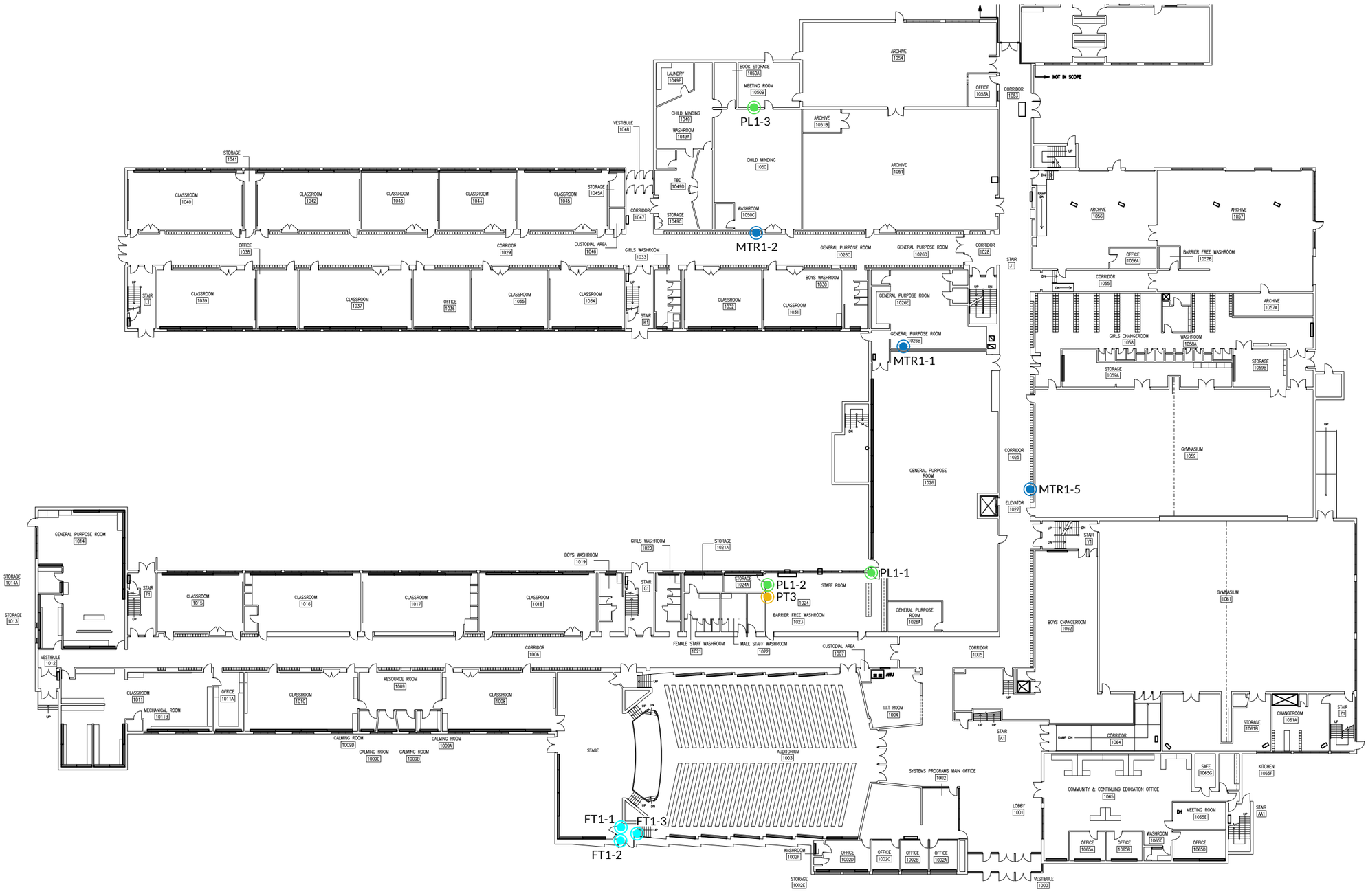
DATE: FEB 2025

SCALE: NTS

PROJECT: 622074.CE TASK 4

FIGURE: 1

FILE EXTENSION: P:\2022 Projects\Cambridge\622074.CE-HWDSB-DSS-Hill Park & Glendale, Hamilton, ON\!AutoCAD\622074.CE.dwg



LEGEND

- MORTAR SAMPLE TESTED NEGATIVE FOR ASBESTOS
- PLASTER SAMPLE TESTED NEGATIVE FOR ASBESTOS
- VINYL FLOOR TILE SAMPLE TESTED NEGATIVE FOR ASBESTOS
- PAINT SAMPLE TESTED NEGATIVE FOR LEAD-CONTAINING PAINT

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REFERENCE: ARC ENGINEERING INC., HILL PARK LEARNING CENTRE - HVAC AND PLUMBING UPGRADES. 465 EAST 16TH STREET, HAMILTON, ONTARIO. PROJECT NO.: 24-127-110. GROUND FLOOR MECHANICAL - DEMOLITION . DRAWING NO.: M-301. ISSUED FOR 70% COMPLETE NOV 29, 2024.

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CLIENT: HWDSB

SITE: 465 EAST 16TH STREET, HAMILTON, ONTARIO

TITLE: GROUND FLOOR SAMPLE LOCATIONS

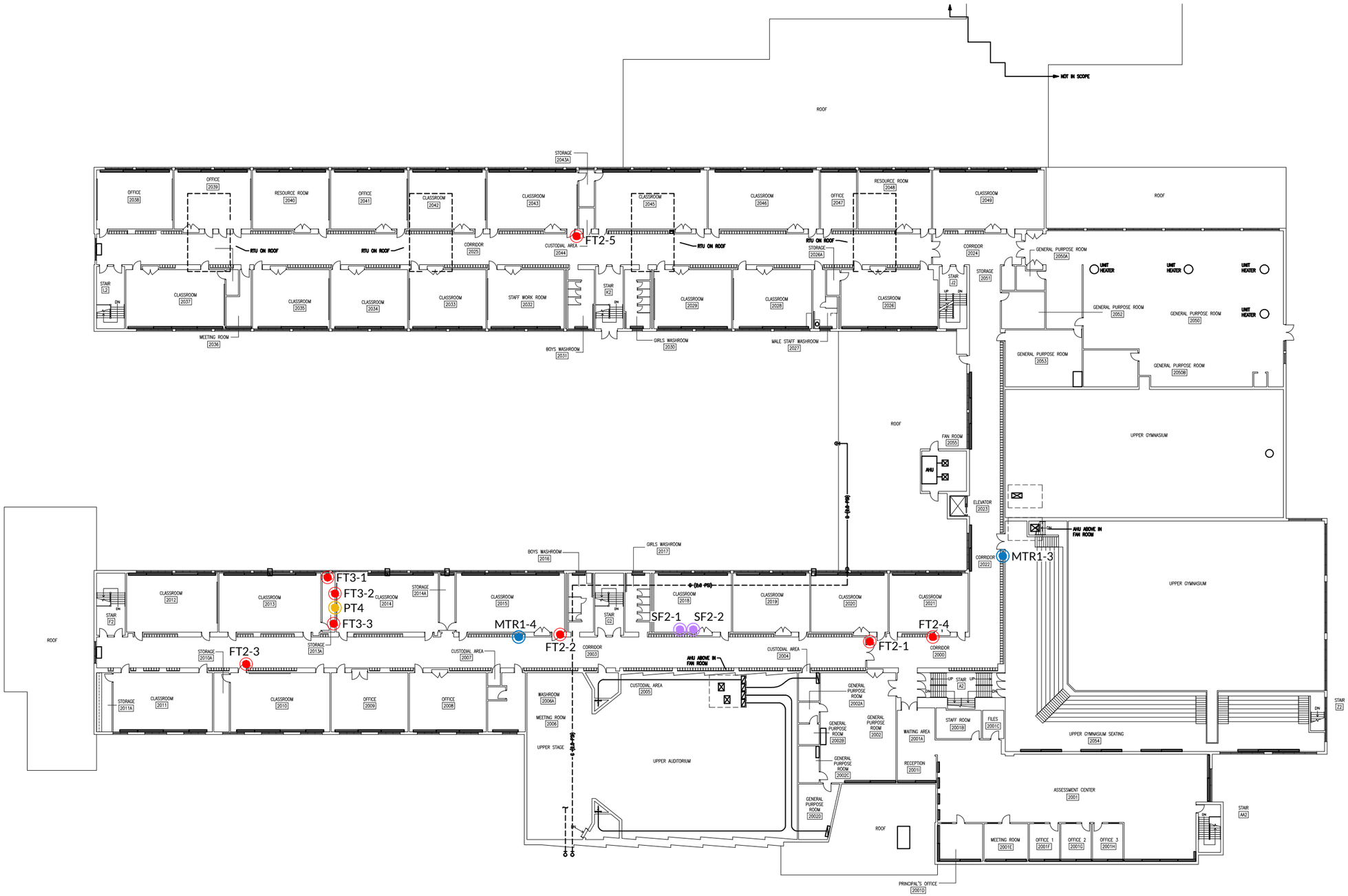
DATE: FEB 2025

SCALE: N.T.S.

PROJECT: 622074.CE TASK 4

FIGURE: 2

FILE EXTENSION: P:\2022 Projects\Cambridge\622074.CE-HWDSB-DSS-Hill Park & Glendale, Hamilton, ON\!AutoCAD\622074.CE.dwg



LEGEND

- MORTAR SAMPLE TESTED NEGATIVE FOR ASBESTOS
- SPRAY FOAM INSULATION SAMPLE TESTED NEGATIVE FOR ASBESTOS
- FLOOR TILE SAMPLE TESTED POSITIVE FOR ASBESTOS
- PAINT SAMPLE TESTED NEGATIVE FOR LEAD-CONTAINING PAINT

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REFERENCE: ARC ENGINEERING INC., HILL PARK LEARNING CENTRE - HVAC AND PLUMBING UPGRADES. 465 EAST 16TH STREET, HAMILTON, ONTARIO. PROJECT NO.: 24-127-110. SECOND FLOOR MECHANICAL - DEMOLITION . DRAWING NO.: M-302. ISSUED FOR 70% COMPLETE NOV 29, 2024.

NOTE: LOCATIONS OF BUILDINGS, UNDERGROUND UTILITIES, ETC. ARE FOR REFERENCE ONLY AND SHOULD NOT BE RELIED UPON FOR DETAILED DESIGN, EXCAVATION, OR CONSTRUCTION PURPOSES

CLIENT: HWDSB

SITE: 465 EAST 16TH STREET, HAMILTON, ONTARIO

TITLE: SECOND FLOOR SAMPLE LOCATIONS

DATE: FEB 2025

SCALE: N.T.S.

PROJECT: 622074.CE TASK 4

FIGURE: 3

FILE EXTENSION: P:\2022 Projects\Cambridge\622074.CE-HWDSB-DSS-Hill Park & Glendale, Hamilton, ON\!AutoCAD\622074.CE.dwg

APPENDIX B – Photographic Log

PREMIER ENVIRONMENTAL SERVICES

PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
Hamilton-Wentworth District School Board	465 East 16th Street, Hamilton, Ontario	622074.CE

Photo No.	Date:
1	15-Jan-25

Direction Photo Taken:

West

Description:

A view of the basement furnace room with light blue (PT1) and white (P2) wall paint.

Photo No.	Date:
2	15-Jan-25

Direction Photo Taken:

West

Description:

East door of room 1024 showing drywall plaster (PL1) and white wall paint (PT 3).

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PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
Hamilton-Wentworth District School Board	465 East 16th Street, Hamilton, Ontario	622074.CE

Photo No.	Date:
3	15-Jan-25

Direction Photo Taken:

North

Description:

West stage fire exit showing 9" x 9" brown and cream floor tiles (FT1).

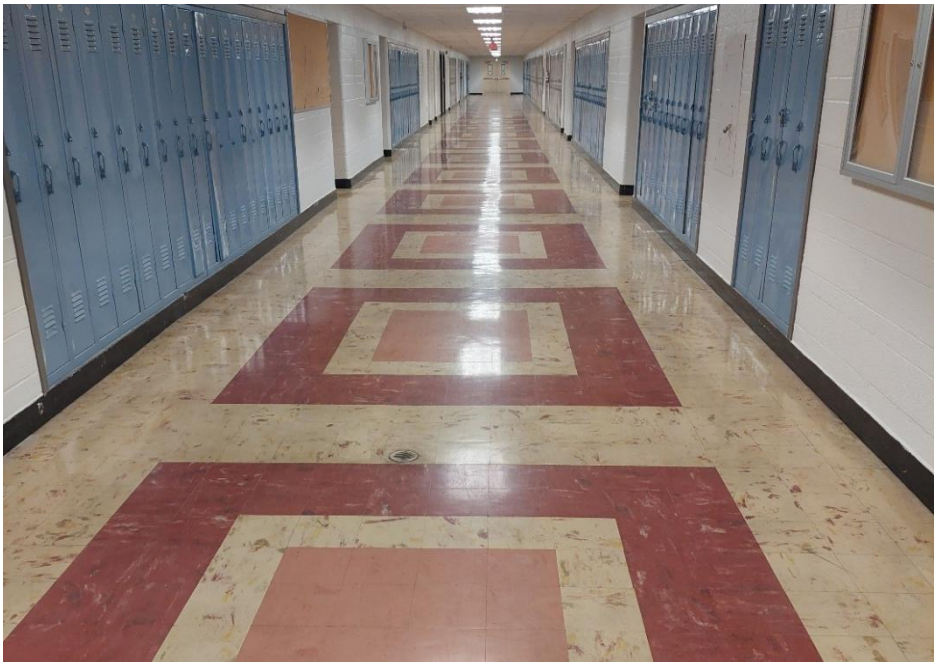
Photo No.	Date:
4	15-Jan-25

Direction Photo Taken:

North

Description:

View of 2nd floor hallway showing 9" x 9" beige and maroon floor tiles (FT2).



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PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
Hamilton-Wentworth District School Board	465 East 16th Street, Hamilton, Ontario	622074.CE

Photo No.	Date:
5	15-Jan-25

Direction Photo Taken:

North

Description:

View of storage room of room 2013 showing 9" x 9" brown/grey floor tiles (FT3) and turquoise wall paint (PT4).

Photo No.	Date:
6	15-Jan-25

Direction Photo Taken:

East

Description:

View of dividing wall between rooms 1026B and 1026 showing cinderblock mortar (MTR1).

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PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
Hamilton-Wentworth District School Board	465 East 16th Street, Hamilton, Ontario	622074.CE

Photo No.	Date:
7	15-Jan-25

Direction Photo Taken:

N/A

Description:

View of ceiling over the stage showing grey spray insulation.

Photo No.	Date:
8	15-Jan-25

Direction Photo Taken:

N/A

Description:

View of room 1026 showing white transite ceiling panels.

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PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
Hamilton-Wentworth District School Board	465 East 16th Street, Hamilton, Ontario	622074.CE

Photo No.	Date:
9	15-Jan-25

Direction Photo Taken:

N/A

Description:

View of the boiler showing (left) decommissioned boiler and reportedly containing ACM and (right) currently primary boiler install in 2001 and therefore unlikely to contain ACMs.

APPENDIX C – Tables

TABLE 1
BULK SAMPLE DATA SHEET FOR ASBESTOS
465 EAST 16th STREET, HAMILTON, ONTARIO

Sample ID Number	Material Description	Location	Analytical Results	Asbestos Finding	Asbestos Type
PL1-1	White, drywall plaster	East wall by east door in room 1024	ND	N/A	N/A
PL1-2	White, drywall plaster	North wall by east door in room 1024	ND	N/A	N/A
PL1-3	White, drywall plaster	East wall by east door in room 1050B	ND	N/A	N/A
FT1-1	9" x 9" floor tile, cream with brown streaks	In front of east, stage fire exit, northeast corner	ND	N/A	N/A
FT1-2	9" x 9" floor tile, cream with brown streaks	In front of east, stage fire exit, northwest corner	ND	N/A	N/A
FT1-3	9" x 9" floor tile, cream with brown streaks	In front of east, stage fire exit, south portion	ND	N/A	N/A
FT2-1	9" x 9" floor tile, beige with maroon	2nd floor hallway outside room 2020	POSITIVE	2%	Chrysotile
FT2-2	9" x 9" floor tile, beige with maroon	2nd floor hallway outside room 2015	POSITIVE	2%	Chrysotile
FT2-3	9" x 9" floor tile, beige with maroon	2nd floor hallway outside room 2010	POSITIVE	2%	Chrysotile
FT2-4	9" x 9" floor tile, beige with maroon	2nd floor hallway outside room 2021	POSITIVE	2%	Chrysotile
FT2-5	9" x 9" floor tile, beige with maroon	2nd floor hallway outside room 2043	POSITIVE	2%	Chrysotile
FT3-1	9" x 9" floor tile, brown/grey	Room 2013, east portion of back supply room	POSITIVE	2%	Chrysotile
FT3-2	9" x 9" floor tile, brown/grey	Room 2013, south portion of back supply room	Not analyzed, positive stop		
FT3-3	9" x 9" floor tile, brown/grey	Room 2013, south portion of back supply room	Not analyzed, positive stop		

NOTES:

ND – None detected (no asbestos fibres were observed). Once a positive test result is found, the other samples in the homogenous set are not analyzed. If no positive asbestos test result is found, analysis continues in the homogenous set until either a positive result is found or all samples are analyzed.

NA – Not analyzed as analysis for asbestos in a prior sample indicated positive results.

N/A – Not applicable as analysis for asbestos indicated non-detectable results.

PREMIER ENVIRONMENTAL SERVICES
210 Sheldon Drive, Unit 201
Cambridge, Ontario
N1T 1A8
P: 519-653-7140
F: 519-653-8907

TABLE 1
BULK SAMPLE DATA SHEET FOR ASBESTOS
465 EAST 16th STREET, HAMILTON, ONTARIO

Sample ID Number	Material Description	Location	Analytical Results	Asbestos Finding	Asbestos Type
SF2-1	Grey, spray foam insulation	West wall room 2018	ND	N/A	N/A
SF2-2	Grey, spray foam insulation	West wall room 2018	ND	N/A	N/A
SF2-3	Grey, spray foam insulation	South wall room 2009	ND	N/A	N/A
MTR1-1	Grey cinderblock mortar	Wall separating 1026E and 1026	ND	N/A	N/A
MTR1-2	Grey cinderblock mortar	North wall of room 1024	ND	N/A	N/A
MTR1-3	Grey cinderblock mortar	2nd floor hallway, south wall at gymnasium observation deck	ND	N/A	N/A
MTR1-4	Grey cinderblock mortar	2nd floor hallway, east wall at room 2015	ND	N/A	N/A
MTR1-5	Grey cinderblock mortar	1st floor hallway, south wall at room 1026	ND	N/A	N/A

NOTES:

ND – None detected (no asbestos fibres were observed). Once a positive test result is found, the other samples in the homogenous set are not analyzed. If no positive asbestos test result is found, analysis continues in the homogenous set until either a positive result is found or all samples are analyzed.

NA – Not analyzed as analysis for asbestos in a prior sample indicated positive results.

N/A – Not applicable as analysis for asbestos indicated non-detectable results.

PREMIER ENVIRONMENTAL SERVICES
210 Sheldon Drive, Unit 201
Cambridge, Ontario
N1T 1A8
P: 519-653-7140
F: 519-653-8907

TABLE 2
BULK SAMPLE DATA SHEET FOR LEAD
465 EAST 16th STREET, HAMILTON, ONTARIO

SAMPLE ID NUMBER	Material Description	Location	Concentration of Lead by Weight (%)
PT1	Light blue wall paint	Boiler room	**1.06**
PT2	White wall paint	Boiler room	**0.23**
PT3	White wall paint	Room 1024	0.0017
PT4	Turquoise wall paint	Storage room of room 2015	0.020

NOTES:

Bold – Concentration is greater than 0.1 % (or 1,000 ppm) and is considered a lead containing paint.

Bold and Underline – Concentration is greater than 0.5% (or 5,000 ppm) and is considered a lead-based paint.

Concentrations <0.1% are considered to be below the de minimis (virtually safe) level of lead in paint or surface coatings, provided that aggressive disturbance or heating does not occur.

PREMIER ENVIRONMENTAL SERVICES
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APPENDIX D – Certificates of Analysis

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www.paracellabs.com

Certificate of Analysis

Premier Environmental Services Inc.

244 Montrose Street North
Cambridge, ON N3H 2H7
Attn: Jason Garrett

Client PO:
Project: 622074.CE
Custody:

Report Date: 23-Jan-2025
Order Date: 17-Jan-2025

Order #: 2503444

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2503444-01	PL1-1
2503444-02	PL1-2
2503444-03	PL1-3
2503444-04	FT1-1
2503444-05	FT1-2
2503444-06	FT1-3
2503444-07	FT3-1
2503444-08	FT3-2
2503444-09	FT3-3
2503444-10	MTR1-1
2503444-11	MTR1-2
2503444-12	MTR1-3
2503444-13	MTR1-4
2503444-14	MTR1-5
2503444-15	FT2-1
2503444-16	FT2-2
2503444-17	FT2-3
2503444-18	FT2-4
2503444-19	FT2-5
2503444-20	SF2-1
2503444-21	SF2-2
2503444-22	SF2-3

Approved By:

Emma Diaz

Senior Analyst

Certificate of Analysis

Client: Premier Environmental Services Inc.

Client PO:

Report Date: 23-Jan-2025

Order Date: 17-Jan-2025

Project Description: 622074.CE

Asbestos, PLM Visual Estimation **MDL - 0.5%**

Paracel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
2503444-01	15-Jan-25	white---	Plaster	No	**Client ID: PL1-1**	
					Non-Fibers	100
2503444-02	15-Jan-25	White	Plaster	No	**Client ID: PL1-2**	
					Non-Fibers	100
2503444-03	15-Jan-25	White	Plaster	No	**Client ID: PL1-3**	
					Non-Fibers	100
2503444-04	15-Jan-25	Beige	Vinyl Floor Tile	No	**Client ID: FT1-1**	
					Non-Fibers	100
2503444-05	15-Jan-25	Beige	Vinyl Floor Tile	No	**Client ID: FT1-2**	
					Non-Fibers	100
2503444-06	15-Jan-25	Beige	Vinyl Floor Tile	No	**Client ID: FT1-3**	
					Non-Fibers	100
2503444-07	16-Jan-25	Grey	Vinyl Floor Tile	**Yes**	**Client ID: FT3-1**	
					Chrysotile	2
					Non-Fibers	98
2503444-08	16-Jan-25	Grey	Vinyl Floor Tile		**Client ID: FT3-2**	
					not analyzed, positive stop	
2503444-09	16-Jan-25	Grey	Vinyl Floor Tile		**Client ID: FT3-3**	
					not analyzed, positive stop	
2503444-10	16-Jan-25	Grey	Mortar	No	**Client ID: MTR1-1**	
					Non-Fibers	100
2503444-11	16-Jan-25	Grey	Mortar	No	**Client ID: MTR1-2**	
					Non-Fibers	100
2503444-12	16-Jan-25	Grey	Mortar	No	**Client ID: MTR1-3**	
					Non-Fibers	100

Certificate of Analysis

Client: Premier Environmental Services Inc.

Client PO:

Report Date: 23-Jan-2025

Order Date: 17-Jan-2025

Project Description: 622074.CE

Asbestos, PLM Visual Estimation **MDL - 0.5%**

Paracel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
2503444-13	16-Jan-25	Grey	Mortar	No	**Client ID: MTR1-4**	
					Non-Fibers	100
2503444-14	16-Jan-25	Grey	Mortar	No	**Client ID: MTR1-5**	
					Non-Fibers	100
2503444-15	16-Jan-25	Beige	Vinyl Floor Tile	**Yes**	**Client ID: FT2-1**	
					Chrysotile	2
					Non-Fibers	98
2503444-16	16-Jan-25	Beige	Vinyl Floor Tile	**Yes**	**Client ID: FT2-2**	
					Chrysotile	2
					Non-Fibers	98
2503444-17	16-Jan-25	Beige	Vinyl Floor Tile	**Yes**	**Client ID: FT2-3**	
					Chrysotile	2
					Non-Fibers	98
2503444-18	16-Jan-25	Beige	Vinyl Floor Tile	**Yes**	**Client ID: FT2-4**	
					Chrysotile	2
					Non-Fibers	98
2503444-19	16-Jan-25	Beige	Vinyl Floor Tile	**Yes**	**Client ID: FT2-5**	
					Chrysotile	2
					Non-Fibers	98
2503444-20	16-Jan-25	Brown	Insulation	No	**Client ID: SF2-1**	
					Cellulose	30
					Non-Fibers	70
2503444-21	16-Jan-25	Brown	Insulation	No	**Client ID: SF2-2**	
					Cellulose	30
					Non-Fibers	70
2503444-22	16-Jan-25	Brown	Insulation	No	**Client ID: SF2-3**	
					Cellulose	30
					Non-Fibers	70

Certificate of Analysis

Report Date: 23-Jan-2025

Client: Premier Environmental Services Inc.

Order Date: 17-Jan-2025

Client PO:

Project Description: 622074.CE

**** Analytes in bold indicate asbestos mineral content.**

Analysis Summary Table

Analysis	Method Reference/Description	Lab Location	Lab Accreditation	Analysis Date
Asbestos, PLM Visual Estimation	AppE to SubE of 40CFR Part763 and EPA/600/R-93/116	1 - Mississauga	CALA 3762	23-Jan-25

Mississauga Lab: 15 - 6800 Kitimat Rd Mississauga, Ontario, L5N 5M1

Work Order Revisions | Comments

None

PARACEL LABORATORIES LTD.

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ad Office
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awa, Ontario K1G 4J8
1-800-749-1947
paracel@paracellabs.com

Chain of Custody
(Lab Use Only)

Client Name: Premier Environmental Services	Project Reference: 622074.CE
Contact Name: Jason Garrett	Quote #:
Address: 210 Sheldon Dr, Unit 201 Cambridge, ON N1T1A8	PO #:
Telephone: 519-835-6923	Email Address: jgarrett@premiercorp.ca

Turnaround Time:

- ☐ Immediate
- ☐ 4 Hour
- ☐ 24 Hour
- ☐ 1 Day -EOD
- ☐ 2 Day -EOD
- ☐ 3 Day -EOD
- ☒ Regular

Date Required:

ASBESTOS & MOLD ANALYSIS

Matrix: ☐ Air ☒ Bulk ☐ Tape Lift ☐ Swab ☐ Other **Regulatory Guideline:** ☒ ON ☐ QC ☐ AB ☐ SK ☐ Other:

Analyses: ☐ Microscopic Mold ☐ Culturable Mold ☐ Bacteria GRAM ☐ PCM Asbestos ☒ PLM Asbestos ☐ Chatfield Asbestos ☐ TEM Asbestos

Paracel Order Number: 2503444

	Sample ID	Asbestos - Bulk: Materials to Be Analyzed * (If Positive Stop requested, indicate if by Sample (SMP) or Material (MAT))	POS STOP SMP	POS STOP MAT	Sampling Date	Air Volume (L)	Analysis Required
1	PL1-1	White drywall plaster	☒	☐	2025/01/15		PLM
2	PL1-2	White drywall plaster	☒	☐	2025/01/15		PLM
3	PL1-3	White drywall plaster	☒	☐	2025/01/15		PLM
4	FT1-1	Floor Tile cream w\ brown streaks	☒	☐	2025/01/15		PLM
5	FT1-2	Floor Tile cream w\ brown streaks	☒	☐	2025/01/15		PLM
6	FT1-3	Floor Tile cream w\ brown streaks	☒	☐	2025/01/15		PLM
7	FT3-1	9" x 9" brown/grey floor tile	☒	☐	2025/01/16		PLM
8	FT3-2	9" x 9" brown/grey floor tile	☒	☐	2025/01/16		PLM
9	FT3-3	9" x 9" brown/grey floor tile	☒	☐	2025/01/16		PLM
10			☐	☐			

* If left blank, all lab identified distinct materials in each sample will be analyzed and reported separately, as per EPA 600/R-93/116. Additional charges will apply.
Manufactured multi-layered building materials will be analyzed as one sample, unless requested by client.

Comments:

Method of Delivery:

Submitting adequate sample volume is the responsibility of the client. Refer to the reverse of this COC for recommended sample volumes. Signing this CoC authorizes Paracel to complete the analysis on the sample as submitted.

Relinquished By (Sign):	Received at Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Jason Garrett			
Date/Time: 2025/01/16 13:00	Date/Time:	Date/Time: Jan 17/25 12:40	Date/Time: Jan 17/25 13:25

PARACEL LABORATORIES LTD.

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d Office
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-800-749-1947
aracel@paracellabs.com

Chain of Custody
(Lab Use Only)

Client Name: Premier Environmental Services	Project Reference: 622074.CE
Contact Name: Jason Garrett	Quote #:
Address: 210 Sheldon Dr, Unit 201 Cambridge, ON N1T1A8	PO #:
Telephone: 519-835-6923	Email Address: jgarrett@premiercorp.ca

Turnaround Time:

- ☐ Immediate
- ☐ 4 Hour
- ☐ 24 Hour
- ☐ 1 Day -EOD
- ☐ 2 Day -EOD
- ☐ 3 Day -EOD
- ☒ Regular

Date Required:

ASBESTOS & MOLD ANALYSIS

Matrix: ☐ Air ☒ Bulk ☐ Tape Lift ☐ Swab ☐ Other **Regulatory Guideline:** ☒ ON ☐ QC ☐ AB ☐ SK ☐ Other:

Analyses: ☐ Microscopic Mold ☐ Culturable Mold ☐ Bacteria GRAM ☐ PCM Asbestos ☒ PLM Asbestos ☐ Chatfield Asbestos ☐ TEM Asbestos

Paracel Order Number: 2503444

	Sample ID	Asbestos - Bulk: Materials to Be Analyzed * (If Positive Stop requested, indicate if by Sample (SMP) or Material (MAT))	POS STOP SMP	POS STOP MAT	Sampling Date	Air Volume (L)	Analysis Required
1	MTR1-1	grey cinderblock mortar	☒	☐	2025/01/16		PLM
2	MTR1-2	grey cinderblock mortar	☐	☐	2025/01/16		PLM
3	MTR1-3	grey cinderblock mortar	☐	☐	2025/01/16		PLM
4	MTR1-4	grey cinderblock mortar	☐	☐	2025/01/16		PLM
5	MTR1-5	grey cinderblock mortar	☐	☐	2025/01/16		PLM
6	FT2-1	9" x 9" beige w\ maroon	☐	☐	2025/01/16		PLM
7	FT2-2	9" x 9" beige w\ maroon	☐	☐	2025/01/16		PLM
8	FT2-3	9" x 9" beige w\ maroon	☐	☐	2025/01/16		PLM
9	FT2-4	9" x 9" beige w\ maroon	☐	☐	2025/01/16		PLM
10	FT2-5	9" x 9" beige w\ maroon	☐	☐	2025/01/16		PLM

* If left blank, all lab identified distinct materials in each sample will be analyzed and reported separately, as per EPA 600/R-93/116. Additional charges will apply. Manufactured multi-layered building materials will be analyzed as one sample, unless requested by client.

Comments:

Method of Delivery: Purolator

Submitting adequate sample volume is the responsibility of the client. Refer to the reverse of this COC for recommended sample volumes. Signing this CoC authorizes Paracel to complete the analysis on the sample as submitted.

Relinquished By (Sign):	Received at Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Jason Garrett			
Date/Time: 2025/01/16 13:00	Date/Time:	Date/Time: Jan 17/25 12:40	Date/Time: Jan 17/25 13:45

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Ottawa, Ontario K1G 4J8
1-800-749-1947
paracel@paracellabs.com

Chain of Custody
(Lab Use Only)

Client Name: Premier Environmental Services	Project Reference: 622074.CE
Contact Name: Jason Garrett	Quote #:
Address: 210 Sheldon Dr, Unit 201 Cambridge, ON N1T1A8	PO #:
Telephone: 519-835-6923	Email Address: jgarrett@premiercorp.ca

Turnaround Time:

- ☐ Immediate
- ☐ 4 Hour
- ☐ 24 Hour
- ☐ 1 Day -EOD
- ☐ 2 Day -EOD
- ☐ 3 Day -EOD
- ☒ Regular

Date Required:

ASBESTOS & MOLD ANALYSIS

Matrix: ☐ Air ☐ Bulk ☐ Tape Lift ☐ Swab ☐ Other **Regulatory Guideline:** ☒ ON ☐ QC ☐ AB ☐ SK ☐ Other:

Analyses: ☐ Microscopic Mold ☐ Culturable Mold ☐ Bacteria GRAM ☐ PCM Asbestos ☒ PLM Asbestos ☐ Chatfield Asbestos ☐ TEM Asbestos

Paracel Order Number: 2503444		Asbestos - Bulk			Sampling Date	Air Volume (L)	Analysis Required
	Sample ID	Materials to Be Analyzed * If Positive Stop requested, indicate if by Sample (SMP) or Material (MAT)	POS STOP SMP	POS STOP MAT			
1	SF2-1	Grey, spray insulation	☒	☐	2025/01/16		PLM
2	SF2-2	Grey, spray insulation	☒	☐	2025/01/16		PLM
3	SF2-3	Grey, spray insulation	☒	☐	2025/01/16		PLM
4			☐	☐			
5			☐	☐			
6			☐	☐			
7			☐	☐			
8			☐	☐			
9			☐	☐			
10			☐	☐			

* If left blank, all lab identified distinct materials in each sample will be analyzed and reported separately, as per EPA 600/R-93/116. Additional charges will apply.
Manufactured multi-layered building materials will be analyzed as one sample, unless requested by client.

Comments:

Method of Delivery:

Submitting adequate sample volume is the responsibility of the client. Refer to the reverse of this COC for recommended sample volumes. Signing this CoC authorizes Paracel to complete the analysis on the sample as submitted.

Relinquished By (Sign):	Received at Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Jason Garrett			
Date/Time: 2025/01/16 13:00	Date/Time:	Date/Time: Jan 17/25 12.40	Date/Time: Jan 17/25 13.21

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Certificate of Analysis

Premier Environmental Services Inc.

244 Montrose Street North
Cambridge, ON N3H 2H7
Attn: Jason Garrett

Client PO:
Project: 622074.CE
Custody:

Report Date: 22-Jan-2025
Order Date: 17-Jan-2025

Order #: 2504011

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2504011-01	PT1
2504011-02	PT2
2504011-03	PT3
2504011-04	PT4

Approved By:

Milan Ralitsch, PhD
Senior Technical Manager

Certificate of Analysis

Report Date: 22-Jan-2025

Client: Premier Environmental Services Inc.

Order Date: 17-Jan-2025

Client PO:

Project Description: 622074.CE

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-MS	EPA 6020 - Digestion - ICP-MS	22-Jan-25	22-Jan-25

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Certificate of Analysis

Report Date: 22-Jan-2025

Client: **Premier Environmental Services Inc.**

Order Date: 17-Jan-2025

Client PO:

Project Description: 622074.CE

Sample Results

Lead

Matrix: Paint

Paracel ID	Client ID	Sample Date	Units	MDL	Result
2504011-01	PT1	15-Jan-25	ug/g	5	10600
2504011-02	PT2	15-Jan-25	ug/g	5	2170
2504011-03	PT3	15-Jan-25	ug/g	5	17
2504011-04	PT4	15-Jan-25	ug/g	5	198

Laboratory Internal QA/QC

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Matrix Blank									
Lead	**ND**	**5**	**ug/g**						
Matrix Duplicate									
Lead	**549**	**5**	**ug/g**	**567**			**3.35**	**50**	
Matrix Spike									
Lead	76.0	5.00	ug/g	22.7	107	70-130			

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Paracel ID: 2504011

Paracel Order Number (Lab Use Only)	**Chain Of Custody** (Lab Use Only)

Client Name: Premier Environmental Services	Project Ref: 622074.CE	Page 1 of 1
Contact Name: Jason Garrett	Quote #:	**Turnaround Time**
Address: 210 Sheldon Dr, Unit 201 Cambridge, ON N1T1A8	PO #:	☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone: 519-835-6923	E-mail: jgarrett@premiercorp.ca	Date Required:

☐ REG 153/04 ☐ REG 406/19

☐ Table 1 ☐ Agri/Other ☐ Med/Fine
☐ Table 2 ☐ Res/Park ☐ Coarse
☐ Table 3 ☐ Ind/Comm
☐ Table ___
For RSC: ☐ Yes ☐ No

Other Regulation

☐ REG 558 ☐ PWQO
☐ CCME ☐ MISA
☐ SU - Sani ☐ SU - Storm
Mun: ___
☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Field Filtered	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Lead			
1	PT1	P				2025/01/15									X			
2	PT2	P				2025/01/15									X			
3	PT3	P				2025/01/15									X			
4	PT4	P				2025/01/16									X			
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery:

Relinquished By (Sign):	Received at Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Jason Garrett	Date/Time: 17h	Date/Time: 1/20/25 11:56	Date/Time: 1/20/25 11:58
Date/Time: 2025/01/16 13:00	Temperature: °C	Temperature:	pH Verified: ☐ By:

12-40

APPENDIX E – Statement of Limitations

STATEMENT OF LIMITATIONS

The information given herein is specifically for this project and Hamilton-Wentworth District School Board (Client) only and for the scope of work described herein. It may not be sufficient for other uses. Premier Environmental Services Inc. (Premier) does not accept responsibility for use by third parties.

The data, conclusions, and any recommendations which are present in this report, and the quality thereof, are based on a scope authorized by the Client. Note however, that no scope of work, no matter how exhaustive can, identify all hazardous materials or all conditions above and below ground. For example, conditions between sample locations may differ from those encountered in the investigation and observed or measured conditions may change with time. This report therefore cannot warranty that all conditions on or off the Site are presented by those identified at specific locations.

Any recommendations or conclusions provided that are based on conditions or assumptions reported herein will inherently include any uncertainty associated with those conditions or assumptions. In fact, many aspects involving professional judgment such as remediation criteria contain a degree of uncertainty which cannot be eliminated. This uncertainty should be managed by periodic review and refinement as additional information becomes available.

Note also that standards, guidelines, and practice related to environmental investigations may change with time. Those which are applied at the time of this investigation may be obsolete or unacceptable at a later date.

Any comments given in this report on potential remediation problems and possible methods are intended only for the guidance of the Client. The scope of work may not be sufficient to determine all of the factors that may affect construction or clean-up methods and costs. For example, should materials suspected of containing asbestos be identified within previously inaccessible areas (e.g., beneath a floor slab or behind a concrete wall), additional asbestos sampling and analyses may be required in order to be compliant with Ontario Regulation 278/05. Contractors bidding on this project or undertaking abatement or remediation should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the conditions may affect their work.

Any results from an analytical laboratory, title searcher, or other subcontractor reported herein have been carried out by others, and Premier cannot warranty their accuracy. Similarly, Premier cannot warranty the accuracy of information supplied by the Client or any Site representatives.

ABATEMENT SPECIFICATIONS FOR ASBESTOS AND LEAD

HILL PARK LEARNING CENTRE HVAC RENOVATION 465 EAST 16TH STREET, HAMILTON, ONTARIO

Prepared for: Hamilton-Wentworth District School Board
Prepared by: Premier Environmental Services Inc.
Premier Project Number: 622074.CE

February 27, 2025

PREMIER ENVIRONMENTAL SERVICES

LIST OF CONTENTS

TABLES

ATTACHMENTS

PREMIER ENVIRONMENTAL SERVICES
210 Sheldon Drive, Unit 201
Cambridge, Ontario
N1T 1A8
P: 519-653-7140
F: 519-653-8907

1.0 GENERAL

1.1 General and Related Work

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

1.1.2 Client: For the purposes of this document and project reference, all references to client refer to refer to Hamilton-Wentworth District School Board. (the "Client").

1.1.3 Owner: For the purposes of this document and project reference, all references to owner refer to the Hamilton-Wentworth District School Board (the "Owner").

1.1.4 Prime Consultant: For the purposes of this document, all references to prime consultant refer to Filer Engineering Ltd., of Burlington, ON.

1.1.5 Environmental Consultant: For the purposes of this document and project reference, all references to environmental consultant, consultant, or inspector refer to Premier Environmental Services Inc., of Cambridge, Ontario (the "Consultant").

1.1.6 General Contractor: For the purposes of this document and project, all references to the General contractor refer the General Contractor to be determined (the "General").

1.1.7 Abatement Contractor: For the purposes of this document and project, all references to the abatement contractor refer to the sub-contractor retained by the general contractor to complete the abatement work (the "Abatement Contractor").

1.1.8 Site: For the purposes of this document and project reference, all references to the Site refer to Hill Park Learning Centre HVAC Renovation, 456 East 16th Street, Hamilton Ontario (the "Site").

1.1.9 Survey: The following report (the "Survey") should be referenced by project team members for specifics regarding asbestos and lead sampling results within the school:

PO1057 Designated Substances Survey – Hill Park Learning Centre HVAC Renovation, 456 East 16th Street, Hamilton Ontario, prepared by Premier and dated February 27, 2025. (the "Survey").

1.1.10 Work Areas: For the purposes of this document and project P01057, all references to work area(s) refer to areas at either school that will be affected by the work to be undertaken. Floor plans depicting the locations of confirmed ACMs collected during the recent survey and in proximity to work areas are presented on the attached Figures. Work areas will be determined by the general contractor based upon project requirements, and the appropriate level of abatement will need to be determined based on the means and methods of ACM / lead material removal required to facilitate completion of the project. All work areas must be returned to a safe condition prior to re-occupancy by school employees or students in that area of the building.

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1.1.11 This specification fulfils the requirements required by Ontario Regulation 278/05 of the Ontario Occupational Health and Safety Act ("O. Reg. 278/05") for Type 1, 2 and 3 Removal, and the Environmental Abatement Council of Ontario (EACO) Lead Guideline for Construction, Renovation, Maintenance or Repair (October 2014) for Class 1 and 2a Operations.

1.1.12 All work to be completed must comply with all Federal, Provincial, and local requirements pertaining to asbestos and lead. In any case of conflict among those requirements, the more stringent requirement shall apply. The regulations shall include the following, and all amending regulations of the following:

- Ontario Ministry of Labour ("MOL"), Occupational Health and Safety Division, Regulation Respecting Asbestos on Construction Projects and in Buildings and Repair Operations, O. Reg. 278/05;
- Ontario Ministry of Labour, Ontario Health and Safety Act; Ontario Regulation 490/09 Designated Substances ("O. Reg. 490/09");
- The Surface Coating Materials Regulations (SOR/2005-109) under the Federal Hazardous Products Act;
- Ontario Ministry of Labour, Ontario Health and Safety Act; Ontario Regulation 490/09 Designated Substances ("O. Reg. 490/09");
- The Ministry of Labour (MOL) Guideline for Lead on Construction Projects (April 2011);
- Environmental Abatement Council of Ontario (EACO) Lead Guideline for Construction, Renovation, Maintenance or Repair (October 2014);
- Ontario Ministry of the Environment, Conservation and Parks, Regulation 347, under the Ontario Environmental Protection Act ("EPA");
- Government of Canada Regulations respecting the Handling, Offering for Transport and Transporting of Dangerous Goods (Extract from the Canada Gazette Part II, dated February 6, 1985);
- Regulations for Construction Projects O. Reg. 213/91;
- Office of Fire Commissioner of Canada;
- Ontario Hydro Electrical Safety Code;
- Ontario Occupational Health and Safety Act RSO 1990 Co.1 as amended; and
- WHMIS Regulation RRO 1990, Regulation 860.

1.1.13 Outline of Work: It is the intent that work performed as per this document will result in the Type 3 removal of the decommissioned boiler which reportedly contains asbestos-containing material ("ACM"). It is also the intent that potential lead dust generation associated with removal of equipment, cutting access holes, and/or affixing new equipment to painted surfaces containing lead is managed. Disturbance of lead

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containing surface coatings and paints are to be avoided and/or minimized. Lead containing paints should either be covered to prevent damage, or removed prior to drilling into surface coatings. Non-powered hand tools, or power tools equipped with a HEPA filter should be used following Class 1 or Class 2a work procedures, respectively.

1.1.14 All ACM or asbestos waste to be removed and disposed of under this document shall be abated using the abatement procedures as described under O. Reg. 278/05. This may include any ACM and material that may or may not contain asbestos materials but has been deemed asbestos waste by virtue of contamination by other asbestos containing materials. The type of asbestos precaution required is dependent on the removal method and quantity involved.

1.1.15 All lead waste to be removed and disposed of under this document shall be abated / managed using the work procedures as described under EACO (2014). This may include any lead-containing materials or materials that may or may not contain lead but has been deemed lead waste by virtue of contamination by other lead-containing materials.

1.1.16 Should the Abatement Contractor wish to remove any asbestos or lead containing materials using any approved method other than those determined during project commencement (e.g., glove bag, Type 1, Type 2, Type 3), then it is the responsibility of the Abatement Contractor to submit in writing to both the Consultant and Client seeking permission to change the scope of work or abatement procedure. Therefore, all procedures and removal work completed at this Site shall be done so assuming that all identified and suspected ACM will be completely removed and disposed of as ACM waste.

1.1.17 The location of all positive samples are depicted on the attached Figures. Abatement of all suspect and confirmed ACMs or LBP affected by the proposed work is to be included in the abatement scope of work.

1.1.18 The following table briefly summarizes ACMs identified to be located within project areas:

Table 1: Summary of ACMs
HVAC Renovation Addition Project

Location	Material Description	Corresponding Sample Numbers	Analytical Results	Quantity	Present Condition
Floor tiles 2nd floor hallway	beige and maroon 9" x 9" floor tiles	FT2 (1-3)	2% Chrysotile	5 linear metres per window (10 windows)	Non-Friable Fair
Floor tiles room 2013 storage room	brown/grey 9" x 9" floor tiles	FT3 (1-3)	2% Chrysotile	5 linear metres per window (10 windows)	Non-Friable Fair

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Location	Material Description	Corresponding Sample Numbers	Analytical Results	Quantity	Present Condition
Decommissioned Boiler in Boil Room	Rope gasket, shield insulation and assumed boiler refractory	N/A	70-80% Chrysotile	Unknown	Non-Friable Unknown

NOTES:

Refer to DSS report for ACMs and suspect ACMs identified elsewhere within the building.
Non-Friable – Asbestos-containing material is bound into the product matrix, so that the fibres are not readily released.
Friable – ACM can be easily pulverized by hand pressure.
Poor – Minor damage in some areas. Material is stable and may become friable upon casual contact.
Good – No significant damage.
Fair – Material may be cracked or broken, but is stable and not likely to become friable upon casual contact.
N/A – Information not available and/or submitted for analysis previously and are assumed to be ACMs.

1.1.19 The following table briefly summarizes lead containing paints identified to be located within project areas:

Table 2: Summary of Lead Paints
HVAC Renovation Addition Project

Sample ID Number	Description	Location	Concentration of Lead by Weight (%)
PT1	Light Blue	Boiler room	1.06
PT2	White	Boiler room	0.23

NOTES:

1. All samples greater than 0.5% are classified as lead-based paints. Samples greater than 0.1% but less than 0.5% are classified as lead containing paints. All work must be completed to ensure that the Occupational Exposure Limit (OEL) for lead cannot be exceeded. This may be achieved by ensuring the Ontario Time Weighted Average exposure for Particles Not Otherwise Specified (PNOS), or 'nuisance dust' is maintained at a level below 10 mg/m^3 and by following the measures and procedures outlined in EACO 2014.

1.1.20 Schedule: To be determined subsequent to the tendering process.

1.1.21 Security: Site access shall be controlled by the General Contractor to ensure unauthorized individuals do not access the Work Areas. Any waste stored on-Site must be properly secured (e.g., bagged in a secure room or container) at all times prior to off-site disposal. The client may outline additional security requirements in the RFQ.

1.1.22 Supervision: The abatement work shall be supervised full time by a competent person, and monitored a part-time basis by the Consultant, based on unscheduled and scheduled site visits. The Consultant will be providing written reports [Inspection, Incident, and/or Construction progress reports (with or without pictures)] to the Client summarizing abatement activities, and milestones, and visual clearance inspection findings. It is the

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responsibility of the Contractor to make themselves available to the Consultant to answer questions and provide information on work completed and planned for the day/week.

1.1.23 Regulations: The abatement contractor is expected to complete all ACM removal work in strict accordance with any and all applicable municipal, provincial, and federal regulations and statutes including, but not limited to those outlined in Section 1.1.10.

1.1.24 Notification: At least 48 hours prior to initiating any abatement work, the Environmental Consultant is to be contacted with the anticipated abatement start date and schedule.

Before commencing a Type 3 removal operation (if required), the owner or prime consultant shall notify, orally and in writing, an inspector at the office of the Ministry of Labour nearest the workplace of the operation (herein referred to as the 'Inspector'). The written notice shall set out: the name and address of the person giving notice; the name and address of the owner of the place where the work will be carried out; the municipal address or other description of the place where the work will be carried out sufficient to permit the inspector to locate the place, including the location with respect to the nearest public highway; a description of the work that will be carried out; the starting date and expected duration of the work; and the name and address of the supervisor in charge of the work.

1.1.25 Submittals: All submittals, except waste manifests, must be submitted to the Inspector or their representative prior to commencing work. Submit written proof satisfactory to the Consultant that suitable arrangements have been made to dispose of asbestos-containing waste in accordance with requirements of authority having jurisdiction. Ensure that waste manifest/bills of lading for each waste shipment have been signed by a representative or authorized agent of the client. A copy of the waste manifest/bill of lading shall be submitted to the inspector prior to shipment.

1.1.26 Protection Repair and Replacement of Equipment and Materials: The work is to be conducted to support the dust collector replacement project. All equipment and materials within and surrounding the work area shall be suitably protected by the Abatement Contractor prior to other trades accessing the work space.

1.1.27 Waste Transport and Disposal: Asbestos waste shall be disposed of in accordance with procedures under Ontario Regulation 347 of the Ontario Environmental Protection Act.

1.2 Definitions

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

1.2.2 *Air Monitoring*: The process of measuring the fibre content or lead dust concentration of a specific volume of air.

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

1.2.4 *Asbestos*: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite, anthophyllite, and actinolite-tremolite. For purposes of

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determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.

1.2.5 *Environmental Consultant or Consultant*: The Owner or person designated by the Owner or Client to provide inspection and air monitoring of the Abatement Contractor's work.

1.2.6 *Asbestos-Containing Material (ACM)*: Any material containing asbestos of any type or mixture of types.

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

1.2.8 *Asbestos debris*: Means pieces of ACM that can be identified by colour, texture, or composition, or means dust, if the dust is determined by the Consultant to be ACM.

1.2.9 *Authorized Visitor*: The Owner, Client, an approved representative, and / or persons representing regulatory agencies.

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

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

1.2.12 *Competent Person*: a worker who;

(a) is qualified because of knowledge, training and experience to perform the work;

(b) is familiar with the provisions of the regulations that apply to the work; and

(c) has knowledge of all potential or actual dangers to health or safety in the work.

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

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

1.2.15 *Disposal Bag*: A properly labelled leak-tight plastic bag at least 6 mil (0.15 mm) thick used for transporting asbestos or lead waste from the work area to the disposal site. ACM or lead waste that could puncture an airtight bag must be double-bagged and then placed in an approved puncture-proof container.

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1.2.16 *D.O.P. Test*: Dioctylphthalate aerosol challenge of a HEPA filter system, which is used to establish the integrity and effectiveness of the HEPA filter system to remove asbestos fibres and lead dust from air.

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

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

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

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

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

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

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

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

1.2.25 *Glovebag*: A sack with inward projecting long sleeve gloves, which are designed to enclose an object from which an asbestos or lead-containing material is to be removed.

1.2.26 *HEPA Filter*: High Efficiency Particulate Air (HEPA) filter that is at least 99.97 percent efficient in collecting a 0.3 micrometre diameter aerosol.

1.2.27 *Lead:* A heavy metal that has been in industrial use for thousands of years. Lead may be used in its pure elemental form or combined chemically with other elements to form lead compounds. Inorganic lead compounds are used in pigments, paints, glasses, plastics and rubber compounds. Lead can cause a variety of health problems including death if ingested or inhaled.

1.2.28 *Negative Pressure*: A system which extracts air directly from work area, filters such extracted air through a HEPA filtering system, and discharges this air directly outside a work area to exterior of building. This system shall maintain a minimum pressure differential of 0.02 inches Water Gauge relative to adjacent areas outside of work areas, be equipped with an alarm to warn of system breakdown and be equipped with an instrument to continuously monitor and automatically record pressure differences.

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

1.2.30 *Occupied Area*: Any area of the building or facility outside the Work Area.

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

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

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

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

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

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

1.3 Worker Protection

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

1.3.2 Provide workers with personally issued marked respiratory equipment acceptable to the Occupational Health and Safety Division of the MOL, and suitable for asbestos exposure.

1.3.3 Ensure that suitable respiratory protective equipment is worn by every worker who enters the Work Area. The respirator provided by the employer and used by the workers shall be selected according to the type of asbestos / lead removal performed, and the removal procedure required, as prescribed by O. Reg. 278/05 and EACO 2014.

1.4 Respiratory Protection

1.4.1 The respiratory selection shall be matched in accordance with the removal procedure as well as the type and condition of the asbestos:

a) Breaking, cutting, drilling, abrading, grinding, sanding, or vibrating non-friable asbestos-containing material by means of power tools, if the tool is not attached to a dust collecting devise equipped with a HEPA filter as described in paragraph 5 of subsection 12 (4) of O. Reg. 278/05 requires: *Pressure demand supplied air respirator equipped with a half mask (material not wetted), or one of the following (material wetted): air purifying full-facepiece respirator with N-100, R-100, or P-100 particulate filter; Powered air purifying respirator equipped with a tight-fitting facepiece (half of full-facepiece) and a high efficiency filter or N-100, P-100, or R-100 particulate*

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filter; Negative pressure (demand) supplied air respirator equipped with a full-facepiece; or continuous flow supplied air respirator equipped with a tight fitting facepiece (half of full facepiece).

b) Work with friable material containing asbestos, as described in paragraph 1 to 4 and 6 of subsection 12 (4) of O. Reg. 278/05 requires: *Pressure demand supplied air respirator equipped with a half mask (material not wetted.).*

c) Work with friable material, as described in paragraph 1 to 4 and 6 of subsection 12 (4) of O. Reg. 278/05, that contains a type of asbestos other than chrysotile and was applied or installed by spraying and is wetted to control spread of fibres requires: *Pressure demand supplied air respirator equipped with a full facepiece.*

d) Work with friable material, as described in paragraph 1 to 4 and 6 of subsection 12 (4) of O. Reg. 278/05, that contains only chrysotile asbestos and was applied or installed by spraying and is wetted to control spread of fibres requires: *air purifying full-facepiece respirator with N-100, R-100, or P-100 particulate filter; Powered air purifying respirator equipped with a tight-fitting facepiece (half of full-facepiece) and a high efficiency filter or N-100, P-100, or R-100 particulate filter; Negative pressure (demand) supplied air respirator equipped with a full-facepiece; or continuous flow supplied air respirator equipped with a tight fitting facepiece (half of full facepiece).*

e) Work with friable material, as described in paragraph 1 to 4 and 6 of subsection 12 (4) of O. Reg. 278/05 that was not installed or applied by spraying, and is wetted to control spread of fibres requires: *air purifying full-facepiece respirator with N-100, R-100, or P-100 particulate filter; Powered air purifying respirator equipped with a tight-fitting facepiece (half of full-facepiece) and a high efficiency filter or N-100, P-100, or R-100 particulate filter; Negative pressure (demand) supplied air respirator equipped with a full-facepiece; or continuous flow supplied air respirator equipped with a tight fitting facepiece (half of full facepiece).*

1.4.2 The respirator shall be used and maintained so that:

a) Each respirator assigned to a worker is for that worker's exclusive use;

b) They are regularly fit tested to ensure that there is an effective seal between the respirator and the worker's face;

c) It is used and maintained in accordance with the procedures specified by the equipment manufacturer;

d) It is cleaned, disinfected and inspected after use on each shift, or more often if necessary;

e) It is free of damage and/or deteriorated parts are replaced prior to being used by a worker; and

f) It is stored in a convenient, clean and sanitary location, when not in use.

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1.4.3 The respirator must be certified by the US National Institute for Occupational Safety and Health (NIOSH) or the British Standards Institution for exposure to airborne asbestos fibres.

1.5 Protective Clothing

1.5.1 Provide workers with full body disposable coveralls. Full body disposable type coveralls shall be:

a) Worn by every worker who enters the Work Area;

b) Made of a material which does not readily retain nor permit penetration of asbestos fibres;

c) Include a head covering with snug fitting cuffs at the wrists, ankles and neck;

d) Include suitable footwear; and

e) Repaired or replaced if torn.

1.5.2 Provide other body protection required under applicable safety regulations.

1.6 Work Area Entry Procedures

1.6.1 Only persons wearing protective clothing and equipment per Sections 1.4 and 1.5 shall enter a work area where there is an asbestos hazard.

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

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

1.7 Work Area Exit Procedures

1.71. Before leaving the work area, a worker shall:

a) Remove visible contamination from protective clothing using HEPA vacuum or by wet wiping before removing and disposing of the protective clothing as asbestos waste;

b) Clean and store contaminated footwear, hard hats, etc. in a designated area; and

c) When leaving contaminated area, wash respirator, hands and face.

1.8 Visitor Protection

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

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

1.9 Air Monitoring

1.9.1 The purpose of the air monitoring is to detect faults in the Work Area such as: contamination outside the work area, failure of filtration or rupture in the differential pressure system, contamination of air outside the building envelope with airborne asbestos fibres, and enclosure clearance. Air testing will be completed during and following completion of the Type 2 abatement work, prior to teardown or entry by visitors

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or other personnel not directly involved with the abatement work. The procedures for air testing are provided for reference.

1.9.2 Ambient Air Testing: Collected outside a Type 2 or 3 enclosure, either within or adjacent to the construction area, during or immediately following completion of the work. This shall be conducted by the environmental consultant, and is completed to ensure that the time weighted average (TWA) concentration of asbestos does not exceed the exposure limit of 0.1 fibres / cubic centimetre outside the enclosure, as detailed under O. Reg. 490/09. If appropriate, ambient air testing may be completed to ensure the TWA for PNOS / nuisance dust does not exceed the exposure limit of 10 mg/m^3.

1.9.3 Clearance Air Testing: On completion of the work inside a Type 3 asbestos enclosure (if required) and once the enclosure is "Dry", as detailed under O. Reg. 278/05, clearance air testing shall be conducted by the environmental consultant.

1.9.4 If the area inside the enclosure fails the clearance test, the work area shall be re-cleaned to the satisfaction of the Consultant before a further test is carried out. The samples may be subjected to a second asbestos analysis using Transmission Electron Microscopy in accordance with O. Reg. 278/05.

1.9.5 When a second air analysis is done as described in the regulation, the Work Area inside the enclosure passes the clearance test only if every air sample collected has a concentration of asbestos fibres that does not exceed 0.01 fibres per cubic centimetre of air. The sample collection and analysis of the clearance air samples shall be done using Phase Contrast Microscopy method in accordance with U.S. National Institute for Occupational Safety and Health method 7400, Issue 2: Asbestos and other Fibres by PCM (August 15, 1994), using asbestos fibres counting rules, and shall comply with the O. Reg. 278/05.

1.9.6 During clearance air testing all samples shall be taken inside the enclosure. For asbestos clearance air sampling, forced air shall be used, both before and during the sampling process, to ensure that fibres are dislodged from all surfaces inside the enclosure before sampling begins and are kept airborne throughout the sampling process. At least 2,400 litres of air shall be drawn through each sample filter.

1.9.7 The number of clearance air samples collected shall include the following: Any individual enclosure less than or equal to 10 m^2 in area shall require a minimum of 2 samples, any enclosure greater than 10 m^2 but less than 500 m^2 shall require a minimum of 3 air samples; and any enclosure greater than 500 m^2 in area shall require a minimum of 5 air samples.

1.9.8 The work inside the enclosure passes the clearance test only if every air sample collected has a concentration of fibres that does not exceed 0.01 fibres per cubic centimetre of air.

1.10 Posting Air Monitoring Results

1.10.1 Within 24 hours after the clearance air testing results are received, the Contractor shall post a copy of the results in a conspicuous place or places in a common area of the building. The Contractor shall cooperate fully with the Consultant in the collection of air monitoring samples, and the posting of results as they are forwarded.

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2.0 PRODUCTS

2.1 Materials and Equipment

2.1.1 Polyethylene Sheeting: A single polyethylene film, 0.15 mm (6 mil) minimum thickness unless otherwise specified.

2.1.2 Rip Proof Polyethylene Sheeting: Woven fibre reinforced fabric bonded both sides with polyethylene sheeting. 0.20 mm (8 mil) fabric made up from one layer of 0.13 mm (5 mil) weave and two layers of 0.04 mm (1.5 mil) poly laminate.

2.1.3 Flame-Resistant Polyethylene Sheeting: A single polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films, 0.15 mm (6 mils) thickness. Flame–resistant polyethylene sheeting is to be used anywhere open flame or high temperature cutting is to be conducted, or in enclosure areas required to be heated.

2.1.4 Drop Sheets: A polyethylene sheet of type and size appropriate for the work being performed.

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

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

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

2.1.8 Foam: Low density polyurethane expanding foam Froth-Pack or equivalent or better.

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

2.1.10 Sealer: The slow-drying sealer shall be a non-staining, clear, water dispersible type that remains tacky on the surface for a minimum of 8 hours for the purpose of trapping any residual airborne fibres during the settling period. The product must have flame spread and smoke development ratings both less than 50 and shall leave no stain when dry. The slow drying sealer is often referred to as a "Lockdown Agent."

2.1.11 Bridging Encapsulant: Polymeric, water-based coating used to protect and isolate friable ACM. Acceptable products: Childers CP 211, or Monokote® MK-6, equivalent or better.

2.1.12 Asbestos Waste Containers: Waste shall be contained in two separate containers or waste bins which shall be dust-tight and impervious to asbestos and any chemicals used during the removal process. The inner container shall be a sealable polyethylene bag (or where the glove bag method is used, the glove-bag itself). Where there are sharp objects included in the waste material, the outer container shall be a sealable fibre type drum or bin, otherwise the outer container may be a sealable polyethylene bag. Containers shall be as follows:

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Polyethylene Waste Bag: 0.15 mm (6 mil) thick leak-tight polyethylene bags labelled as required by sub-section 3.5 Waste Disposal.

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

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

2.1.13 Fire Extinguishers: Provide Type "A" fire extinguishers for temporary offices and similar spaces where there is minimal danger of electrical or grease-oil-flammable liquid fires. In other locations provide type "ABC" dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposures in each case.

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

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

a) Ground fault circuit interrupters of sufficient capacity to power temporary electrical equipment and lights in the Work Area;

b) Interrupters to have a 5 mA ground fault protection;

c) Necessary accessories including main switch disconnect, ground fault interrupter lights, test switch to ensure unit is working, and reset switch; and

d) Openings sealed to prevent moisture or dust penetration.

2.1.16 HEPA Vacuum: Vacuum with necessary fittings, tools and attachments. Discharged air must pass through a HEPA filter.

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

a) Prefilter and HEPA filter. Air must pass through the HEPA filter before discharge;

b) Pressure differential gauge to monitor filter loading;

c) Auto shut off and warning system for HEPA filter failure;

d) Separate hold down clamps to retain HEPA filter in place during change of prefilter; and

e) Abatement contractor to ensure that each Unit passes a D.O.P. test prior to using on this project.

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

2.1.19 Airless Sprayer: Spray equipment for amended water: for application to asbestos-containing materials for saturation prior to removal. Airless spray units only are acceptable.

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

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

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

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

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

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

3.0 EXECUTION

3.1 Type 1 Operations

3.1.1 The Abatement Contractor is to perform pre-removal damage survey and submit any findings to the Consultant.

3.1.2 It is strongly recommended that workers voluntarily wear respiratory protection including a half-face respirator and disposable clothing.

3.1.3 Eating, drinking, chewing and smoking are not permitted in the work area, and facilities for hand and face washing are to be provided.

3.1.4 All visible dust to be removed via a vacuum equipped with a HEPA filter or wiped with a damp cloth.

3.1.5 The spread of dust shall be controlled by using a polyethylene drop cloth, where practicable.

3.1.6 The material to be removed shall be wetted before and kept wet during disturbance.

3.1.7 Non-friable ACMs are to be removed using non-powered hand-held tools unless they can be removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.

3.1.8 Frequently, at regular intervals and at the completion of work the Abatement Contractors shall clean up dust and waste using a vacuum fitted with a HEPA filter or damp cloth.

3.1.9 At completion of work, the polyethylene sheeting shall be wetted and disposed.

3.1.10 Waste materials should be disposed of as asbestos waste by placing into double-bagged, 6-mil polyethylene bags, taped shut and labelled.

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3.1.11 Waste should be delivered to the designated waste disposal location without un-due delay.

3.1.12 A full description of the measures and procedures for Type 1 operations is outlined in O. Reg. 278/05 of the Occupational Health and Safety Act.

3.2 Type 2 Operations

3.2.1 Ensure hoardings and other work barriers set-up by the general contractor are suitable for preventing access by unauthorized personnel.

3.2.2 Post signs at locations at access points to all sealed Work Areas. Signs shall be installed at Curtained Doorways leading directly into each Type 2 enclosure. Such signs shall read:

CAUTION

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

3.2.3 Do not proceed with Work Area preparation without obtaining written permission from the Prime Consultant. Provide a minimum of 24 hours' notice to the Environmental Consultant for the need of an inspection.

3.2.4 Isolate at panel and disconnect or ground existing power supply to the Work Area where necessary. Power supply to remaining areas of building must not be disrupted during work.

3.2.5 Remove fixtures, equipment etc. specified for removal, and that can be removed without disturbing ACM.

3.2.6 Fire alarms, heat detectors, and smoke detectors will remain active; protect as required.

3.2.7 Construct Decontamination Enclosures as follows:

a) Build suitable framing for enclosures, and line with polyethylene sheeting sealed with tape. Framing shall be constructed of 2" x 4" studs (stud grade) at 24" o/c (max.) with 2" x 4" wood sill and top plates (stud grade) fastened with a minimum of two 3 1/2" common nails per stud end. Use one layer of rip-proof polyethylene on floors. Use 2 layers of opaque rip-proof polyethylene sheeting on walls and ceiling: an inner layer made up of 6 mil poly, and an outer layer made up of rip-proof polyethylene; and

b) Build overlapping curtained doorways for each enclosure with weighted flaps.

3.2.8 Carefully protect items scheduled to remain in place using polyethylene, spray adhesive, tape, caulking, etc.

3.2.9 Seal all below deck openings, and openings at deck level, to Work Area using polyethylene, spray adhesive, tape, caulking, etc., including but not limited to windows, doors, vents, diffusers, etc.

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3.2.10 Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to Fire Commissioner of Canada and Provincial Fire Marshall. Collaborate with the General Contractor and facility personnel to ensure that enclosures do not interfere with facility fire exits.

3.2.11 Provide a fire extinguisher at each emergency exit and in both sides of the decontamination facilities.

3.2.12 Install temporary lighting in all work areas at levels that will provide for a safe and efficient use of the work area. Install battery powered emergency lights so as to light exit routes through Work Area.

3.2.13 When work procedures warrant, establish negative pressure in the Work Area as follows:

a) Distribute negative air filter/fan units evenly around the Work Area. Remove windows, if possible, and replace with 1/2" plywood with appropriately sized openings for exhaust. Switch the negative air pressure system to the "ON" mode and operate continuously until final completion of the work, including final clean-up. Exhaust air to the outside of the building or enclosure using sealed ducting. A spare negative air unit will be fully installed and ready to operate as a backup unit. The negative air pressure system must have the capacity to exchange air volume of the work area three times per hour and maintain a minimum of 0.02 inches of water gauge differential. Operate negative pressure system continuously from the time the first polyethylene is installed to seal openings until final completion of the work including final clean-up and air testing. Replace pre-filters and HEPA filters as required and on a regular basis to maintain even and constant draw across negative air unit. Do not discharge negative air ducting within 25 feet of building access points. Replace windows removed for discharge panels upon completion of project, if window removal was required;

b) Leak test negative air units in place using DOP method; and

c) Do not discharge negative air units into Occupied Areas unless specified or with written approval from the Consultant.

3.2.14 Spray ACMs with water containing the specified wetting agent, using airless spray equipment capable of providing a "mist" application to prevent release of fibres. Saturate the asbestos material sufficiently to wet it to the substrate without causing excess dripping. Spray the asbestos material repeatedly during work process to maintain saturation and to minimize asbestos fibre dispersion. Score the outer surface where water does not penetrate the outer layers.

3.2.15 Remove the saturated asbestos material in small sections by hand unless the material is non-friable and may be removed using power tools that are attached to a dust-collecting device equipped with HEPC filter. Do not allow saturated asbestos to dry out. As it is being removed, pack the material in sealable plastic bags 0.15 mm minimum thick and place in labelled containers for transport. Collect waste water from the floor and do not allow it to pool. Mist the air continuously where asbestos is being disturbed with amended

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water using one dedicated airless sprayer equipped with a fine atomizing nozzle. Contain wastewater in sealable plastic containers, suitable for transport and disposal without leaking or dispose of by pumping into a settling tank, filtering the water using specified filters, and then pumping into a sanitary sewer.

3.2.16 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving containers to decontamination wash area. Wash containers thoroughly in decontamination washroom, and store in holding room pending removal to unloading room and outside. Ensure that containers are removed from the holding room by workers who have entered from uncontaminated areas dressed in clean coveralls.

3.2.17 After completion of removal work, all surfaces from which asbestos has been removed shall be wire brushed and/or damp-sponged to remove all visible material. During this work the surfaces shall be kept wet.

3.2.18 Where the Consultant decides complete removal of asbestos-containing material is impossible due to obstructions such as structural members or major service elements, and provides written direction, seal the material as directed by the Consultant.

3.2.19 After wire brushing or damp-sponging to remove visible dust, wet clean the entire enclosure including waste storage areas and vestibules. Pre-filters on fan units shall be treated as asbestos waste and disposed of accordingly.

3.2.20 Do not proceed with work of applying Lock Down Agent without obtaining verbal permission from the Consultant indicating a visual clearance inspection has been performed and the site is satisfactory to the Consultant. Completion of multiple work areas should be completed simultaneously where safe and practicable to avoid project delays and the Contractor must provide a minimum of 24 hours' notice to the Consultant for the need of a visual clearance inspection.

3.2.21 A full description of the measures and procedures for Type 2 operations is outlined in O. Reg. 278/05 of the Occupational Health and Safety Act.

3.3 Type 2 Glove Bag Operations

3.3.1 The Contractor is to perform a pre-removal damage survey and submit any findings to the Consultant.

3.3.2 Workers are to wear respiratory protection including but not limited to a half-face respirator and disposable clothing.

3.3.3 Eating, drinking, chewing and smoking are not permitted in the work area, and facilities for hand and face washing are to be provided.

3.3.4 All visible dust to be removed via a vacuum equipped with a HEPA filter or wiped with a damp cloth.

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3.3.5 The spread of dust shall be controlled by using a polyethylene drop cloth.

3.3.6 The material to be removed shall be wetted before and kept wet during disturbance.

3.3.7 The glove bag is to be inspected for damage immediately before used and at regular intervals during the abatement.

3.3.8 The glove bag is to be attached to the piping in such a way as to completely enclose the ACM insulation.

3.3.9 Once the glove bag has been attached to the piping, the seals around the piping shall be inspected to ensure an air-tight seal.

3.3.10 The abatement contractor to proceed with the removal of the ACM insulation, ensuring that all materials are wetted regularly.

3.3.11 Once all ACM parging cement has been removed from the fitting, the fitting shall be scrubbed with a wire brush and washed with a damp rag.

3.3.12 When all the visible evidence of the ACM insulation has been removed from the fitting, the inner surface of the glove bag and the waste materials shall be thoroughly wetted and the air inside the bag removed with a vacuum fitted with a HEPA filter.

3.3.13 The glove bag and waste materials should be disposed of as asbestos waste by placing into double-bagged, 6-mil polyethylene bags, taped shut and labelled.

3.3.14 At completion of work polyethylene sheeting shall be wetted and disposed.

3.3.15 Waste should be delivered to the designated waste disposal location without un-due delay.

3.3.16 A full description of the measures and procedures for Type 2 Glove bag operations are outlined in O. Reg. 278/05 of the Occupational Health and Safety Act.

3.4 Type 3 Operation - Preparations

3.4.1 The Contractor is to perform pre-removal damage survey and submit any findings to the Consultant.

3.4.2 HEPA vacuum any floor areas and any tools, supplies, or fixtures that will be removed from building prior to the abatement work of residue dust and debris prior to installation of decontamination facility in order to avoid disturbance of any friable loose fibres that may be present in the room.

3.4.3 HEPA vacuum all other surface areas, gaps or holes in any surfaces, fixtures or building materials where possible of any residual waste material.

3.4.4 Move equipment, tools, supplies, stored materials, etc. which can be performed without disturbing ACM, to a location designated by the Consultant.

3.4.5 Install Worker Decontamination Facility which shall comprise of an Equipment and Access Room, a Shower Room, and a Clean Room, as follows:

a) Equipment and Access Room: build an Equipment and Access Room between Shower Room and work areas, with two air locks, one to the Shower Room and one

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to work areas. The Equipment and Access Room shall be large enough to accommodate the storage of work boots, or any other protective clothing that might be used again, and at least three workers allowing them sufficient space to undress comfortably;

b) Shower Room: build a Shower Room between the Clean Room and Equipment and Access Room, with two air locks, one to the Clean Room and one to Equipment and Access Room. Provide a constant supply of hot and cold water. The Shower Room shall have individual controls inside the room to regulate water temperature and flow. Provide piping and connect to water sources and drains. Pump wastewater through a 5 micrometre filter system acceptable to Consultant before directing into drains connected to a septic system and/or sanitary sewer. Provide soap, clean towels and appropriate containers for disposal of used respirator filters;

c) Clean Room: build a Clean Room between the Shower Room and clean areas outside of enclosures, with two air locks, one to outside of enclosures and one to Shower Room. Provide lockers or hangers for workers street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install a mirror to permit workers to fit respiratory equipment properly, and sufficient hangers and hooks; and

d) Construct Decontamination Enclosures as follows:

   i. Build suitable framing for enclosures, and line with polyethylene sheeting sealed with tape. Framing shall be constructed of 2" x 4" studs (stud grade) at 24" o/c (max.) with 2" x 4" wood sill and top plates (stud grade) fastened with a minimum of two 3 1/2" common nails per stud end. Use one layer of rip-proof polyethylene on floors. Use 2 layers of opaque rip-proof polyethylene sheeting on walls and ceiling: an inner layer made up of 6 mil poly, and an outer layer made up of rip-proof polyethylene; and

   ii. Build curtained doorways between enclosures.

3.4.6 Erect walls separating Work Area from Occupied Areas as follows:

3.4.6.1 Build suitable floor to ceiling lumber stud framing, cover with polyethylene sheeting sealed with tape, and apply 9 mm minimum thick plywood. Seal all joints between plywood sheets and between plywood and adjacent materials with surface film forming type sealer, to create an airtight barrier.

3.4.6.2 Cover plywood barrier with polyethylene sealed with tape, as specified for work areas.

3.4.6.3 Caulk as required, edges of partition both sides at floor, walls and around fixtures.

3.4.7 Supply water as required for the Work Area and Decontamination Facilities. Water will be supplied by the Owner from existing water supply system. Contractor is responsible for all fittings. Contractor shall install using vacuum breakers or other backflow preventer as required by local authority.

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3.4.7.1 Water supply shall be by means of copper pipe and fittings on high- pressure hose and fittings. A master shut-off valve shall be installed adjacent to, and on the clean side, of the decontamination facility. Any hose and hose connections must be for high pressure only and downstream of the master shut-off valve and is not to be left under pressure unattended. Maintain hose connections and outlet valves in leak proof condition. Where finish work below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize the possibility of water damage. Drain water promptly from pans as it accumulates and dispose through filtration system.

3.4.8 Provide and install drainage facilities from temporary shower.

3.4.9 Provide and install drainage in removal work areas as required.

3.4.10 Provide and install a filtration system to filter all water to be disposed of from the removal and decontamination area.

3.4.11 Pre-clean all surfaces in the Work Area, using a HEPA vacuum or damp cloth prior to installing protection.

3.4.12 Remove fixtures, equipment etc. specified for removal, and that can be removed without disturbing ACM.

3.4.13 Lighting fixtures, security cameras, fire alarms, heat detectors, and smoke detectors will remain active; protect as required.

3.4.14 Erect sealed worker platforms where specified as follows, if required:

a) Shop drawings of all platform layouts, hoarding and details to be submitted to the Consultant prior to commencing work;

b) Scaffolding and platforms, if required, shall be designed by a professional engineer and built in accordance with said design if the height of the platform exceeds 15 metres or 10 metres of tube and clamp system;

c) Install support bases of sufficient dimension and strength to protect floors. Repair or replace damage caused by erection, weight or dismantling of platform;

d) Install platform supports in and around existing fixtures, walls, doors and equipment so as not to interfere with the operating, use, or maintenance of space or equipment. Leave 36" (900 mm) clear around all operating equipment;

e) Install platform to maintain a minimum clear height of 6 feet 6 inches (2.0 meters);

f) Construct a framework of metal scaffolding or equivalent on top of which the working platform is to be placed. The working platform shall consist of one layer of rip-proof polyethylene below scaffold boards over which plywood (of sufficient thickness to support personnel and equipment as required by Occupational Health and Safety Act and Regulations) is nailed in place;

g) Caulk and tape plywood seams to provide a barrier to water penetration;

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h) Seal platform to prevent any water leakage during removal by covering working platform with moisture impermeable barrier consisting of at least two layers of rip-proof polyethylene;

i) Install Hoarding Walls so as to completely isolate platform from Occupied Area;

j) Install fluorescent lighting at underside of platforms to maintain existing lighting levels; and

k) Provide 1 emergency escape hatch for each 500 square feet (50 square meters) of platform. The hatch is to be constructed in a water and air tight manner that can be readily opened in an emergency situation. Provide emergency lighting at each hatch.

3.4.15 Erect tunnels where specified as follows, if required:

a) Minimum interior clear width of tunnel to be 3'-7" (1100 mm), 5'-5" (1650 mm), or the width of emergency exit at end of tunnel;

b) Install Hoarding walls at both sides of the tunnel so as to isolate the tunnel from the Work Area;

c) Maintain a minimum clear height of 7'-0" (2135 mm) to the underside of the tunnel roof;

d) Install 2" x 6" (50 mm x 150 mm) wood or metal roof joists at 16" (400 mm) o/c. with continuous 2" x 6" (50 mm x 150 mm) headers;

e) Cover roof joists with 3/4" (20 mm) plywood sheeting;

f) Caulk and tape joints in plywood, and cover with two layers of rip-proof polyethylene. One layer to extend continuously over rip-proof polyethylene on the perimeter walls;

g) Install one layer of good one side plywood at underside of joist.

h) Install fluorescent lighting at underside of tunnel to maintain existing lighting levels; and

i) Occupied Area side of plywood tunnel walls and ceiling to be painted with two coats of flat white latex paint.

3.4.16 Erect equipment enclosures where specified as follows, if required:

a) Construct walls 24" (610mm) around specified items using 2" x 4" (38 mm x 89 mm) wood or metal studs at 16" (405 mm) o/c. with continuous top and sill plates. Walls to extend 12" (305mm) above specified items;

b) Install ¾" (19mm) plywood sheeting over stud walls except at emergency access to enclosure. Caulk and tape joints in plywood;

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c) Install 2 layers of independently supported rip-proof polyethylene over enclosure walls;

d) Installing 2" x 6" (38 mm x 152 mm) wood or metal roof joists at 16" (400 mm) o/c. with continuous 2" x 6" (38 mm x 152 mm) headers, over specified items;

e) Install ¾" (19mm) plywood over roof joists. Caulk and tape joints in plywood;

f) Install two layers of rip-proof polyethylene over roof. Both layers to extend continuously over rip-proof polyethylene on the perimeter walls;

g) Supply adequate amount of clean, dry air to bottom of enclosure adjacent to the normal air entry louvres of equipment, using a negative air machine(s) supplying air from outside the Work Area;

h) Draw off exhaust air adjacent to the normal air exhaust louvres of equipment, using a second negative air machine to exhaust the air outside the Work Area, for each negative air machine supplying the enclosure; and

i) Use flexible ducting for supply and exhaust to individual enclosures.

3.4.17 Carefully protect items scheduled to remain in place using polyethylene, spray adhesive, tape, caulking, etc.

3.4.18 Seal all below deck openings, and openings at deck level, to Work Area using polyethylene, spray adhesive, tape, caulking, etc., including but not limited to windows, doors, vents, diffusers, etc.

3.4.19 Seal all openings in floor using plugs, tape, caulking, rip-proof polyethylene, etc. Floor openings are to be sealed independently prior to installation of floor polyethylene. Include floors of duct and service shafts.

3.4.20 Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to Fire Commissioner of Canada and Provincial Fire Marshall.

3.4.21 Provide a fire extinguisher at each emergency exit and in both sides of the decontamination facilities.

3.4.22 Install temporary lighting in all work areas at levels that will provide for a safe and efficient use of the work area. Install battery powered emergency lights so as to light exit routes through Work Area.

3.4.23 Protect floors as follows, as applicable:

a) If drywall ceilings or other items are being demolished that may damage finishes, protect surfaces with plywood;

b) Sprayed fireproofing removal, install 2 layers of 6-mil rip proof polyethylene;

c) Floor on grade and/or concrete, install 1 layer of 6-mil rip proof polyethylene;

d) Carpeted surfaces, install 2 layers of 6-mil rip proof polyethylene over plywood. Plywood sheets to be taped and/or caulked at the seams, beneath rip proof polyethylene; and

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e) For all areas, extend floor protection a minimum of 12" up all vertical surfaces in the Work Area. Each layer of polyethylene is to be laid and sealed independently of each other.

3.4.24 Install 2 layers of polyethylene all walls forming the perimeter of the Work Area. Each layer of polyethylene is to be laid and sealed independently of each other. Overlap floor polyethylene with wall polyethylene by a minimum of 12" (305 mm) at each layer.

3.4.25 Establish negative pressure in the Work Area as follows:

a) Distribute negative air filter/fan units evenly around the Work Area. Remove windows, if required, and replace with 1/2" plywood with appropriately sized openings for exhaust. Switch the negative air pressure system to the "ON" mode and operate continuously until final completion of the work, including final clean-up. Exhaust air to the outside of the building using sealed ducting. A spare negative air unit will be fully installed and ready to operate as a backup unit. The negative air pressure system must have the capacity to exchange air volume of the work area three times per hour and maintain a minimum of 0.02 inches of water gauge differential. Operate negative pressure system continuously from the time the first polyethylene is installed to seal openings until final completion of the work including final clean-up and air testing. Replace pre-filters and HEPA filters as required and on a regular basis to maintain even and constant draw across negative air unit. Do not discharge negative air ducting with-in 25 feet of building access points. Replace windows removed for discharge panels upon completion of project, if window removal was required;

b) If required, provide separate air circulation, dust and temperature control measures for computer server located in Room A115. Control measures must remain in place during any time that HVAC system is shut-down for that area and times where there is possibility of dust from the work in the area;

c) Leak test negative air units in place using DOP method; and

d) Do not discharge negative air units into Occupied Areas unless specified or with written approval from the Consultant.

3.4.26 Isolate at panel and disconnect or ground existing power supply to the Work Area where necessary. Power supply to remaining areas of building must not be disrupted during work of this section.

3.4.27 Post signs at locations where access to a sealed Work Area is possible. Signs shall be installed at Curtained Doorways leading directly into Work Area. Such signs shall read:

CAUTION

Asbestos Hazard Area

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No Unauthorized Entry

Wear assigned protective equipment

Breathing asbestos dust may cause serious bodily harm

3.4.28 Do not proceed with Work Area preparation without obtaining written permission from the Consultant. Provide a minimum of 24 hours' notice to the Consultant for the need of an inspection.

3.5 Type 3 Operation - Work Area Preparation

3.5.1 Use full personal protective procedures and equipment, amended water and HEPA vacuums during Work Area preparation.

3.5.2 Shut down HVAC systems affecting the Work Area during the proposed abatement schedule only.

3.5.3 Remove and dispose of ceilings and other obstructions to access ducts supplying into and exhausting from the Work Area, or ducts to remain live within the Work Area. Secure and/or remove and store any in-place ceiling mounted light fixtures for future use.

3.5.4 Seal ducts supplying into and exhausting from the Work Area during one shift, as follows:

a) Cut and cap ducts as close as possible to perimeter of the Work Area;

b) Cap with metal of gauge equal to sheet metal being capped;

c) Cap all exposed wall openings or other significant gaps in any surfaces or building fixtures which may contain or collect residue asbestos fibres or other asbestos waste materials as a result of asbestos abatement work; and

d) Seal seams of cap with duct sealant, tape and polyethylene sheeting.

3.5.5 For HVAC systems to remain active within the Work Area, perform the following:

a) Remove flexible ducts and diffusers attached to systems to remain active;

b) Cap with metal of gauge equal to sheet metal being capped;

c) Seal seams of cap with duct sealant, tape and polyethylene sheeting;

d) Clean outside and seal duct or equipment with rip-proof polyethylene and other products so as to make air tight; and

e) Smoke test seals regularly.

3.5.6 Smoke test seals after HVAC system is reactivated. Reseal and retest as required.

3.6 Type 3 Operation - Asbestos Removal

3.6.1 Spray ACMs with water containing the specified wetting agent, using airless spray equipment capable of providing a "mist" application to prevent release of fibres. Saturate the asbestos material sufficiently to wet it to the substrate without causing excess dripping. Spray the asbestos material repeatedly during work process to

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maintain saturation and to minimize asbestos fibre dispersion. Score the outer surface where water does not penetrate the outer layers.

3.6.2 Remove the saturated asbestos material in small sections. Do not allow saturated asbestos to dry out. As it is being removed, pack the material in sealable plastic bags 0.15 mm minimum thick and place in labelled containers for transport. Collect waste water from the floor; do not allow it to pool. Mist the air continuously where asbestos is being disturbed with amended water using one dedicated airless sprayer equipped with a fine atomizing nozzle. Contain waste water in sealable plastic containers, suitable for transport and disposal without leaking or dispose of by pumping into a settling tank, filtering the water using specified filters, and then pumping into a sanitary sewer.

3.6.3 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving containers to decontamination wash area. Wash containers thoroughly in decontamination washroom, and store in holding room pending removal to unloading room and outside. Ensure that containers are removed from the holding room by workers who have entered from uncontaminated areas dressed in clean coveralls.

3.6.4 After completion of removal work, all surfaces from which asbestos has been removed shall be wire brushed and wet-sponged to remove all visible material. During this work the surfaces shall be kept wet.

3.6.5 Where the Consultant decides complete removal of asbestos-containing material is impossible due to obstructions such as structural members or major service elements, and provides written direction, seal the material as directed by the Consultant.

3.6.6 After wire brushing and wet sponging to remove visible asbestos, wet clean the entire work area including the Equipment and Access Room, and equipment used in the process. Pre-filters on fan units shall be treated as asbestos waste and disposed of accordingly.

3.6.7 Do not proceed with work of applying Lockdown Agent without obtaining written permission from the Consultant indicating a visual clearance inspection has been performed and the site is satisfactory to the Consultant. All Work Areas should be completed simultaneously to avoid project delays and the Contractor must provide a minimum of 24 hours' notice to the Consultant for the need of a visual clearance inspection.

3.7 Type 3 Operation - Application of Lockdown Agent

3.7.1 After completion of the final cleaning and after the Consultant has passed a visual cleanliness inspection, spray sealant (approved by the Consultant) on all surfaces in the Work Area.

3.7.2 Allow a 24-hour settling period, or a time period accepted by the Consultant, for the sealer to dry. During this settling period, no entry or activity will be permitted in the Work Area.

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3.7.3 Obtain written permission from the Consultant to proceed with the insulation reinstatement following the visual clearance inspection and air monitoring results (if required). Should clearance air monitoring results exceed 0.01 fibres per cubic centimetre of air, the Contractor will, at no cost to the Owner, re-clean the Work Area and apply another coat of Lockdown Agent.

3.8 Type 3 Operation - Work Area Teardown and Dismantling

3.8.1 After application of lockdown and clearance air sampling, the Type 3 enclosure is to remain in place as a dust enclosure for the re-instatement of the new sprayed fire proofing. The perimeter seal, negative air and decontamination facility shall be used to prevent the spread of dust through the building.

3.8.2 Depending on the timing of the abatement and fire-spray reapplication, re-mobilization for tear-down by the abatement contractor may be necessary.

3.8.3 Operate negative air units during teardown.

3.8.4 Remove all polyethylene, tape, polyurethane foam, caulking and enclosures from the Work Area.

3.8.5 Remove asbestos contaminated floor polyethylene by carefully rolling away from walls to centre of Work Area.

3.8.6 Remove top layer of polyethylene sheeting from surfaces protected by two layers of polyethylene sheeting.

3.8.7 Cut the lower layer of polyethylene sheeting to expose the baseboards, window sills, cabinets, shelves and other horizontal surfaces that may be contaminated by fallen ACM.

3.8.8 Remove visible fibres or residue found during removal of polyethylene using a HEPA vacuum.

3.8.9 Place polyethylene, tape, cleaning material, clothing and other contaminated waste in asbestos waste containers and dispose of as asbestos waste in accordance with O. Reg. 278/05.

3.8.10 Seal vacuum hoses and fittings, flexible ductwork and all tools used in the Work Area in 6 mil polyethylene bags prior to removal from Work Area.

3.8.11 Wash equipment used in the Work Area to remove all asbestos fibres, or double bag for transportation prior to being removed from the Work Area, via waste and equipment decontamination facility.

3.8.12 Clean up the Work Area, Equipment and Access area, washing/Showering Room, and other enclosures that may contain asbestos fibres.

3.8.13 Remove polyethylene protection and hoarding walls where hoarding walls separate occupied areas from work area.

3.8.14 Hoarding walls to remain are identified on drawings, if applicable.

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3.8.15 Remove polyethylene sheeting from contaminated side of decontamination facilities.

3.8.16 Wash and mop with clean water all surfaces in the Work Area.

3.8.17 Remove all temporary lights, ground fault panels and Negative Pressure Units.

3.8.18 Remove negative air unit prefilters. Dispose of as asbestos contaminated waste.

3.8.19 Immediately upon shutting down negative air units, seal air inlet grill and exhaust vent with polyethylene and tape.

3.8.20 Maintain all hoarding walls adjacent to areas where ACM is present and in good condition.

3.8.21 Remove decontamination facilities, platforms and platform scaffolding, and tunnels, etc.

3.8.22 Damp mop and clean with HEPA vacuum Occupied Areas previously below platforms, tunnels and decontamination facilities with HEPA vacuum.

3.9 Re-establishment of Objects and Systems

3.9.1 Make good at completion of work, all damage not identified in pre-removal survey.

3.9.2 Notify the Consultant of any damage to any utilities immediately upon discovery.

End of Section

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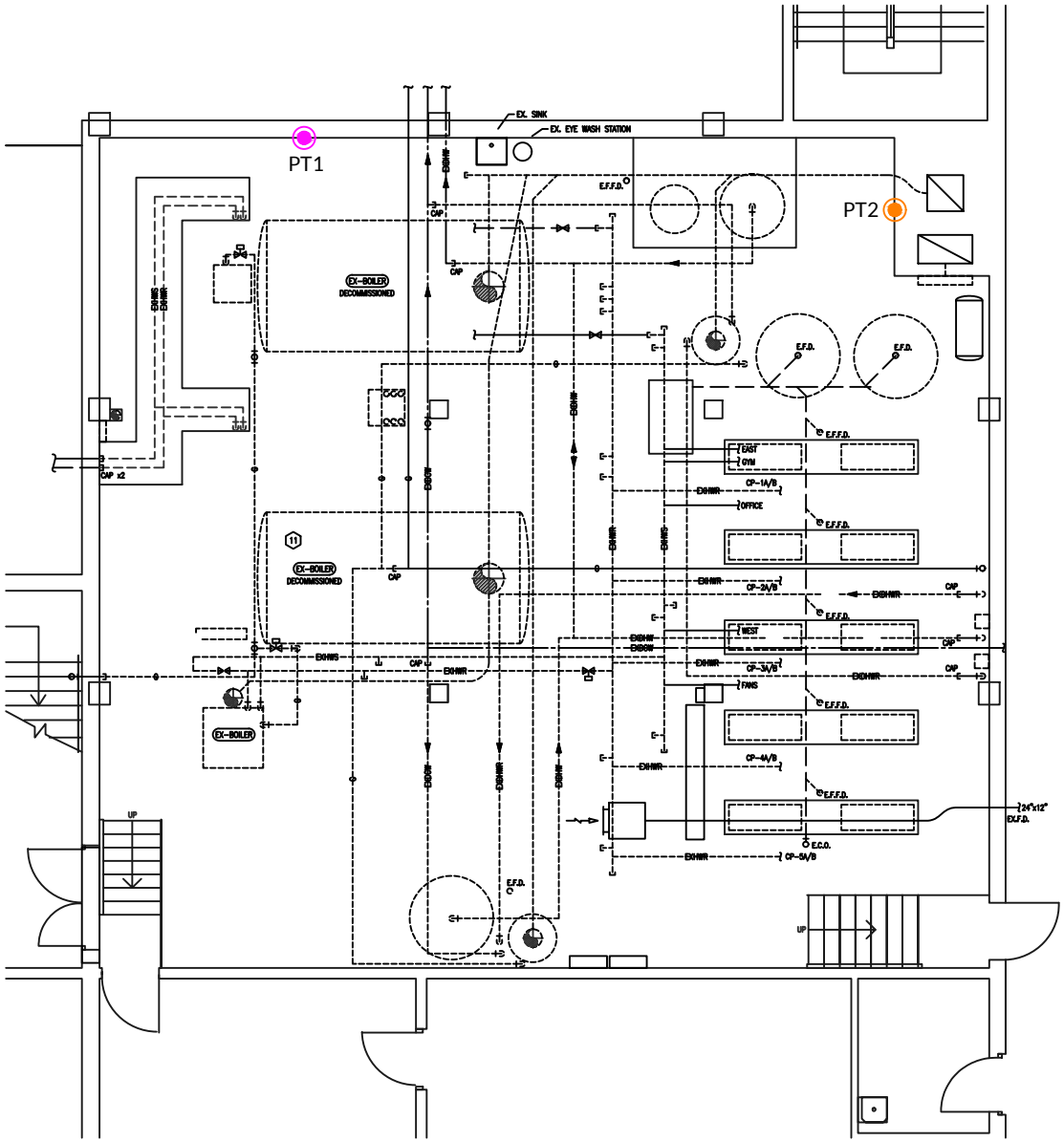
ATTACHMENT A – Figures



LEGEND

- PAINT SAMPLE TESTED POSITIVE FOR LEAD-BASED PAINT
- PAINT SAMPLE TESTED POSITIVE FOR LEAD-CONTAINING PAINT

REFERENCE: ARC ENGINEERING INC., HILL PARK LEARNING CENTRE - HVAC AND PLUMBING UPGRADES. 465 EAST 16TH STREET, HAMILTON, ONTARIO. PROJECT NO.: 24-127-110. BOILER ROOM UPGRADES - DEMOLITION . DRAWING NO.: M-300. ISSUED FOR 70% COMPLETE NOV 29, 2024.

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NOTE: LOCATIONS OF BUILDINGS, UNDERGROUND UTILITIES, ETC. ARE FOR REFERENCE ONLY AND SHOULD NOT BE RELIED UPON FOR DETAILED DESIGN, EXCAVATION, OR CONSTRUCTION PURPOSES

CLIENT: HWDSB

SITE: 465 EAST 16TH STREET, HAMILTON, ONTARIO

TITLE: BOILER ROOM SHOWING SAMPLE LOCATIONS

DATE: FEB 2025

SCALE: NTS

PROJECT: 622074.CE TASK 4

FIGURE: 1

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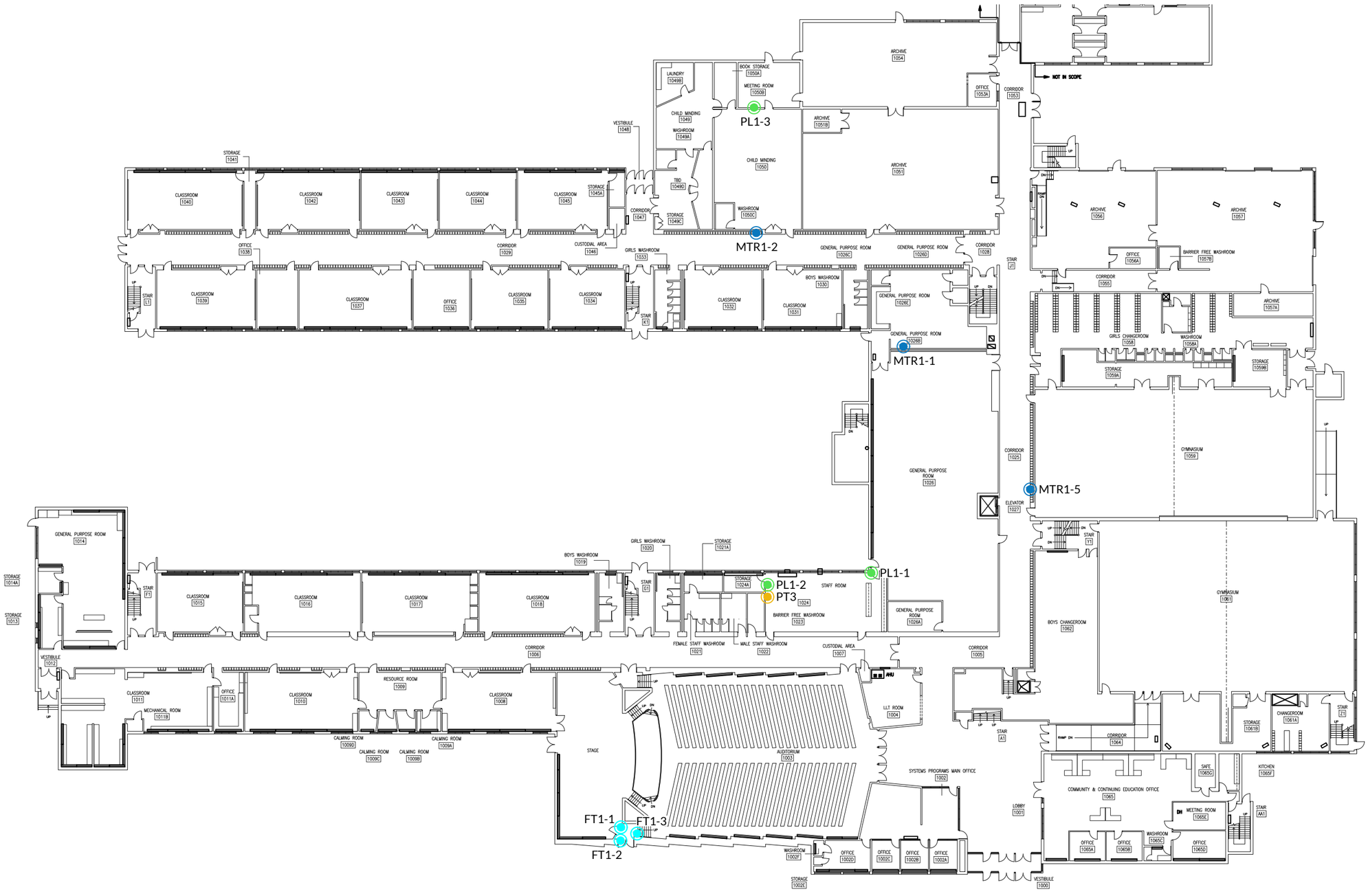

LEGEND

- MORTAR SAMPLE TESTED NEGATIVE FOR ASBESTOS
- PLASTER SAMPLE TESTED NEGATIVE FOR ASBESTOS
- VINYL FLOOR TILE SAMPLE TESTED NEGATIVE FOR ASBESTOS
- PAINT SAMPLE TESTED NEGATIVE FOR LEAD-CONTAINING PAINT

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Fax:(519)-653-8907

REFERENCE: ARC ENGINEERING INC., HILL PARK LEARNING CENTRE - HVAC AND PLUMBING UPGRADES. 465 EAST 16TH STREET, HAMILTON, ONTARIO. PROJECT NO.: 24-127-110. GROUND FLOOR MECHANICAL - DEMOLITION . DRAWING NO.: M-301. ISSUED FOR 70% COMPLETE NOV 29, 2024.

NOTE: LOCATIONS OF BUILDINGS, UNDERGROUND UTILITIES, ETC. ARE FOR REFERENCE ONLY AND SHOULD NOT BE RELIED UPON FOR DETAILED DESIGN, EXCAVATION, OR CONSTRUCTION PURPOSES

CLIENT: HWDSB

SITE: 465 EAST 16TH STREET, HAMILTON, ONTARIO

TITLE: GROUND FLOOR SAMPLE LOCATIONS

DATE: FEB 2025

SCALE: N.T.S.

PROJECT: 622074.CE TASK 4

FIGURE: 2

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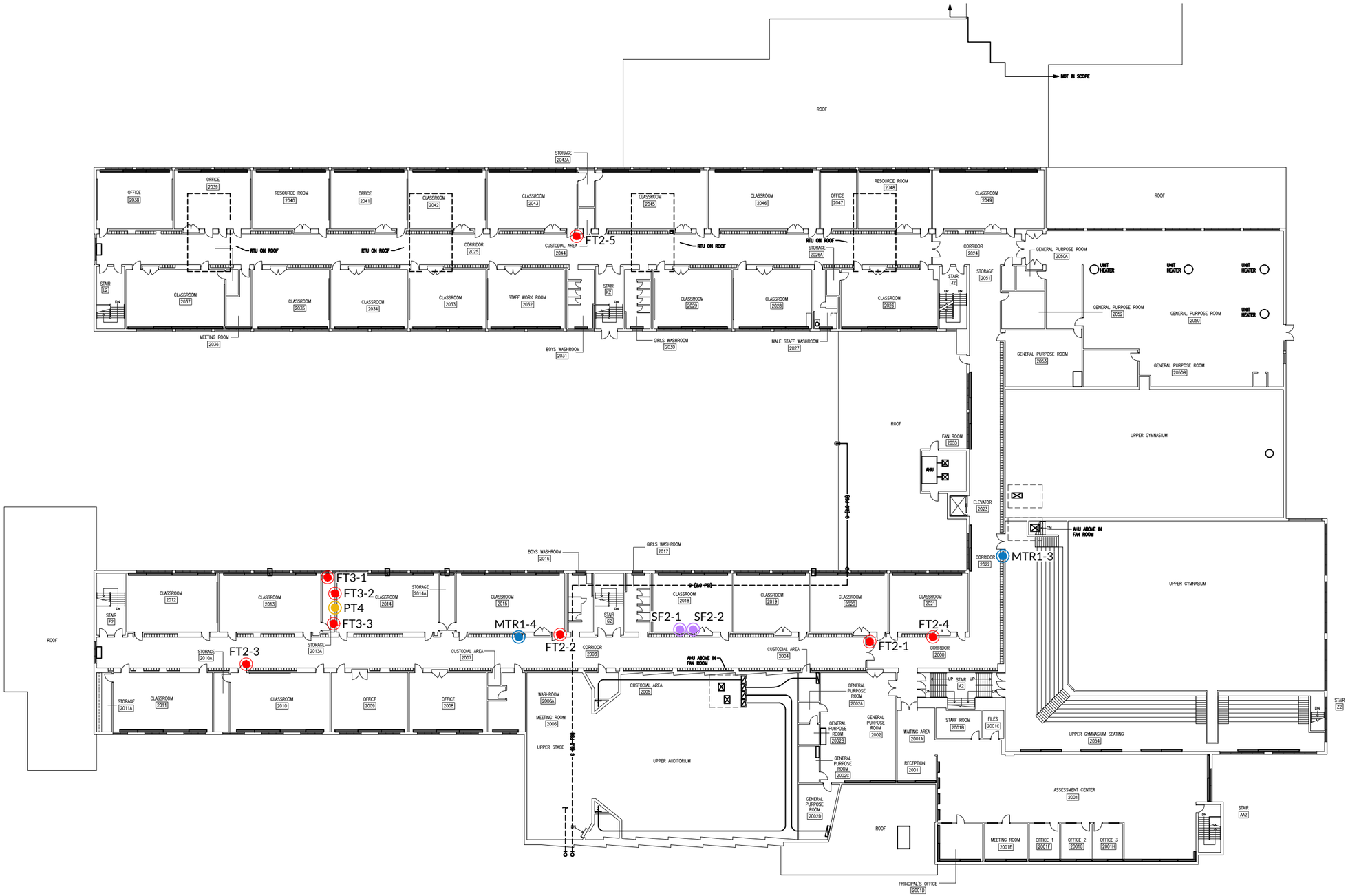

LEGEND

- MORTAR SAMPLE TESTED NEGATIVE FOR ASBESTOS
- SPRAY FOAM INSULATION SAMPLE TESTED NEGATIVE FOR ASBESTOS
- FLOOR TILE SAMPLE TESTED POSITIVE FOR ASBESTOS
- PAINT SAMPLE TESTED NEGATIVE FOR LEAD-CONTAINING PAINT

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REFERENCE: ARC ENGINEERING INC., HILL PARK LEARNING CENTRE - HVAC AND PLUMBING UPGRADES. 465 EAST 16TH STREET, HAMILTON, ONTARIO. PROJECT NO.: 24-127-110. SECOND FLOOR MECHANICAL - DEMOLITION . DRAWING NO.: M-302. ISSUED FOR 70% COMPLETE NOV 29, 2024.

NOTE: LOCATIONS OF BUILDINGS, UNDERGROUND UTILITIES, ETC. ARE FOR REFERENCE ONLY AND SHOULD NOT BE RELIED UPON FOR DETAILED DESIGN, EXCAVATION, OR CONSTRUCTION PURPOSES

CLIENT: HWDSB

SITE: 465 EAST 16TH STREET, HAMILTON, ONTARIO

TITLE: SECOND FLOOR SAMPLE LOCATIONS

DATE: FEB 2025

SCALE: N.T.S.

PROJECT: 622074.CE TASK 4

FIGURE: 3

FILE EXTENSION: P:\2022 Projects\Cambridge\622074.CE-HWDSB-DSS-Hill Park & Glendale, Hamilton, ON\!AutoCAD\622074.CE.dwg

1. Definitions

1. The following Section of this Specification are of the abbreviated type and include incomplete sentences. Definite and indefinite articles have often been omitted and sentences are written in the form of direct instructions to the Contractor without using the phrase `the Contractor shall.' Standard specifications and other quality references inserted govern materials and workmanship without using phrases `conform with,' `conformity therewith,' etc. Omitted words and phrases to be supplied in the same manner as they are when a note appears on the Drawings.

2. The Specifications are separated into Sections for reference convenience only. Such separation must in no instance make Owner or his Consultants arbiter to establish subcontract limits between Contractor and Subcontractor.

3. Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on Drawings and/or in Specifications, including all labour, materials, equipment, tools, services, and incidentals necessary and required to complete the work. Responsibility for breakdown into and extension of subcontracts, including co-ordination of same, rests entirely with the Contractor.

4. Standard Specifications referred to are editions in force at Tender Closing Date.

2. Terminology

1. Consultants are the team of Architects, Engineers and other experts commissioned by the Owner, directly or indirectly, to execute design, contract documents and supervision for the project, including any of their agents or employees.

2. Prime Consultant is the Architect.

3. Contractor is the Firm or Corporation who, having signed the Agreement, has the sole legal responsibility to carry out the work shown or described in the Contract Documents for the Owner, whether contractually assigned to a Subcontractor or supplier, or not.

3. Minimum Standards

1. Unless otherwise specified, work and material to conform or exceed the minimum standards set out in the editions of the Canadian Government Specification Board, Canadian Standards Associations, the Ontario Building Code, Underwriters' Laboratories of Canada, the Canadian Electrical Code, the Local Building Code in force, whichever is applicable.

2. Copies of Standard Specifications referred to in this Specification to be kept on the site.

3. The use of the name (or its abbreviation) of any of the following bodies, accompanied by the reference number of a specification of that body to mean that the entire specification of the body to apply as noted:

AISC: American Institute of Steel Construction;
ASTM: American Society for Testing Materials;
CEC: Canadian Electric Code;
CGSB: Canadian Government Specification Board;
CISC: Canadian Institute of Steel Construction;
CRCA: Canadian Roofing Contractors' Association;
CSA: Canadian Standards Association;
OBC: Ontario Building Code;
ULC: Underwriters' Laboratories of Canada;
CLA: Canadian Lumbermen's Association.

4. Cooperation

1. Each trade to co-operate with the trades of adjacent or affected work. Supply in good time requirements affecting adjacent and underlying work in writing and items to be set or built in. Similarly, heed requirements and build-in items provided by other trades.

2. Take necessary precautions to protect work of other trades from contamination, marring or other damage due to application or installation processes, methods and activities.

3. General Contractor and each trade to co-operate with Contractors which may be assigned or selected by the Owner to perform work under Cash Allowances. Owner reserves the right to assign non-unionized labour to perform work under Cash Allowances, at Owners discretion.

5. Coordination

1. Co-ordinate the work of all trades in such a manner that each trade co-operates with the trade of adjacent work.

2. Organize weekly job site meetings and send out notices stating time and place to Consultants, subcontractors, Suppliers and all others whose presence is required at the meetings.

3. Take note of all persons attending these meetings and submit to Consultants and Owner, Minutes of these Meetings showing any major decisions made and instructions or information required.

4. Co-ordinate the Work in this Contract with the work of others awarded work under Cash Allowances.

6. Building Dimensions and Co-ordination

1. Ensure that all necessary job dimensions are taken and all trades are coordinated for the proper execution of the work. Assume complete responsibility for the accuracy and completeness of such dimensions, and for co-ordination.

2. Verify that all 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.

3. Check and verify all dimensions referring to the work and the interfacing of all services. Verify all dimensions with the trade concerned when pertaining to the work of other trades. Be responsible to see that Subcontractors for various trades co-operate for the proper performance of the Work.

4. Avoid scaling directly from the drawings. If there is ambiguity or lack of information, immediately inform the Consultant. Be responsible for any change through the disregarding of this clause.

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

6. Advise Consultant of discrepancies and if there are omissions on drawings, particularly reflected ceiling plans and jointing patterns for paving, ceramic tile, or carpet tile layouts, which affect aesthetics, or which interfere with services, equipment or surfaces. DO NOT PROCEED without direction from the Consultant.

7. Ensure that each Subcontractor communicates requirements for site conditions and surfaces necessary for the execution of the Subcontractor's work, and that he provides setting drawings, templates and all other information necessary for the location and installation of material, holes, sleeves, insets, anchors, accessories, fastenings, connections and access panels. Inform other Subcontractors whose work is affected by these requirements and preparatory work.

8. Prepare interference drawings to properly co-ordinate the work where necessitated. Refer to Section 01340.

7. Use of Premises Before Substantial Performance

1. The Owner shall have the right to enter and occupy the building, in whole or in part, for the purpose of placing fittings and equipment, or for other use, before completion of the Contract if, in the opinion of the Consultant, such entry and occupancy does not prevent or interfere with the Contractor in the performance of the Contract. Such entry shall in no way be considered as an acceptance of the Work in whole, or in part, nor shall it imply acknowledgment that terms of the Agreement are fulfilled.

8. Layout of Work

1. Layout work with respect to the work of all trades. Arrange mechanical and electrical work such as piping, ducts, conduits, panels, equipment and the like to suit the architectural and structural details.

2. Alterations necessary due to conflict and interference between trades, to be executed at no cost to the Owner unless notification is given in writing before Tender Closing Date.

9. By-Laws and Regulations

1. Nothing contained in the Drawings and Specifications are to be so construed as to be knowingly in conflict with any law, by-law or regulation of municipal, provincial or other authorities having jurisdiction.

2. Perform work in conformity with such laws, by-laws and regulations and make any necessary changes or deviations from the Drawings and Specifications subsequently required as directed and at no cost to the Owner unless notification is given in writing before Tender Closing Date.

3. Furnish inspection certificates and/or permits as may be applicable as evidence, that installed work conforms with laws, by-laws, and regulations of authorities having jurisdiction.

10. Protection

1. Take necessary precautions and provide and install required coverings to protect material, work and finishes from contamination, damage, the elements, water and frost.

2. Make good any damage or replace damaged materials, as directed. Repairs to be made by the trade having originally installed or fabricated the damaged material, finish or item. Protect electrical equipment from water and the elements.

3. Protect adjacent private and public property from damage and contamination.

4. Protect curbs and sidewalks from damage from trucking by means of boards and the like. Repair, or pay or repair of damage to existing roads and sidewalks.

5. Mark glass after glazing in an acceptable manner and leave in place until final clean-up.

6. Protect floor finishes from construction traffic and transport of construction materials and equipment by means of 6 mm plywood panels.

11. Delivery, Handling and Storage of Materials

1. Schedule material delivery so as to keep storage at site to the absolute minimum, but without causing delays due to late delivery.

2. All deliveries to the school premises must be scheduled to arrive when no students are outside. This includes avoiding times when students are arriving, departing, or during outdoor activities.

3. Any maneuvering of vehicles or equipment within or around the school premises must be conducted while students are in class. This excludes maneuvering during breaks, lunch periods, or any other times when students might be outside.

4. All site maneuvering activities must be accompanied by a flag person to ensure the safety of students and staff.

5. Store materials which will be damaged by weather in suitable dry accommodation. Provide heat, as required, to maintain temperatures recommended by material manufacturer.

6. Store highly combustible or volatile materials separately from other materials, and under no circumstances, within the building. Protect against open flame and other fire hazards. Limit volume of supply on the site to minimum required for one day's operations.

7. Handle and store material so as to prevent damage to material, structure and finishes. Avoid undue loading stresses in materials or overloading of floors.

8. Do not store material and equipment detrimental to finished surfaces within areas of the building where finishing has commenced or has been completed. No storage will be available within the school. Contractor to make necessary arrangements exterior to the school in storage containers as needed. Coordinate locations with school prior to placement and protect all existing surfaces.

9. Deliver package material in original, and Storage of unopened and undamaged containers with manufacturer’s labels and seals intact.

12. Debris

1. Assign clean-up duties to a crew with own Foremen which will be of sufficient size to prevent accumulation of debris and dirt in any part of the structure or on the site.

2. Remove construction debris on a daily basis and legally dispose of same.

3. Under no circumstances should debris, rubbish or trash be burned or buried on the site.

13. Cutting, Fitting and Patching

1. Required cutting to be done by General Contractor. Patching and painting of work to be executed by the General Contractor.

2. All sub-trades are to notify the General Contractors bidding as to the extent of the cutting, patching, and painting of their respective trades.

3. Drilling, cutting, fitting and patching necessary due to failure to deliver items to be built-in time, or installation in wrong location to be executed, as directed, at no cost to the Owner.

4. Give written notification prior to commencement of drilling and cutting of load bearing structural members and finished surfaces.

5. Cut holes with smooth, true, clean edges, after they are approved by applicable trade. Size holes and openings for hot water and steam pipes, so as to allow for expansion and contraction of such pipes.

14. Fastenings

1. Supply all fastenings, anchors and accessories required for fabrication and erection or work.

2. Metal fastenings to be of the same material as the metal component they are anchoring, or of a metal which will not set up an electrolysis action which would cause damage to the fastening or metal component under moist conditions.

3. Exposed metal fastenings and accessories to be of the same texture, color, and finish as base metal on which they occur. Keep to a minimum; evenly space and lay out.

4. Fastenings to be permanent, of such a type and size and installed in such a manner to provide positive anchorage of the unit to be secured. Wood plugs are not acceptable. Install anchors at required spacing to provide required load bearing or shear capacity.

5. Power actuated fastenings are not to be used without prior written approval for specific use.

15. Surplus Materials

1. Surplus materials specifically so specified, to remain property of the Owner and be neatly stockpiled or stored, as directed.

2. All other surplus materials to become property of the Contractor; to be removed from the site and legally disposed of.

16. Documents Required and General Duties

1. **At Commencement of Contract**
   - .1 The Owner has paid for the cost of the Building Permit. Mechanical Subcontractor will pay the cost of other Fees related to the Work Specified under Mechanical Scope. Electrical Subcontractor will pay the cost of all permits and fees related to the Work specified under Electrical Scope.
   - .2 The General Contractor is to pay all other fees and refundable deposits if applicable.

2. **During Construction**
   - .1 Adjust Allowances, as required.
   - .2 Organize Job Meetings in accordance with Section 01200.
   - .3 Supply Monthly Progress Reports and Construction Schedule in accordance with Section 01200.
   - .4 Confirm that payments are being made to subcontractors and suppliers by submission of receipts with the second and subsequent Progress Payment Application. No payment will be made for unincorporated material on the site, unless Bill of Sale in proper format is provided.

3. **Upon Completion**

   1.Upon completion of work before the Final Certificate of Payment is issued, the

following to be observed, executed and submitted:

.1 All deficiencies to have been completed in a satisfactory manner.
.2 All final clean-up to have been executed, as specified in Section 01710.
.3 Finishing Hardware, Inspection and Verification.
.4 Organize a Final Inspection tour at which to be present:
- the Owner's authorized representative;
- the Architectural, Structural, Mechanical and Electrical Consultants, and their supervisory personnel, if any;
- the Contractor and his superintendent.

.5 Where the above procedure is impossible or where any deficiencies remain outstanding, the Owner's representative and the Consultant concerned, to inspect and accept the affected work and/or material upon notification by the Contractor, that all deficiencies involving this Consultant have been made good.
.6 A complete release of all liens arising out of this Contract, other than his own. If a subcontractor or supplier refuses to furnish a release of such a lien, furnish a bond satisfactory to the Owner to indemnify him against any claim under such a lien.
.7 Certificates of good standing from the Workers' Compensation board, for the General Contractor and all Subcontractors.
.8 All reference records, as specified, under Section 01720.
.9 Certificate of Inspection from Mechanical and Electrical Engineers.
.10 Copies of all Lists of Deficiencies with each Deficiency verified when complete by only this project's job Superintendent. The Final List of Deficiencies to be signed, completed by all concerned, if accepted.
.11 Statement of Completion from General Contractor.
.12 Final adjustment of all Allowances.
.13 H.E.P.C. Inspection Certificate and all other Inspection Certificates required by Provincial, Municipal and other authorities having jurisdiction.
.14 Balancing Reports.
.15 As-Built Drawings. – Hardcopy mark ups and digital pdf files and AutoCAD v2018 or higher.
.16 One hard copy of Operation and Maintenance Manuals. A digital copy (pdf file) of all closeout documents to be provided on USB memory stick format.

17. Progress Reports

1. Submit to the Architect, Monthly Progress Reports consisting of a concise narrative and a marked-up summary schedule showing physical percentage complete by item and in total. These progress calculations must agree with the Progress Payment Claims.

2. Keep permanent written daily records on the site on the progress of work. Record to be open to inspection at reasonable times and copies to be furnished upon request. Records to show notes of commencement and completion of different trades and parts of work; daily high and low temperatures and other weather particulars; number of men engaged on the site (including sub-trades) broken down in groups for each type of construction work, and particulars about excavation and shoring; erection and removal of form work; pouring and curing of concrete; floor finishing; placing and compaction of backfill, masonry work; roofing.

3. Daily progress to give particulars on commencement and completion of each trade or part of work; form work erections and removal; concrete pouring and curing; floor finishing; masonry work; roofing; waterproofing; finishing trades, tests and inspection and the like.

18. Inspection and Testing

1. The contractor is responsible to provide his own quality control in order to meet or exceed the requirements of specified standards, codes, design criteria and referenced documents.

End of Section

1. Selection of Products

1. If requested by the Consultant, provide the following services and/or information:

   .1 Assist the Consultant in determining qualified suppliers.
   .2 Obtain proposals from suppliers.
   .3 Make appropriate recommendations for consideration of Consultant.
   .4 Notify Consultant of any effect anticipated by selection of product or supplier under consideration, on construction schedule and contract sum.

2. On notification of selection, enter into purchase agreement with designated supplier.

2. Cash Allowance

1. Expend cash allowance **only** as authorized by the Owner though the Consultant's written instructions.

2. Include in Contract price the Contractor's charges for handling at site, including uncrating and storage, protection from elements and damage, labour, installation and finishing, testing, adjusting and balancing, and other expenses including overhead and profit on account of Cash Allowance in accordance with Article GC4.1 of the General Conditions of the Contract as amended.

3. Credit the Owner with any unused portion of Cash Allowances in the statement for final payment.

4. If a test made under payment by a specific allowance proves that the material or system is not in accordance with the Documents, then the subsequent testing including Owner's testing of replacement materials or systems shall be Contractor's expense and not taken from Cash Allowance.

5. Add or deduct any variation in cost from the Cash Allowance. No adjustment will be made to Contractor's expense.

6. The amount of each allowance includes the net cost of the product or service, delivery and unloading at the site.

7. All refunds, trade and/or quantity discounts which the Contractor may receive in the purchase of goods under allowances, to be extended to the Owner.

8. Receipted invoices covering all disbursements made by the Contractor under Allowances, to be submitted to the Consultant for audit.

9. Where the Cash Allowance stipulates "Supply Only," the Contract Price and not the Cash Allowances include the installation and hook-up costs. The installation and hook-up of some equipment and materials are specified under other Sections of the Specifications. The General Contract includes the installation and hook-up not specified elsewhere.

10. Contractor's profit and overhead on all Cash Allowances to be carried in his lump sum amount, not in the Cash Allowances.

11. All Cash Allowances will be dealt with in accordance with Article GC4.1 of the General Conditions.

12. All expenditures under Cash Allowances must be approved by the Owner.

13. Cash Allowance in the amount of **Five thousand Dollars ($5,000)** for Roofing Repairs and other site related items.

14. H.S.T. Goods and Services tax is not included in Cash Allowance amount and is to be carried in the General Contractor's Stipulated Sum Amount.

15. Refer to Section 01005 for co-operation with others assigned to this Section.

End of Section

1. Project Meetings for Coordination

1. Following the pre-construction meeting/construction phase kick-off meeting, arrange for site meetings every 2 weeks as appropriate to the stage of construction, for project coordination. Such meetings shall fall at the same time each week the meeting is scheduled. Prior to substantial performance, meetings shall be scheduled for every week in an effort to effectively complete all obligations under the contract in a timely manner.

2. General contractor's site supervisor and project manager as well as other responsible representatives of the Contractor's and Subcontractor's office and field forces and suppliers shall be obliged to attend.

3. Inform the Owner, Consultant, and those others whose attendance is obligatory, of the date of each meeting, in sufficient time to ensure their attendance.

4. Provide physical space for meetings within the construction office, prepare an agenda, chair and record the minutes of each meeting. Relevant information must be made available to all concerned, in order that problems to be discussed may be expeditiously resolved. Identify "action by: _____".

5. Within three days after each meeting, distribute digital copies of the minutes to each invited person, regardless of attendance.

2. Pre-construction Meeting

1. Within 5 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

3. Project Meetings for Progress of Work

1. Conduct progress meetings in accordance with the schedule and/or decisions made at Pre-construction meeting.

2. Inform the Owner, Consultant, project consultants, Subcontractors and suppliers and those whose attendance is obligatory, of the date of the meeting, in sufficient time to ensure their attendance.

3. Include in the agenda the following:

    .1 Review, approval of minutes of previous meeting.
    .2 Review of Work progress since previous meeting.
    .3 Field observations, problems, conflicts.
    .4 Problems which impede construction schedule.
    .5 Review of off-site fabrication delivery schedules.
    .6 Corrective measures and procedures to regain projected schedule.
    .7 Revisions to construction schedule.
    .8 Progress during the preceding work period.
    .9 Look ahead for the succeeding two-week work period.

.10 Review submittal schedules: expedite as required.
.11 Maintenance of quality standards.
.12 Pending changes and substitutions.
.13 Review proposed changes for effect on construction schedule and on completion date.
.14 Other business

4. Progress Records

1. Maintain a permanent written record on the site of the progress of the work using standard OGCA form. This record shall be available to the Consultant at the site, and a copy shall be furnished to same on request. The record shall contain:

    .1 Daily weather conditions, including maximum and minimum temperatures.
    .2 Dates of the commencement and completion of stage or portion of the work of each trade in each area of the project.
    .3 Conditions encountered during excavation.
    .4 Dates of erection and removal of formwork, in each area of the project.
    .5 Dates of pouring the concrete in each area of the project, with quantity and particulars of the concrete.
    .6 Work force on project daily per trade.
    .7 Visits to site by personnel of Consultant, Jurisdictional Authorities and testing companies.

End of Section

1. General

1. Submit to Architect, for review, shop drawings, product data and samples specified.

2. Until the submission is reviewed, work involving relevant products must not proceed.

2. Shop Drawings

1. Drawings to be originals prepared by Contractor, Subcontractor, Supplier or Distributor, which illustrate the appropriate portion of work; showing fabrication, layout, setting or erection details as specified in appropriate Sections.

2. Identify details by reference to sheet and detail numbers shown on Contract Drawings.

3. Maximum sheet size 24” x 36” as a PDF.

4. General Contractor shall provide and maintain an up-to-date shop drawing tracking log, which shall be reviewed at each construction meeting.

3. Project Data

1. Certain specification Sections specify that manufacturer's standard schematic drawings, catalogue sheets, diagrams schedules, performance charts, illustrations and other standard descriptive data will be accepted in lieu of shop drawings.

2. Above will only be accepted if they conform to following:
   .1 Delete information which is not applicable to project.
   .2 Supplement standard information to provide additional information applicable to project.
   .3 Show dimensions and clearances required.
   .4 Show performance characteristics and capacities.
   .5 Show wiring diagrams (when requested) and controls.

4. Coordination of Submissions

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

2. Verify:
   .1 Field measurements.
   .2 Field construction criteria.
   .3 Catalogue numbers and similar data.

3. Coordinate each submission with requirement of work and Contract documents. Individual shop drawings will not be reviewed until all related drawings are available.

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

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

6. Notify Architect, in writing at time of submission, of deviations from requirements of Contract documents.

7. After Architect's review, distribute copies.

5. Submission Requirements

1. Schedule submissions at least fourteen (14) days before dates that reviewed submissions will be required to be returned.

2. Submit a digital copy (PDF) of shop drawings, product data to Architect for review.

3. Accompany submissions with transmittal letter, in duplicate, containing:
   .1 Date.
   .2 Project title and number.
   .3 Contractor's name and address.
   .4 Number of each shop drawing, product data and sample submitted.
   .5 Other pertinent data.

4. Submissions must include:
   .1 Date and revision dates.
   .2 Project title and number.
   .3 Name of:
      .1 Contractor.
      .2 Subcontractor.
      .3 Supplier.
      .4 Manufacturer.
      .5 Separate detailer when pertinent.

5. Identification of product or material.
   .1 Relation to adjacent structure or materials.
   .2 Field dimensions, clearly identified as such.
   .3 Specification Section number.
   .4 Applicable standards, such as CSA or CGSB numbers.
   .5 Contractor's stamp, initialled or signed, certifying review of submission, verification of field measurements and compliance with Contract documents.

6. Interference Drawings
   .1 Prepare interference drawings for all work in confined space ie: ceiling space.

End of Section

1. Access

1. Provide and maintain adequate service roads to project site to provide safe and convenient access for deliveries.

2. Contractor's Site Office

1. Contractor's trailer will be used as site office during construction and to accommodate site meetings. It shall be furnished with a drawing layout table and remain for the duration of the project. Coordinate location with Owner and obtain approval.

2. Maintain in clean condition.

3. Provide and maintain in clean condition: two separate plans layout tables, minimum 48" x 72" each. One table shall be used by the General Contractor, and Subcontractors, at their discretion. The second shall be provided for use by subcontractors and by the consultant or Inspection and Testing Companies during site visits or project meetings.

4. The contractors and/or subcontractors are not permitted to use school spaces/areas to form a site office/s at any time.

3. Storage Sheds

1. Provide adequate weather-tight sheds with raised floors, for storage of materials, tools and equipment. Coordinate location with Owner and obtain approval.

2. The contractors and/or subcontractors are not permitted to use school spaces/areas for storage at any time.

4. Sanitary Facilities

1. Provide portable toilets and other washroom facilities as required. Coordinate location with Owner and obtain approval. Keep area and premises in sanitary condition.

2. The contractors and/or subcontractors are not permitted to use school sanitary facilities at any time.

5. Parking

1. The contractors and/or subcontractors are responsible for coordinating parking with the local municipality.

2. The contractors and/or subcontractor are not permitted to use the school parking lots during the months of September to June. The school parking lots can be used for construction during the months of July and August. Coordinate use of spaces with Owner and obtain approval.

6. Site Enclosures

1. Erect temporary site enclosures, hoarding, using prefabricated lock fence system. Fencing shall be mechanically fastened to the ground using secure spikes on the construction side of the fence. Alternatively, construction fencing shall be mechanically fastened to the vertical t-bar piled into the ground. The ground shall be repaired to its original condition matching adjacent surfaces once the fence is no longer required and removed off site. Exterior fencing shall include visual barrier using geotextile fastened to the fence. Access into this fenced area shall be controlled by the general contractor. Maintain fence at all times for the duration of the project.

2. Interior hoarding walls shall be erected at all locations where existing occupied spaces are in the vicinity and adjacent to the construction area. All interior hoarding walls shall be constructed using stud framing and drywall. Alternatively, good-one-side plywood can be used. All hoarding walls shall include a properly latching and lockable man door complete with locking handset/lever or orbit hardware. Access through this door shall be controlled by the general contractor. Maintain hoarding walls at all times for the duration of the project.

3. Size and location of enclosure to suit area of construction.

7. Enclosure of Structure

1. Provide temporary weather-tight enclosures protection for exterior openings until permanently enclosed.
2. Erect enclosures to allow access for installation of materials and working inside enclosures.

3. Design enclosures to withstand wind pressure.

4. Erect dust barriers to prevent dust migration to non-renovated areas. Provide boot dust mats at each interior connection to occupied areas from the construction entrances/exits. If contractor is not able to prevent dust migration to non-renovated areas, the contractor shall provide negative air units and maintain for the duration of the project until such time where dust migration can be prevented.

8. Power supply

1. Electrical power is available in existing building and will be provided at no charge for construction purpose.

9. Water Supply

1. Water is available in existing building and will be provided at no charge for construction purpose.

10. Scaffolding

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

2. Erect scaffolding independent of walls. Remove promptly when no longer required.

3. Scaffolding to be designed by a professional Engineer when required under the Occupational Health and Safety act.

11. Heat and Ventilating

1. Not applicable.

End of Section

1. Construction Safety Measures

1. Observe and enforce construction safety measures required by the National Building Code; the O.B.C.; The Provincial Government; Workers' Compensation Board; and Municipal authorities.

2. In particular, the Occupational Health and Safety Act (Ont. Re. 213/91), the Occupational Health and Safety Act, the regulations of the Ontario Ministry of Labour and Ontario Hydro Safety requirements shall be strictly enforced.

3. Contractor shall ensure that copies of all applicable construction safety regulations, codes and standards are available on the job-site throughout the period of construction. All workers are to be informed that these documents are available for reference at any time.

4. The Contractor shall ensure that all supervisory personnel on the job-site are fully aware of the contents of the Occupational Health and safety Act (Ontario Regulation 213/91 - Construction Projects) the Workers' Compensation Act" and, Bill 208 (Chapter 7, Standards of Ontario) “An Act to Amend the Occupational Health & Safety Act and the Workers’ Compensation Act”, and, that they comply with all requirements and procedures prescribed therein. These documents include, but are not limited to, the following construction safety requirements:

    .1 Contractor to register with the Director of the Occupational Health and Safety Division before or within 30 days of the commencement of the project, (O.Reg. 213/91, sec 5).
    .2 File a notice of project with a Director before beginning work on the project, (O.Reg 313/91, sec 6).
    .3 Notification prior to trenching deeper than 1.2m, (O.Reg. 213/91, sec 7).
    .4 Accident Notices and Reports, (O.Reg. 213/91, sec 8 through sec 12).
    .5 General Safety Requirements, (O.Reg. 213/91, sec 13 through sec 19).
    .6 General Construction Requirements, e.g. protective clothing, hygiene practices, housekeeping, temporary heat, fire safety, access to the job-site, machine and equipment guarding and coverings, scaffolds and platforms, electrical hazards, roofing, et al, (O.Reg. 213/91, sec 20 through sec 221).
    .7 Establish a Joint Health and Safety Committee where more than 19 workers are employed for more than 3 months, (Bill 208, S.8(2) to S.8(14).
    .8 Establish a Worker Trades Committee for all projects employing more than 49 workers for more than 3 months, (Bill 208, S-8a(1) to S.8b(4).
    .9 Ensure that all activities arising out of (.07) and (.08) above are recorded and that minutes are available to an inspector of the Ontario Ministry of Labour.

5. The Contractor shall be considered as the "Constructor" in consideration of the rights and responsibilities for all construction safety requirements, procedures, facilities and inspection of all work performed by the Contractor, Subcontractors/Sub-trades and other Contractors engaged on this project.

6. In the event of a conflict between any of the provisions of the above authorities the most stringent provisions are to be applied.

2. Material Safety Data Sheet

1. Material Safety Data Sheets (SDS) must be available at the job-site for any product listed on the Hazardous Ingredients List prior to being used, installed or applied inside of the building.

2. A Material Safety Data Sheet is to be submitted to the Architect for any product which is known to create, or suspected of creating, a health hazard or discomfort during construction or upon commissioning of the project including, but not limited to, the following:
   .1 adhesives
   .2 solvents
   .3 sealants, (caulking, vapour seals, etc.)
   .4 sprayed-on fireproofing
   .5 resilient flooring
   .6 carpet, paint, varnish or other coatings
   .7 exposed membrane waterproofing
   .8 special coatings, (terrazo sealants, chafing coatings, etc.)
   .9 solder, brazing and welding and other filler metal
   .10 other products whose particles or vapours may become air borne after installation.
   .11 any other product as directed by the Consultant.

3. Comply with WHMIS regulation, Workplace Hazardous Material Information System.

3. Fire Safety Requirements

1. Comply with requirements for Building Construction, the Ontario Building Code, the Ontario Fire Code, the requirements of Local Fire Authorities and of the requirements of the Office of the Fire Marshal.

4. Overloading

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

5. Falsework

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

6. Scaffolding

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

2. Scaffolding to be designed by a Professional Engineer when required under the Occupational Health and Safety Act.

7. Materials Specifically Excluded

1. Asbestos and/or asbestos-containing products are not permitted. Submit Material Safety Data Sheets for any product suspected of containing asbestos if so requested by Consultant. Examples of some materials requiring close scrutiny and/or confirmation include:
   .1 Transite drainage pipe - whether buried or above grade - not permitted.
   .2 Composite floor tile containing asbestos - not permitted.
   .3 Lay-in ceiling tiles containing asbestos - not permitted.
   .4 Insulation and/or jacketing for pies, ducts, motors, pumps, etc. - not permitted if any asbestos is present.

2. Solder for all piping is to be lead-free.
   .1 "Lead Free" shall mean solder which contains less than 0.030% of lead when dissolved in fluoroboric and nitric acids and tested by inductively coupled argon plasma atomic emission spectroscopy. "Steelbond 281" and "Silverbrite" are acceptable solder products.
   .2 The mechanical contractor shall provide an affidavit signed by the Principal of the company, on company letterhead, that all of the solder used on the project was either one of the two acceptable products or that the solder used (identified by brand name) meets or exceeds the testing criteria.
   .3 The Owner shall undertake random testing of the soldered joints. Should testing prove that the solder used was not as specified, the Owner shall take action against the contractor to the full extent of the law.

3. All paint and finish coatings are to be lead and mercury-free. Submit Material Safety Data Sheets confirming that these products are free of all lead and/or mercury compounds.

End of Section

PART 1 - GENERAL

1.1 Related Work

1. These specifications apply to all 16 divisions of the project specification. It is the responsibility of the contractor to apply these provisions wherever practical within specification limits to all products and services used on this project.

2. It is recognized that currently specified materials and methods may conflict with the basic intention of this section. Where reasonable alternate materials and methods exist that are not specified here, and that do not compromise quality or create additional cost for the owner, notify the Architect of such alternate materials or methods. Do not proceed to use alternate materials or methods to those specified without the express approval of the Architect.

3. Elsewhere, apply the provisions of this section to all work. Exceptions can only be made when signed off by the Architect. Suitability of all products used is the responsibility of the contractor.

1.2 Compliance Specifications

1. The contractor must comply with all applicable health, safety and environmental regulations.

1.3 Beyond Compliance Specifications

1. These specifications apply in addition to all applicable health, safety and environmental compliance regulations. They are incorporated here to reflect the Owner’s intention to develop a specification which maximizes environmentally “friendly” materials and methods wherever possible within current technical and budget limitations.

2. Beyond compliance specifications recognize that performance well beyond the minimum regulatory standard is often desirable, possible and affordable, often with no cost or low cost options. It also recognizes that application methods or protocols may be as important as the material specified. Therefore these specifications cover both material and methods.

3. The primary goal of beyond compliance specification is to reduce the use of products or methods which have negative health and environmental impacts both during and after construction. These considerations may include full life cycle impacts, associated with raw materials, manufacturing, transport, deconstruction and their eventual fate.

4. These specifications will specifically address primary categories of readily identifiable products, ingredients and methods.

5. These provisions apply to both indoor and outdoor applications equally.

1.4 Exceptions

1. These specifications recognize that not all substitutes are equal and therefore exceptions can be made based on substantive evidence of necessary and superior performance. Special considerations may be given to restricted substances when secondary provisions are made such as sealed in place (contained) applications. All such exceptions must be approved in writing by the Architect.

PART 2 - MATERIALS

2.1 Products or Substances to be Avoided or Limited in Use

1. No product containing the following substances may be used on this project when an equivalent product without or with a lower concentration of this substance is suitable and available. All products containing substances which are known to cause health effects including but not limited to cancer, mutagenic, neurological, or behavioral effects should be avoided if suitable substitutes not containing or containing lower concentrations are available. This provision shall be limited to information contained on Material Safety Data Sheets, therefore SDS sheets must be reviewed for all products for which such sheets are required. Applications for exceptions must be accompanied by related SDS and product application and performance sheets, clearly showing a need for the exception.

2.2 Volatile Organic Compounds

1. No product containing volatile organic compounds (in over simplified terms volatile petro chemical or similar plant derived solvents) may be used on this project when a suitable non VOC or failing that a low VOC substitute is available. Manufacturers may refer to the U.S. EPA definition of VOC's for guidance or alternatively use the low molecular weight organic compound descriptor.

   Example: Paints, Coatings, Primer, Adhesives, Chalks, Firestops, etc.

2. Waterborne equivalents are available for most of the solvent borne products used in construction and in most cases would be the preferred alternative. Waterborne products may in some instances have high VOC contents, therefore the fact that a product is waterborne does not automatically make it acceptable.

2.3 Chlorinated Substances

1. Poly Vinyl Chloride (vinyl) and other chlorinated products should be avoided if suitable substitutes are available.

2.4 Plasticizers

1. Plasticisers which offgass (low molecular weight) should be avoided.

2.5 Man Made Mineral Fibres

1. Products containing mineral fibres which can be emitted or abraded should be avoided.

   Examples: duct liner, mineral fibre ceiling tiles, etc.

2.6 Radiation

1. Products or methods which result in the lowest emission of Electro Magnetic Fields are preferred.

2.7 Biocides

1. Products containing biocides (pesticides, miticides, mildeweides. fungicides, rodenticides, etc.) are not to be used if suitable alternatives are available. Highly stable, low human toxicity biocides such as Portercept may be acceptable substitutes. Biocide formulas which break down, emit powders of offgass should be avoided.

2.8 Heavy Metals

1. Heavy metals such as lead, cadmium, mercury etc. should be avoided.

2.9 Aluminum

1. Raw aluminum should be avoided, anodized or factory painted aluminum is acceptable. This is particularly applicable to surfaces which people can touch.

2.10 Ozone Depleting Substances

1. Products which contain or which use Ozone Depleting Substances such as Bromide, Chlorofluorocarbons (CFC) or Hydrofluorocarbons (HFC) etc. should be avoided if suitable substitutes are available.

2.11 Greenhouse Gasses

1. Products which contain, use or generate Greenhouse gasses such as CO2 should be avoided if suitable substitutes are available.

2.12 Bituminous (tar) Products

1. Products containing tar compounds should not be used if suitable substitutes are available.

2.13 Chemical Compounds

1. Products containing the following chemical compounds should not be used if suitable substitutes are available: Neoprene, Latex, Butyl, ABS, Formaldehyde.

2.14 Adhesives

1. Adhesives containing solvents or other non preferred ingredients should be avoided if suitable substitutes are available, including systems designs which do not need adhesives or can use mechanical etc. fastening alternatives

2.15 Composite Products

1. Some composite products contain adhesives such as formaldehyde which are not preferred, and some composites such as Fibre Reinforced Plastics are not practical for recycling. These products should be avoided if suitable substitutes are available.

2.16 Cleaners and Solvents

1. Products, equipment, and methods which require the use of cleaners and solvents are not preferred if suitable substitutes are available. Examples of preferred products would include No Wax floors, or primerless caulks and adhesives, or products not requiring caulks and adhesives.

End of Section

1. General

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

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

3. Prevent accumulation of waste, which create hazardous conditions.

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

5. At no time shall waste be stored inside the school building. All waste and waste containers must be separated from general public and school occupants using properly secured and locking construction hoarding.

2. Materials

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

2. Provide on-site construction specific dump containers for collection of waste materials, and rubbish. The school waste bins, and garbage collection shall not be used to dispose of construction related waste materials, debris and/or rubbish.

3. Cleaning During Construction

1. Maintain project grounds, and public properties free from accumulations of waste materials and rubbish.

2. Remove waste materials, and rubbish from site.

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

4. Schedule cleaning operations so that resulting dust and other contaminants will not fall on wet, newly painted surfaces.

4. Final Cleaning

1. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery, and surplus materials, and clean all surfaces and leave project clean and ready for occupancy.

2. Employ experienced professional cleaners, for final cleaning.

3. In preparation for Substantial Performance or Fitness for Occupancy status, whichever occurs first, conduct final inspection of interior and exterior surfaces and of concealed spaces.

4. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from all interior and exterior finished surfaces; polish resilient and ceramic surfaces so designated to shine finish. Vacuum carpet.

5. Clean and polish glass and mirrors.

6. Repair, patch and touch-up marred surfaces to specified finish and to match new adjacent surfaces.

7. Broom-clean, magnet roll, and pressure wash all concrete and asphalt paved surfaces; rake clean other surfaces of grounds.

8. Clean exposed ductwork and structure.

9. Replace filters.

10. Clean bulbs and lamps and replace those burned out.

11. Clean diffusers and grilles.

12. Clean sinks, faucets, and water closets and controls.

13. Maintain cleaning until project, or portion thereof, is occupied by Owner.

End of Section

1. Requirements Included

1. Record documents, samples, and specifications.
2. Equipment and systems.
3. Product data, materials and finishes, and related information.

2. Quality Assurance

1. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

3. Format

1. Organize data in the form of an instructional manual.
2. Binders: commercial quality, 8½" x 11" maximum 2½" ring size.
3. When multiple binders are used, correlate data into related consistent groupings.
4. Cover: Identify each binder with type or printed title "Project Record Documents", list title of Project, identify subject matter of contents.
5. Arrange content under Section numbers and sequence of Table of Contents.
6. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
7. Drawings: provide with reinforced punched binder tab. Bind in with text, fold larger drawings to size of text pages.

4. Contents, Each Volume

1. Table of Contents: Provide title of project; names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
2. For each Product or System: list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
3. Product Data: mark sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
4. Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
5. Typed Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

5. Submission

1. Submit for review a digital pdf file of completed closeout documents in final form 15 days prior to substantial performance. For equipment put into use with Owner's permission during construction, submit Operating and Maintenance Manuals within 10 days after start-up. For items of Work delayed materially beyond date of Substantial Performance, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

2. Consultant comments will be returned, and the contractor is to revise the content of documents as required prior to final submittal.

3. Submit one (1) digital copy of revised volumes of data in final form within ten days after final inspection.

4. For contract drawings (architectural, landscaping, structural, mechanical, electrical), transfer neatly as-built notations onto a digital set and submit to consultant.

5. Prepare digital pdf file for submission on USB of completed closeout documents.

6. Record Documents and Samples

1. In addition to requirements in General Conditions, maintain at the site for Owner one record copy of:
   - .1 Contract Drawings.
   - .2 Specifications.
   - .3 Addenda
   - .4 Change Orders and other modifications to the Contract.
   - .5 Reviewed shop drawings, product data and samples.
   - .6 Field test records.
   - .7 Inspection certificates.
   - .8 Manufacturer's certificates.

2. Store Record Documents and Samples in Field Office apart from documents used for construction. Provide files, racks, and secure storage.

3. Label and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "Project Record" in neat, large, printed letters.

4. Maintain Record Documents in a clean, dry, and legible condition. Do not use Record Documents for construction purposes.

5. Keep Record Documents and samples available for inspection by Consultant.

7. Recording As-Built Conditions

1. The consultant will provide electronic copies of project drawings in PDF format. Make one (1) hardcopy of the project drawings for the purpose of recording as-built conditions. Mark and record changes on an on-going basis as construction proceeds. **Near the end of the construction period transfer all marks to the supplied electronic documents and submit for consultant review as project record as-built documents**.

2. Refer to drawings/specifications for additional mechanical and electrical requirements.

3. Record information concurrently with construction progress. Do not conceal work until required information is recorded.

4. Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
   .1 Measure depths of elements of foundation in relation to finish first floor datum.
   .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
   .4 Field changes of dimension and detail.
   .5 Changes made by change orders.
   .6 Details not on original Contract Drawings.
   .7 References to related shop drawings and modifications.

5. Specifications: legibly mark each item to record actual construction, including:
   .1 Manufacturer, trade name, and catalog number of each project actually installed particularly optional items and substitute items.
   .2 Changes made by Addenda and Change Orders.

6. Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

8. Digital As-Built Drawings

1. Contractor is responsible for providing red-line PDF as-builts only. Consultant contract includes for CAD record drawings.

2. After the consultant has found the Redlined As-Built drawings to be acceptable, transfer to digital file all information recorded on As-Built drawings. Layering of information as per consultant's instructions.

9. Equipment and Systems

1. Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

2. Panelboard Circuit Directories: provide electrical service characteristics, controls, and communications.

3. Include installed colour coded wiring diagrams.

4. Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instruction. Include summer, winter, and any special operating instructions.

5. Maintain Requirements: include routine procedures and guide for troubleshooting; disassembly, repair and reassemble instructions; and alignment, adjusting, balancing, and checking instructions.

6. Provide servicing and lubrication schedule, and list of lubricants required.

7. Include manufacturer's printed operation and maintenance instructions.

8. Include sequence of operation by controls manufacturer.

9. Provide original manufacturer's parts lists, illustrations, assembly drawings, and diagrams required for maintenance.

10. Provide installed control diagrams by controls manufacturer.

11. Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

12. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

13. Provide a list of the original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

14. Include test balancing reports as specified in mechanical specifications.

15. Additional Requirements: As specified in individual specification sections.

10. Materials and Finishes

1. Building Products, Applied Materials, and Finishes: include product data, with catalog number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

2. Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

3. Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommend schedule for cleaning and maintenance.

4. Additional Requirements: as specified in individual specifications sections.

11. Guarantees, Warranties and Bonds

1. Separate each warranty or bond with index tab sheets keyed to the List of Contents listing.

2. List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal. Use Guarantee/Warranty Form as provided in Section 01721 whenever standard preprinted trade or manufacturer's Guarantee/Warranty forms are not available.

3. Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

4. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

5. Verify that documents are in proper form, contain full information, and are notarized.

6. Co-execute submittals when required.

7. Retain warranties and bonds until time specified for submittal.

End of Section

1. Notes

1. To be made out on the letterhead of Guarantor or Warrantor which usually is a Subcontractor.

2. This format is to be used only when standard preprinted trade or manufacturer's forms are not available. Preprinted forms are to include all elements of information shown on this sample or as a minimum.

3. Comply with Requirements for Guarantee/Warranty as specified in Section 01720, Article 10.

To: Hamilton Wentworth District School Board
20 Education Court
Hamilton, ON L9A 0B9

Date: _____

SECTION _____

TITLE _____

GUARANTEE/WARRANTY TO:

OWNER	Hamilton Wentworth District School Board
PROJECT	*Hill Park Learning Center* *Boiler Room Renovation and HVAC Upgrades* *Project No. P01957*
ARCHITECT	*AMRA J Architects Inc.*
REFERENCE	(to specifications or drawings)
TIME	Period of Guarantee/Warranty:_____ years
GUARANTEE/ WARRANTY	Starting Date: Substantial Performance as certified by Architect Date: _____

(Description of Guarantee/Warranty)

_____

_____

_____

Upon written notification from the Owner or the Consultant that the above work is defective any repair or replacement work required shall be to the Consultant's satisfaction at no cost to the Owner.

This guarantee shall not apply to defects caused by the work of others, maltreatment of materials, negligence or Acts of God.

SUBCONTRACTOR

_____ _____
Signature Date

Authorized Signing Officer:

_____
(Name Printed)

_____
Title

Name of Firm: _____

Address: _____

Telephone Number _____

CONTRACTOR

_____ _____
Signature Date

Authorized Signing Officer:

_____ _____
(Name Printed)

_____
Title

Name of Firm: _____ SEAL

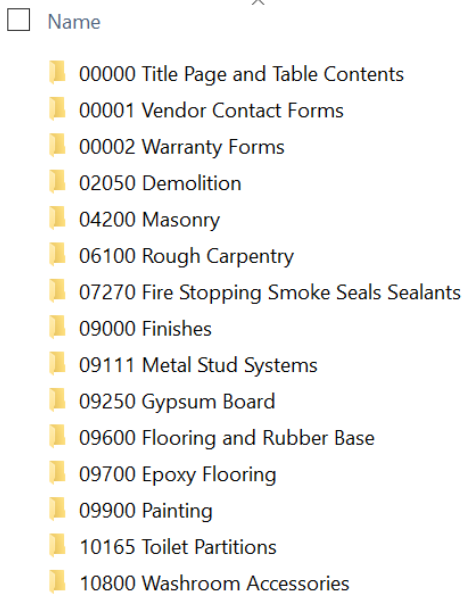
Address: _____

Telephone Number _____

End of Section

1. Maintenance Manual

1. On completion of project, submit to the Owner one (1) digital copy of Operations Data and Maintenance Manual in English, made up as follows:
   1.1. Enclose title sheet, labeled "Operation Data and Maintenance Manual", project name, date and list of contents.
   1.2. Organize content folders into applicable sections of work to parallel project specification break-down. Mark each section by labeled folder similar to the following example:



   1.3. The digital copy of all documents in the operations and manuals must be provided on a USB, format to be PDF.

2. Include the following information, plus data specified.

   .1 Maintenance instructions for finished surface and materials.
   .2 Copy of hardware and paint schedules.
   .3 Description, operation and maintenance instructions for equipment and systems, including complete list of equipment and parts list. Indicate nameplate information such as make, size, capacity, serial number.
   .4 Names, addresses and phone numbers of sub-contractors and suppliers.
   .5 Guarantees, Warranties and bonds showing:
      .1 Name and address of project.
      .2 Guarantee commencement date (date of Final Certificate of Completion).
      .3 Duration of guarantee.
      .4 Clear indication of what is being guaranteed and what remedial action will be taken under guarantee.
      .5 Signature and seal of Contractor.
      .6 Additional material used in project listed under various Sections showing name of manufacturer and source of supply.

3. Neatly type lists and notes. Use clear drawings, diagrams or manufacturers' literature.

4. Include in the Manuals a complete set of final shop drawings indicating corrections and changes made during fabrication and installation.

5. Include in the manuals a complete set of final as-built red line drawings. Include each drawing sheet and indicate on the title block “As-Build Drawing”

End of Section

1. General

1. **Bonds:** Refer to Supplementary General Conditions and to Standard Contract Document CCDC No. 2, 2020 for bonding requirements for this project, both at the time of tender submission and throughout the duration of the construction period.

2. Standard Warranty

1. Refer to Supplementary General Conditions and to Standard Contract Document CCDC No. 2, 2020 for warranty requirements and conditions for the standard warranty which is required for the work of this contract.

3. Extended Warranties

1. Refer to individual specification sections for requirements of extended warranties required for particular sections or items of work.

2. Extended warranties are required to be issued by manufacturers, fabricators, suppliers and/or installers, sometimes jointly, due to their unique position in the construction process and their ability to guarantee a particular section of work. Refer to individual requirements of extended warranties requested.

3. Unless specifically noted otherwise, all extended warranties shall commence on the date of Substantial Performance of the Work as certified by the Consultant.

4. All Extended Warranties shall be listed separately and included as a separate section in the operations and maintenance manuals provided to the HWDSB at project close out. Each Extended Warranty document shall include the vendor's contact information, date of warranty commencement and expiry as well as listing the specific product with extended warranty. This document shall clearly indicate if the warranty includes or excludes labour.

5. Listed below is a summary of extended warranties required for individual Sections. This list, if inconsistent with the specified requirements of individual extended warranties, shall be deemed correct with respect to the length of extended warranties. Extended warranties required shall include, but not be limited to, the following:

   Extended warranties (total warranty period listed, including entire building warranty)

Sealants (Section 07 92 00)	5 years
Painting (Section 09 91 00)	2 years

End of Section

Appendix A – Construction School Specific Information Sheet Sample

In addition to the terms and conditions of the Contract Documents, the Contractor shall follow the protocols of the Construction Site Specific Information Sheet, sample provided below.
A completed version of this document, with site specific content, will be provided to the Contractor at the pre-construction meeting.

HWDSB

Capital Projects
Facility Services

Construction School Specific Information Sheet

1. School Information:

School Name:	Hill Park Learning Center
Bell Times	
Morning (School Entry)**:**	0:00 AM
Afternoon (School Dismissal):	0:00 PM
Aftercare Program Dismissal:	6:00 PM
Caretaking Phone Number:	000-000-0000
***After-Hours Emergency Number:**	905-667-3079
****Caretaking Hours**	
September to June	6:00 AM – 10:00 PM
December Holiday Break	6:00 AM – 2:00 PM
March Break	6:00 AM – 2:00 PM
July to August	6:00 AM – 2:00 PM
Saturday / Sunday	CLOSED
Account Code:	HP0000
Security Panel Code:	0000

*Please call the After-Hours Emergency Number noted above if issues arise outside of Caretaking Hours. These would include unanticipated interruption of services, issues with building or room access, fire alarm or security concerns, etc.

**Caretaker hours are not guaranteed. Please confirm with the HWDSB project supervisor prior to any work taking place, and then on a weekly basis throughout the duration of the project.

2. School Entry for afterhours, school holidays or closures:

Please follow these steps upon entry to the building outside of caretaker hours and on school holidays or closures:

1. Call API Alarm Inc. at 1-877-787-5237 and notify them in advance of the day(s) and time(s) that access to the building will be required. They will require the HP code noted above.
2. Disarm the security panel when arriving.
3. Arm the security panel when leaving.
4. Call API to verify that the building is armed and secure.

Failure to follow this procedure outside of caretaker hours and on school holidays or closures will result in an automatic dispatch of a security guard to the building to verify who has entered/exited the building. Security costs associated with the dispatch of a security guard for failing to follow the procedure will be expensed to the contractor responsible for the incident.

3. Protocol for Work Impacting Fire Alarm System or Devices

The contractor is to follow this guide when the fire alarm system is impacted during school renovations.

A. References and Definitions:

Fire Alarm Control and Testing Service Provider: Hamilton Fire Control

Fire Alarm and Security System Monitoring Service Provider: API Alarm Inc.

Fire Watch: An hourly patrol of the school when the fire alarm system is on bypass, in trouble, or a device is disconnected/red-capped. Contractors cover the construction area; caretakers cover the occupied school area.

Fire Watch Log: A written record of the Fire Watch, maintained separately by contractors and caretakers and kept on the school premises at all times.

B. Mandatory Pre-Construction Site Meeting with Hamilton Fire Control

1. Contractor to request a meeting prior to mobilization with Michael Fleet from Hamilton Fire Control (HFC), the project supervisor from HWDSB, the facility operation supervisor from HWDSB and the head caretaker to review any work that will affect the fire alarm system. This can be coordinated by the project supervisor upon request.

   Contact: Michael Fleet - Hamilton Fire Control
   Phone: (905) 527-7042
   Email: michael@hamiltonfirecontrol.ca

2. Contractor to minute the meeting and submit to the project supervisor and Michael Fleet from HFC for review within 48 hours of the site-walk-through.

C. Mandatory Construction Protocol if the Fire Alarm System is Impacted

1. Contractor to follow procedures discussed and documented from the pre-construction site meeting with Hamilton Fire Control.

2. If devices are impacted during occupied hours:
   - Per the Fire Safety Plan, contractor to notify API that they'll be on Fire Watch (in the area of the impacted devices only). API will not take any action; the notification is for information purposes only.
   - Contractor to either take the device offline or protect/cover it. Fire watch (in the area of the impacted device only) is required in either of these scenarios. If the alarm goes off during work, all occupants, including contractors, are to evacuate the building and the fire department will be dispatched.

   If hot work is taking place, prior to the above-noted steps:
   - Contractors are required to advise HWDSB at least 24 hours before any hot work is scheduled to take place.
   - The contractor is required to provide a hot work permit to HWDSB at the same time.

3. If devices are impacted outside of occupied hours, and the contractor is the only party in the building:
   - The same protocol above is to be followed.

4. If the system or specific devices will not be operational while the school is completely vacant (i.e. overnight or on a weekend when no Work is taking place):
   - No action required.

The system is not to be bypassed. The system is not to be put on test. The <u>only</u> time the system will be put on test and the school will be on Fire Watch is if the system is being tested.

In the event a fire alarm device is activated, all occupants of the school, including contractors, must evacuate the school. The fire department will be dispatched. The contractor will be responsible for all fire department costs resulting from construction.

4. <u>Please follow these steps for planning any service (electrical, gas, water) shutdowns:</u>

A. Internal Localized System/Service Shutdowns:

1. Localized shutdowns **<u>require minimum 3 days' notice</u>** to HWDSB project supervisor for coordination with the school facility and staff.
2. Shutdowns must be completed outside of school bell times/operational hours which vary by facility and must be scheduled for evenings after 6:00 PM, weekends or board holidays.
3. If a shutdown will impact the security system, the contractor shall contact API Alarm Inc. at 1-877-787-5237 and notify them in advance of the day(s) and time(s) of the shutdown.

4. If a shutdown impacts the fire alarm system, the contractor shall follow the Fire Alarm Bypass Protocol, section 4 above.
5. If required, the contractor is to coordinate with Board vendor/s to be on site to ensure boilers, roof top units, heat pumps, etc. are functioning properly after service disruption has concluded.

    - Chamberlain Building Services Inc - info@chbs.ca, 905-664-1914 or
    - Union Boiler Company Limited - info@unionboiler.com, 905-528-7977

6. Process will vary based on services shutdown and ability to localize shutdown.

B. Complete School System/Service Shutdowns:

1. Complete building shutdowns **require minimum 5 days' notice** to HWDSB project supervisor.
2. Shutdowns must be completed outside of school bell times/operational hours which vary by facility and must be scheduled for evenings after 6:00 PM, weekends or board holidays.
3. Contractor to contact API Alarm Inc. at 1-877-787-5237 and notify them in advance of the day(s) and time(s) of shutdown.
4. During the shutdown, the contractor is responsible for following Fire Alarm Bypass Protocol, section 4 above.
5. The contractor is to coordinate with Board vendor/s to be on site to ensure boilers, roof top units, heat pumps, etc. are functioning properly after service disruption has concluded.

    - Chamberlain Building Services Inc - info@chbs.ca, 905-664-1914 or
    - Union Boiler Company Limited - info@unionboiler.com, 905-528-7977

6. HWDSB project supervisor will coordinate with other HWDSB departments to ensure all systems (IIT, security, communications) are up and running after service disruption has concluded.
7. If required, HWDSB project supervisor will coordinate with City of Hamilton staff if site has shared facilities such as recreation centre, community centre, pool or library, etc.
8. Process will vary based on service shutdown.

C. Heating and Cooling System Shutdowns:

1. Heating and cooling system shutdowns **require minimum 5 days' notice** to HWDSB project supervisor
2. Shutdowns must be completed outside of school bell times/operational hours which vary by facility and must be scheduled for evenings after 6:00 PM, weekends or board holidays.
3. The contractor is to coordinate with Board vendor/s to be on site to ensure boilers, roof top units, heat pumps, etc. are functioning properly after service disruption has concluded.

- Chamberlain Building Services Inc - info@chbs.ca, 905-664-1914 or
- Union Boiler Company Limited - info@unionboiler.com, 905-528-7977

4. If the boiler system is drained, the contractor upon refilling the system, is responsible for coordinating Board approved chemical treatment vendor to treat water.

   - Aquarian Chemicals Inc - info@aquarianchemicals.com, 905-825-3711

5. Process will vary based on services shutdown and ability to localize shutdown.

D. Asbestos Abatement and Designated Substance Related Work:

1. Designated substance related work **requires minimum 5 days' notice** to HWDSB project supervisor.
2. Designated substance related work in occupied areas must be completed outside of school bell times/operational hours which vary by facility and must be scheduled for evenings after 6:00 PM, weekends or board holidays.

PART 1 - HWDSB - P01957 Hill Park LCGENERAL

1.1. SUMMARY

1.1.1. Section Includes: Provide demolition and replacement of boilers, pumps, and domestic hot water heaters. The scope includes the demolition of all existing redundant equipment in the boiler room and a complete redesigned system to meet new code.

1.2. REFERENCES

1.2.1. Review "Designated Substance Report" and take appropriate precautions.

1.2.2. Definitions:

1.2.2.1. Hand Demolition: Systematic demolition of structures by workers using hand-held tools.

1.2.2.2. Mechanical Demolition: Systematic demolition of structures using powered equipment.

1.2.2.3. Systematic Demolition: Methodical dismantling of structure piece by piece, usually carried out in reverse order of construction.

1.2.2.4. Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.

1.3. ADMINISTRATIVE REQUIREMENTS

1.3.1. Review Specification for work included under this Section and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, inspection of construction to be demolished, methods to be used, sequence and quality control, Project staffing, restrictions due to environmental protection requirements and other matters affecting demolition, to permit compliance with intent of this Section.

1.3.2. Scheduling:

1.3.2.1. Where practicable, remove or neutralize hazardous or toxic materials before demolition begins.

1.3.2.2. Phase selective demolition to be coordinated with Owner’s on-going occupancy of the school.

1.4. QUALITY ASSURANCE

1.4.1. Comply with National Building Code, Part 8, Construction Safety Measures at Construction and Demolition Sites

1.4.2. Do work in accordance with CSA S350 and comply with pertinent codes, regulations and insurance carriers providing coverage for this work.

1.4.3. Execute the work in strict accordance with The Occupational Health and Safety Act and Regulations for Construction Projects, latest addition. Keep copy of the Act at the place of the Work at all times.

1.4.4. Restrictions: Restrict demolition activities to hours in accordance with Section 01 10 00 - Project Administrative Requirements.

1.5. SITE CONDITIONS

1.5.1. Demolition performed on this Project in school areas adjacent to occupied areas. Every part of the demolition work must be carefully planned, scheduled, and coordinated with the HWDSB Project Manager, including:

1.5.1.1. Hours of operation

1.5.1.2. Dust control, infection prevention and control.

1.5.1.3. Disruption to existing mechanical or electrical services, fire alarm, sprinkler, communications systems.

1.5.1.4. Noise control.

1.5.1.5. Protection to existing building

1.5.1.6. Access to the work area including procedures for movement and removal of materials.

PART 2 - PRODUCTS

2.1. MATERIALS

2.1.1. Description:

2.1.1.1. Regulatory Requirements:

2.1.1.1.1. Conform to The Occupational Health and Safety Act and Regulation for Construction Projects

2.1.1.1.2. Conform to OBC, especially Division C, Part 1, Article 1.2.2.3 as applicable.

2.1.1.1.3. Conform to Fire Code, Regulation under Fire Marshal Act especially Part 8.

2.1.2. Materials and Products Removed From Existing Building

2.1.2.1. Refer to drawings for existing items that are designated to be carefully removed and reinstalled or relocated.

2.1.2.2. Refer to drawings for existing items that are to be carefully removed and handed over to the Owner.

2.1.2.3. Materials resulting from demolition and not required to be retained shall be removed promptly from site in accordance with requirements of authorities having jurisdiction and in safe manner to minimize danger at site and during disposal.

2.1.2.4. Materials that are to be removed from the site and can be reused should be sent to the appropriate facility.

PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Review audit of hazardous materials and designated substances of existing construction provided by Owner.

3.1.2. Consultant does not guarantee that existing conditions are the same as those indicated in Construction Documents.

3.1.3. Preliminary Survey:

3.1.3.1. Before commencing demolition operations, examine building to determine type of construction, condition of structure and site conditions. Assess strength and stability of damaged or deteriorated structures.

3.1.3.2. Assess potential effect of removal of any part or parts on remainder of structure before such part(s) are removed.

3.1.3.3. Investigate for presence of hazardous materials not identified in the construction documents.

3.1.3.4. Prepare a complete photographic record of all finishes and equipment to remain. Note any damages, missing items, breaches in fire rated construction, potential hazardous materials, conditions that are different from what is shown in the Construction Documents, and any other items of concern that could impact the construction. Submit report of existing conditions before start of demolition operations, for each work area.

3.1.4. Existing Services:

3.1.4.1. When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element.

3.1.4.2. Identify all services and systems exposed as part of the demolition.

3.1.4.3. Verify services are cut off and properly capped before commencing associated or effected demolition.

3.1.4.4. Provide and maintain temporary fire alarm and fire protection services required during demolition to satisfaction of authorities having jurisdiction, fire departments and HWDSB Project Manager.

3.1.4.5. Verify prior to commencement work of this Section that disconnection and capping of electrical and mechanical services have been carried out.

3.1.4.6. Verify that dust control hoardings have been completed, inspected and accepted before proceeding.

3.2. PREPARATION

3.2.1. Protection of In-Place Conditions:

3.2.1.1. Post suitable warning signs outside of work area for protection of staff and public. Supervise entrance to work area to prevent entrance by unauthorized persons. If requested, provide lockable doors to prevent public entering danger zone.

3.2.1.2. Post warning signs on electrical lines and equipment which must remain energized to serve other portions of the building during period of demolition.

3.2.1.3. Provide fire extinguishers acceptable to fire prevention authorities in locations and of type suitable to enable personnel to deal with fire occurring during progress of work.

3.2.1.4. Provide suitable protection to existing lockers, doors, walls and finishes to remain. This includes a sealed 6 mil poly cover to prevent dust getting into equipment and fixtures.

3.2.2. Environmental Protection:

3.2.2.1. Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.

3.2.2.2. Removal of all demolition materials shall be in sealed containers.

3.2.3. Protection to Existing Services:

3.2.3.1. Provide protection required to enable existing building services, systems and equipment to remain in continuous and normal operations.

3.2.3.2. Demolition shall be carried out in a manner to ensure the minimum of disruption to Owner, and other contractors working in the building.

3.3. DEMOLITION — GENERAL

3.3.1. Execute work in conformance to Hamilton Wentworth District School Board Standards. Notify HWDSB Project Manager before disrupting building access or services.

3.3.2. Carry out demolition in accordance with CSA S350-M. Demolish structure and remove materials from site. Use hand tools only. Adhere to manufacturer's recommendations in use of hand held tools while conforming to the Occupational Health and Safety Act requirements.

3.3.3. Do not demolish spray or trowel-applied friable materials, materials suspected of containing PCBs or other hazardous materials. Where such materials are encountered notify HWDSB Project Manager immediately. Do not proceed until instructions have been received from Consultant.

3.3.4. Remove mechanical and electrical items indicated to be removed. Remove all abandoned services, communication lines, electrical wiring, plumbing, and ductwork.

3.3.5. The use of pneumatic or electrical jack hammers is not permitted.

3.3.6. Report any existing conditions uncovered by the demolition work that require remediation. This includes:

3.3.6.1. Damaged or unsafe services.

3.3.6.2. Unsupported services, structural members or missing hangers.

3.3.6.3. Incomplete insulation, vapour retarder or air barrier.

3.3.6.4. Incomplete or unacceptable fire separation, missing seals, fire dampers, fireproofing or firestopping.

3.3.7. Minimize noise. Avoid use of noisy equipment. Proposed methods for demolition to be reviewed at the pre-construction meetings ahead of the work in each work area.

3.3.8. Firestopping and Smoke Seal: In event work of this Section impacts on integrity of fire separations, ensure trade performing firestopping is notified.

3.3.9. Demolition for new services:

3.3.9.1. Cut openings through existing walls, partitions, roofs and floors. Establish exact location of steel reinforcing and conduits in existing concrete slabs or walls before cutting. Locate using non destructive, non ionizing radio frequency locators, magnetic scanning or X-ray. Scanning procedures and proposed methods and equipment to be reviewed with HWDSB Project Manager before proceeding. Be responsible for damage to existing steel reinforcing and be liable for structural failure.

3.3.9.2. Neatly cut openings and holes plumb, square and true to dimensions required. Use cutting methods least likely to damage remaining or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

3.3.9.3. Openings to allow passage of ducts shall be closed tight to perimeters of duct at all locations where fire dampers are required.

3.3.10. Where items are to be removed from existing structure or surfaces that are to remain in place, remove those items complete with hangers, brackets and other readily removable supports and fastenings:

3.3.11. Building Services:

3.3.11.1. Arrange with HWDSB Project Manager to disconnect or interrupt existing building services. Cut-off and cap existing building services under Owner's supervision.

3.3.11.2. Coordinate with Mechanical and Electrical respectively for removal, relocation and reinstallation of mechanical and electrical items.

3.3.11.3. Prevent demolition debris from entering building drains.

3.3.12. Relocation of Salvaged Items:

3.3.12.1. Carefully remove, store, protect and re-install where applicable existing materials and equipment noted on Drawings to be retained and relocated. Relocate items to be retained

and store them in areas directed by Consultant. In addition to items indicated on Drawings, Owner still reserves the right to retain any items or materials.

3.4. EXISTING SLAB PREPARATION

3.4.1. At existing locations where flooring and base, has been removed, where concrete curbs, bases, steps and pads have been removed, grind and patch existing concrete slabs as required and clean slab and base surfaces, remove ridges, bumps, adhesives and other matter detrimental to bond of levelling coat, new finish application or underlayment. Surfaces shall be smooth, level and free of gouges; prepare for levelling coat and/or new finish application specified in respective Sections or underlayment.

3.4.2. At existing locations designated to receive new flooring, remove paint, old adhesives, and hard applied finishes by grinding or other approved means, as required to accommodate new flooring. Prepare for flooring application. Coordinate requirements with Work specified in flooring Sections.

3.4.3. At existing locations where slabs have been contaminated with oil, grease, resins or other such material not compatible with subsequent applied underlayment or flooring, remove contaminants by blast tracking or prepare existing surfaces by other approved means.

3.4.4. Rinse subfloor and vacuum clean.

3.5. MISCELLANEOUS DEMOLITION

3.5.1. Remove heaters items, tack boards, chalk boards, notice boards, washroom accessories, fitments, projectors and screens, and other such components as indicated on the drawings.

3.5.2. Remove fixtures, tracks, shelves, doors, frames, and railings that are attached to partitions and ceilings identified to be removed in the drawings.

3.6. CUTTING AND PATCHING

3.6.1. Obtain Consultant's approval before cutting, boring or sleeving load-bearing members.

3.6.2. Cut and patch as required to make work fit.

3.6.3. Make cuts with clean, true, smooth edges.

3.6.4. Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.

3.6.5. Patch openings created where mechanical and electrical services are removed in existing building.

3.6.6. Use specialists in affected materials to execute cutting, fitting and remedial work.

3.6.7. Make good surfaces exposed or disturbed by work with material and finish to match existing adjoining surfaces.

3.7. CLEANING

3.7.1. Waste Management:

3.7.1.1. Clear away dirt, rubbish and loose litter resulting from work of this Section, minimum daily. Keep dust to a minimum. When necessary and practical demolition works shall be sprayed periodically with water to reduce dust. Wet down debris from time to time to control dust.

3.7.1.2. Selling or burning of materials on site is not permitted.

3.7.1.3. Conform to requirements of authorities having jurisdiction regarding disposal of waste materials.

3.7.1.4. Materials prohibited from municipality waste management facilities shall be removed from site and dispose of at recycling companies specializing in recyclable materials.

END OF SECTION

PART 1 - GENERAL

1.1. SUMMARY

1.1.1. Section Includes: Work requirements for flooring restoration including but not limited to following:

1.1.1.1. Repair existing concrete floors where walls and flooring has been removed.

1.1.1.2. Chipping and breaking out all deteriorated, spalled and delaminated concrete, defective cold joints, and the subsequent filling of voids, cracks and holes in concrete floor slabs.

1.1.1.3. Concrete levelling underlayment.

1.2. ADMINISTRATIVE REQUIREMENTS

1.2.1. Coordination:

1.2.1.1. Coordinate with trades responsible for concrete mix design including type of cement, water cement ratio, aggregates and placement technique.

1.2.1.2. Ensure that concrete supplied for slabs contains no admixtures that would be incompatible with concrete leveller, topping, fillers, or adhesives proposed for use by this Section or flooring trades.

1.2.2. Pre-Installation Meetings:

1.2.2.1. Prior to commencement of work, arrange for Project site meeting of all parties associated with work of this Section in accordance with project meetings specified in Section 01 10 00 - Project Administrative Requirements.

1.2.2.2. Include Contractor, Installers performing work of this Section, subcontractors installing finishes over these products (if applicable).

1.2.2.3. Review Specification for work included under this Section and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of placement and other matters affecting construction.

1.3. SUBMITTALS

1.3.1. Submittals in accordance with Submittal Procedures specified in Section 01 10 00 - Project Administrative Requirements.

1.3.2. Product Data:

1.3.2.1. Submit manufacturer's Product data, performance criteria, application instructions, and other documentation for each material specified in this Section proposed for use, including:

1.3.2.1.1. Liquid curing/sealing and curing/hardener.

1.3.2.1.2. Joint sealant and primer.

1.3.2.1.3. Leveller.

1.3.2.2. Safety: Provide WHMIS Material Safety Data Sheets.

1.4. QUALITY ASSURANCE

1.4.1. Perform Work in accordance with ACI 302.1

1.4.2. Installers Qualifications:

1.4.2.1. Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

1.4.2.2. Submit letter signed by manufacturer naming the installers and certifying that they have been trained in the application and safety measures for the products of this Section, and have 5 years experience.

1.4.2.3. Submit name and qualifications for the on-site lead supervisor who will be in full time attendance on site and directing the work of this Section.

1.4.3. Mock-Ups:

1.4.3.1. Provide site mock-up for concrete finishes indicating methods and materials, and procedures proposed to achieve concrete finishes and to comply with following requirements, using materials indicated for completed work:

1.4.3.1.1. Build mock-ups in location and of size as directed by Consultant.

1.4.3.1.2. Obtain Consultant's acceptance of mock-ups before continuing construction;

1.4.3.1.3. Mock-up to be used throughout construction period and used as standard of acceptance for subsequent concrete refurbishing work.

1.4.3.1.4. Mock-up may form part of permanent structure when accepted by Consultant. Repair or replace unacceptable mock-ups at no additional cost to Owner.

1.5. DELIVERY, STORAGE AND HANDLING

1.5.1. Storage and Handling Requirements: Store materials on site in manner to prevent damage. Protect materials from inclement weather. Comply with CSA A23.1, Clause 7.1.

1.5.2. Deliver materials in manufacturer's packaging including application instructions.

1.6. SITE CONDITIONS

1.6.1. Temporary Lighting: Minimum 1-200 W light source, placed 2.5 m (8’) above floor surface, for each 40 m2 (430 sq ft) floor being finished.

1.6.2. Electrical power: Provide sufficient electrical power to operate equipment normally used during construction

1.6.3. Make work area water tight protected against rain and detrimental weather conditions.

1.6.4. Temperature: Maintain minimum 10 degrees C ambient temperature for 7 days before installation and minimum 48 hours after completion of work and maintain relative humidity maximum 40% during same period.

PART 2 - PRODUCTS

2.1. JOINT SEALERS

2.1.1. For exposed locations: 2 component, chemically reactive polyurethane or polysulfide modified sealant over premoulded joint filler; self-levelling, grey colour. Acceptable products:

2.1.1.1. “Mapeflex P2 SL” by Mapei Corporation

2.1.1.2. “Sikaflex 2C/SL” by Sika Canada Inc..

2.1.2. For slabs to receive architectural flooring finish: mix 1 part cement 2 parts sand 1 part additive. Additive: “Albitol” by Sika Canada Inc.

2.1.3. For expansion joints:

2.1.3.1. “Mapeflex P2 SL/NS” by Mapei Corporation

2.1.3.2. “Sikaflex 2C NS/SL” polyurethane sealant by Sika Canada Inc.

2.1.4. For control joints which will not receive a resinous flooring finish:

2.1.4.1. “Mapeflex Joint Filler PO 95/100” by Mapei Corporation

2.1.4.2. “Sikafloor 524 EZ Polyurea” by Sika Canada Inc.

2.1.5. For isolation joints:

2.1.5.1. “Mapeflex P2 SL” by Mapei Corporation

2.1.5.2. “Sikaflex 2C SL” polyurethane sealant by Sika Canada Inc.

2.2. PATCHING AND CRACK REPAIR

2.2.1. Crack filler: Provide 1 of following:

2.2.1.1. “Planiseal VS Fast” by Mapei

2.2.1.2. “Lextile Patch” by Flextile Ltd

2.3. SELF LEVELING UNDERLAYMENT

2.3.1. Self-levelling, polymer-modified Portland cement based compound mixed with either a latex additive or water only depending on substrate conditions and Product instructions.

2.3.1.1. Primer: As recommended by the manufacturer, if required.

2.3.1.2. Compressive strength at 28 days: 38 MPa (5500 psi), to ASTM C109/C109M, or 36.5 MPa (5300 psi) tested to ASTM C1708.

2.3.1.3. Acceptable products:

2.3.1.3.1. “Flex-Flo” up to 12 mm (15/32") or “Flex-Flo Plus” up to 50 mm (2”) by Flextile Ltd.,

2.3.1.3.2. “NXT Level Plus” up to 50 mm (2") or “NXT Level” up to 76 mm (3/4”) by Laticrete International, Inc.,

2.3.1.3.3. “Ardex K-15” up to 40 mm (1-1/2”) by Ardex Canada, Inc.,

2.3.1.3.4. “UltraPlan 1 Plus with primer” up to 38 mm (1-1/2") or “UltraPlan M20 Plus with primer” up to 50 mm (2") by Mapei Corporation

2.3.1.3.5. “Sikafloor Level-25” where resinous flooring or tiles to be installed, or “Sikafloor Level-125” where resilient flooring to be installed.

2.3.1.4. Water: clean, potable.

2.3.1.5. Mechanically mix in accordance with manufacturer's printed instructions.

PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Verification of Conditions:

3.1.1.1. Verify that the surface conditions are smooth, sound, dry, and free from conditions that will adversely affect execution, permanence, or quality of the work of this section and in accordance with manufacturer's printed instructions. Refer to Section 09 05 61 Common Work Results for Flooring Preparation

3.1.1.2. Ensure substrates are structurally sound, solid, stable, level, plumb and true to a tolerance in plane of 6 mm in 3 m (1/4” in 10’ - 0”) in accordance with ANSI A108/A118/A136.1 specification requirements. Ensure substrates are clean and free of dust, oil, grease, paint,

tar, wax, curing agent, primer, sealer, form release agent or any deleterious substance and debris which may prevent or reduce adhesion.

3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. PREPARATION

3.2.1.1. Mechanically sand, shot blast or scarify substrate to ICRI CSP-3 as required to completely remove paint, loosely bonded topping, loose particles and contaminants. Surface etching or contaminant removal by chemical means is not permitted. When sanding or scarifying surfaces that may contain silica sand, wear an approved dust mask.

3.2.1.2. Review setting out point with Consultant for each location, verify patterns and edge condition.

3.2.1.3. Cover and protect work of other sections and property from damage and dust.

3.2.1.4. Containment: Close and seal floor openings. Install dams at edges of floor area to receive treatment as necessary to contain self-leveling underlayment while in plastic state.

3.2.1.5. Use a digital level device to determine elevations on a 1200 mm x 1200 mm (4 x 4 foot) grid to establish and set self-adhering pegs at heights to indicate installation depths and top surface of underlayment application.

3.2.1.6. Erect barriers to prevent entry and presence of personnel not performing work of this section during application of topping or grout.

3.2.1.7. Joint Preparation:

3.2.1.7.1. Expansion and Isolation Joints: Mark and saw cut after self-leveling application.

3.2.1.7.2. Static (Non-Moving) Saw Cuts and Control Joints: to be patched or filled with joint sealer to Section 03 35 00 – Concrete Finishing.

3.2.1.7.3. Dynamic (Active) Cracks: Notify Consultant.

3.2.1.8. Cleaning: Broom clean and vacuum surfaces to pick up dust and debris.

3.3. CRACK FILLER TREATMENT

3.3.1. After existing flooring has been removed, examine concrete floor surfaces and repair cracks.

3.3.2. Using a diamond concrete cutting blade overcut the crack width to obtain a sound, clean edge. Clean cracks or joints with compressed air and/or vacuum with a dustless collection system. Follow ACI RAP Bulletin 2, “Crack Repair by Gravity Feed with Resin”.

3.3.3. Mix components in accordance with manufacturer’s recommendations

3.3.4. Fill joint with to full depth of crack and flush with concrete surface. Ensure that all voids and pinholes are filled/sealed.

3.4. LEVELLING UNDERLAYMENT

3.4.1. Priming:

3.4.1.1. Maintain ambient conditions as specified, with adequate ventilation during and following primer application to promote faster drying.

3.4.1.2. Prepare and apply primer in accordance with manufacturer’s written instructions.

3.4.2. Embedded cable systems such as electric radiant heating, static dissipative wires, or hearing loop wire:

3.4.2.1. Install cable or wire prior to priming; attach securely to substrate along the entire length of the cable or wire every 150 mm (6 inches).

3.4.2.2. Self-Leveller Thickness: Ensure minimum of 12 mm (½ inch) over highest point of embedded cable or wire.

3.4.3. Pump or pour self levellers onto substrate within single lift thickness limit recommended by manufacturer.

3.4.4. Immediately following placement, lightly smooth the surface and pour lines

3.4.5. Provide levelling bed to achieve Floor Flatness value as described in this Section, to ASTM E1155.

3.4.6. Feathered edge: Steel trowel the edge after initial set but before it is completely hard.

3.4.7. Provide minimum 1.6 mm (1/16") levelling bed to surfaces to receive waterproofing and/or tiling uncoupling membrane, in accordance with manufacturer's instructions. Refer to Sectio 09 30 00 – Tiling.

3.4.8. Provide ramped levelling bed beneath finish flooring adjacent to ceramic tile, for minimum 600 mm (24") strip, to achieve flush finished surfaces at finished flooring transition.

3.4.9. Apply leveller with care to ensure that no laps, voids, or other marks or irregularities are visible, and with an appearance of uniform level and texture, within limitations of materials and areas concerned.

3.4.10. Make clean true junctions with no visible overlap between adjoining applications of topping.

3.4.11. Do not cover or bridge expansion joints or control joints. Provide 3 mm (1/8") wide movement joints over concrete slab control joints.

END OF SECTION

PART 1 - GENERAL

1.1. SUMMARY

1.1.1. Section Includes: Work requirements for flooring restoration including but not limited to following:

1.1.1.1. Repair existing masonry units where indicated in the drawings

1.2. REFERENCES

1.2.1. Abbreviations and Acronyms:

1.2.1.1. OMCA: Ontario Masonry Contractors' Association; www.canadamasonrycentre.com.

1.2.2. Reference Standards:

1.2.2.1. ASTM C270-24 - Standard Specification for Mortar for Unit Masonry

1.2.2.2. CAN/CSA-A179-14 (R2024) - Mortar and grout for unit masonry

1.2.2.3. CSA A3000:23 - Cementitious materials compendium

1.3. ADMINISTRATIVE REQUIREMENTS

1.3.1. Pre-Installation Meetings:

1.3.1.1. Prior to commencement of work, arrange for Project site meeting of all parties associated with work of this Section in accordance with project meetings specified in Section 01 10 00 - Project Administrative Requirements.

1.3.1.2. Include Contractor, Installers performing work of this Section, subcontractors installing finishes over these products (if applicable).

1.3.1.3. Review Specification for work included under this Section and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of placement and other matters affecting construction.

1.4. SUBMITTALS

1.4.1. Submittals in accordance with Submittal Procedures specified in Section 01 10 00 - Project Administrative Requirements.

1.4.2. Product Data:

1.4.2.1. Submit manufacturer's Product data. Include product characteristics and performance criteria.

1.4.2.2. Safety: Provide WHMIS Material Safety Data Sheets.

1.5. QUALITY ASSURANCE

1.5.1. Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

1.5.2. Membership in good standing in OMCA.

1.6. DELIVERY, STORAGE AND HANDLING

1.6.1. Storage and Handling Requirements:

1.6.1.1. Handle, stack and store masonry units to avoid chipping, protect against staining and moisture entry.

1.6.1.2. Do not store or locate materials, plant and equipment in areas which will obstruct access to work by others.

1.7. SITE CONDITIONS

1.7.1. Ambient Conditions:

1.7.1.1. Provide uniformly distributed and continuous heating. Prevent stratification and cold spots.

1.7.1.2. Maintain masonry continuously at minimum 4 deg C (39 deg F) during placement and for 48 hours after placement.

1.7.1.3. Employ protection and heating methods which will prevent evaporation of moisture from masonry during curing.

PART 2 - PRODUCTS

2.1. MATERIALS

2.1.1. Replacement Concrete Masonry Unit (CMU): To match existing concrete block in all respects, modular size, with special shapes and sizes as detailed.

2.1.1.1. Acceptable Products: “Carbon Cure®” by Brampton Brick Limited, Permacon, or “Autoclave Block” by Day & Campbell Limited or “Carbo Cure” by Richvale

2.1.2. Ensure exposed surfaces are free of cracks, chips or other blemishes and broken corners. Include required sash blocks for control joints, solid block where noted and concrete block lintels over openings in concrete block walls unless steel lintels are shown.

2.1.3. Cement:

2.1.3.1. Portland cement: to CAN/CSA-A3000, Type GU - General use hydraulic cement (Type 10). For exposed mortar, maintain uniformity of cement manufacturer and batch for colour uniformity.

2.1.3.2. Masonry cement: to CAN/CSA-A3000 and CAN/CSA A179, Type N for non load bearing and and Type S for load bearing.

2.1.4. Hydrated lime: to CAN/CSA A179, Type S.

2.1.5. Sand: Clean, sharp, washed and conforming in all respects to requirements of CAN/CSA-A179.

2.1.6. Course aggregate to CAN/CSA A179.

2.1.7. Water for Mortar Mixing: Potable, free from any deleterious substances.

2.1.8. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification, for job-mixed mortar; and ASTM C1142 for ready-mixed mortar.

2.1.9. Control Joints (Movement Joints) Filler: PVC control joint filler purpose designed for concrete masonry unit construction.

2.1.9.1. Durometer hardness between of 85 +/- 5 tested to ASTM D2240 of sizes and shapes required.

2.1.9.2. Acceptable products:

2.1.9.2.1. “VS Series PVC Control Joint” by Blok-Lok Limited.

2.1.9.2.2. “PVC Control Joint” by Masonpro Inc.

2.1.9.2.3. “PVC Control Joint” by Wire-Bond.

PART 3 - EXECUTION

3.1. PREPARATION

3.1.1. Surface Preparation: prepare surface in accordance with manufacturer's written recommendations.

3.1.2. Thoroughly clean surfaces by scrubbing to remove dirt, dust, and wax. Use stripper in accordance with manufacturer’s printed instructions.

3.1.2.1. Remove dirty solution with wet vacuum or mop.

3.1.2.2. Rinse with clean water and allow to dry thoroughly.

3.1.3. Establish and protect lines, levels, and coursing.

3.1.4. Protect adjacent materials from damage and disfiguration.

3.2. GENERAL REQUIREMENTS

3.2.1. Workmanship:

3.2.1.1. Build masonry plumb, level, and true to line, with vertical joints in proper alignment. Do masonry work in accordance with CSA S304, CSA A370 and CSA A371.

3.2.1.2. Do masonry mortar and grout work in accordance with CSA A179 except where otherwise specified.

3.2.1.3. Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.2.2. Remove and replace existing masonry units that are loose, chipped, broken, stained, or otherwise damaged. Install new CMU to match existing; install in fresh mortar or grout, pointed to eliminate evidence of replacement.

3.2.3. Pointing: During the tooling of joints, enlarge voids and holes and completely fill with mortar. Point-up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of paint.

3.3. LAYING MASONRY UNITS

3.3.1. Install products in accordance with product manufacturer’s written requirements.

3.3.2. Provide control joints between new and existing concrete unit masonry. Do not tooth new CMU walls into existing block walls.

3.3.3. Coursing Design: To match existing. When new work is not attached to existing construction, half running bond for concrete masonry units with vertical joint in each course centered on units in courses above and below.

3.3.4. Lay walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with existing construction.

3.3.5. Locate bearings and piers as Indicated on drawings. Provide solid masonry units at bearings. Grout under bearing plates installed on masonry with non-shrink grout.

3.3.6. Extend masonry and partitions to deck, slab or structural members, except where otherwise noted in the drawings. Incorporate both lateral support and deflection space at termination of walls as required.

3.3.7. Lay masonry in full bed of mortar, properly jointed with other work. Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.

3.3.8. Fully bond intersections, and external corners.

3.3.9. Tool with non-staining pointing tool to provide smooth, compressed, uniformly formed joints:

3.3.9.1. Concave for concrete unit masonry exposed to view.

3.3.9.2. For concrete unit masonry concealed from view:

3.3.9.2.1. Strike flush joints concealed in walls and joints in walls to receive plaster, stucco, tile, insulation, resilient bases, or other applied material except paint or similar thin finish coating. Ensure that no mortar protrudes from joints on wall surfaces to receive materials and coatings.

3.3.10. Maintain mortar joint thickness of 9 mm (3/8”), unless otherwise specified or indicated on drawings. Not to exceed 12 mm (1/2”).

3.3.11. Form control joints in concrete masonry as follows:

3.3.11.1. Fit bond-breaker strips into hollow contour in ends of block units on one side of control joint. Fill the resultant core with grout and rake joints in exposed faces.

3.3.11.2. Install temporary foam plastic filler in head joints and remove when unit masonry is complete.

3.4. INSTALLATION OF TUCK POINTING MORTAR

3.4.1. Repointing and Tuckpointing: Repoint defective joints as follows:

3.4.1.1. Cut back joints 13 mm (1/2") taking care not to damage units. Remove dust and loose materials by brushing or by water jet. If water jet is used, allow excess water to drain before repointing.

3.4.1.2. Repoint with same mix and colour as original.

3.4.1.3. Pack mortar tightly in thin layers and tool joint to match non-defective joints.

3.4.2. Immediately prior to application of mortar, dampen joints to be tuck pointed. Prior to application of pointing mortar, allow masonry units to absorb surface water.

3.4.3. Tightly pack mortar into joints in thin layers, approximately 6 mm (1/4”) thick maximum.

3.4.4. Allow layer to become "thumbprint hard" before applying next layer.

3.4.5. Pack final layer flush with surfaces of masonry units. When mortar becomes "thumbprint hard", tool joints.

3.5. REPLACEMENT OF MASONRY UNITS

3.5.1. Cut out mortar joints surrounding masonry units to be removed and replaced as follows:

3.5.1.1. Units removed may be broken and removed, providing surrounding units to remain are not damaged.

3.5.1.2. Once units are removed, carefully chisel out old mortar and remove dust and debris.

3.5.1.3. If units are located in exterior wythe of a cavity or veneer wall, exercise care to prevent debris falling into cavity.

3.5.2. Dampen surfaces of surrounding units before new units are placed as follows:

3.5.2.1. Allow existing masonry to absorb surface moisture prior to starting installation of new replacement units.

3.5.2.2. Butter contact surfaces of existing masonry and new replacement masonry units with mortar.

3.5.2.3. Centre replacement masonry units in opening and press into position.

3.5.2.4. Remove excess mortar with a trowel.

3.5.2.5. Point around replacement masonry units to ensure full head and bed joints.

3.5.2.6. When mortar becomes "thumbprint hard", tool joints.

3.6. CLEANING

3.6.1. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.

3.6.2. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

3.6.3. Protect masonry and adjacent work from damage from cleaning work.

3.6.4. Clean masonry in strict accordance with masonry manufacturer's printed instructions and referenced standards. Remove masonry and install new masonry if masonry is damaged by cleaning work.

3.6.5. Soak wall with clean water and flush off loose dirt and mortar.

END OF SECTION

PART 1 - GENERAL

1.1. SUMMARY

1.1.1. This Section includes:

1.1.1.1. Hollow metal doors

1.1.1.2. Metal frames.

1.1.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:

1.1.2.1. Installation of snap-in clips and frames in gypsum board partitions: Section 09 22 16 - Non-Structural Metal Framing.

1.2. ADMINISTRATIVE REQUIREMENTS

1.2.1. Coordination:

1.2.1.1. Cooperate fully with door hardware distributor's representative during preparation of shop drawings and execution of shop fabrication. Be responsible to provide adequate reinforcing, clearances, for door hardware specified and for accurate installation of door and door hardware on site.

1.2.2. Preinstallation Meetings:

1.2.2.1. The following minimum items shall be reviewed at the pre-installation meeting:

1.2.2.1.1. Verify project requirements.

1.2.2.1.2. Review installation conditions under which work is to be performed including possible site concerns.

1.2.2.1.3. Inspection of surfaces to receive the work.

1.2.2.1.4. Coordination requirements with other subtrades.

1.2.2.2. Key personnel shall attend the pre-installation meeting including but not limited to:

1.2.2.2.1. Steel door and frame installer subtrade personnel.

1.2.2.2.2. Related work subtrade personnel.

1.3. ACTION SUBMITTALS

1.3.1. Product Data Sheets:

1.3.1.1. Submit manufacturer’s product data sheets for products to be used in the work of this section. Manufacturer’s product data sheets shall include:

1.3.1.1.1. Material and product physical properties and characteristics including size.

1.3.1.1.2. Performance criteria.

1.3.1.1.3. Limitations of products.

1.3.2. Shop Drawings:

1.3.2.1. Indicate door location using numbering system per door and frame schedule.

1.3.2.2. Include size, and hand of each door, elevation of each door type; beveling of door edges, construction type core and edge construction not covered in product data.

1.3.2.3. Indicate dimensions and locations of cut-outs including requirements for louver openings.

1.3.2.4. Provide details of door hardware locations, anchorage and fastening methods.

1.4. DELIVERY, STORAGE, AND HANDLING

1.4.1. Comply with CSDMA, Guide Specification For Installation and Storage of Hollow Metal Doors and Frames.

1.4.2. Inspect materials thoroughly upon receipt and report immediately any discrepancies, deficiencies and damages incurred during shipment on carriers' bill of lading and report immediately, in writing, to Supplier and Consultant.

1.4.3. Store materials properly on planks, in a dry area, out of water and covered to protect from damage from adverse weather conditions. Remove wet packaging immediately.

1.4.4. Remove wrappings or coverings from doors upon receipt at the Project Site, and store in a vertical position, spaced with blocking to permit air circulation between them.

1.5. WARRANTY

1.5.1. Manufacturer Warranty: Warrant work manufactured from ASTM A653/A653M, A40 galvannealed steel, touched up only with zinc-rich rust inhibitive primer where coating was removed during its manufacture for period of 10 years 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. Defects include but are not limited to; rust perforation when stored, installed and finish painted in accordance with manufacturer's written instructions.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Steel door and frames manufacturer list: Products of the following manufacturers are acceptable subject to conformance to requirements of drawings, schedules and specifications:

2.1.1.1. All Steel Doors 2000 Limited; http://www.allsteeldoors.ca/home.html

2.1.1.2. Baron Steel Doors & Frames; www.baronmetal.com

2.1.1.3. Ceco Door: www.cecodoor.com

2.1.1.4. Daybar Industries Limited; www.daybar.com

2.1.1.5. Fleming Doors; www.flemingdoor.com

2.1.1.6. Gensteel Doors, Inc.; www.gensteeldoors.com

2.1.2. Basis of Design:

2.1.2.1. This Specification is based on "Imperial/Versador" by Ceco Door. Comparable Products from manufacturers listed herein will be accepted provided they meet requirements of this Specification.

2.2. PERFORMANCE/DESIGN CRITERIA

2.2.1. Ensure Product is manufactured by a firm experienced in design and production of standard and custom commercial metal door and frame assemblies.

2.2.2. Cycle Test Acceptance Criteria: Ensure door and frame assembly is testing in accordance with ANSI/SDI A250.4 for "High Usage" and is certified as Level "A" (1,000,000 cycles).

2.2.3. Twist Test Acceptance Criteria: Maximum permanent deflection not to exceed 3 mm (1/8") under a maximum 136 kg (300 lb) load, total deflection not to exceed 32 mm (1-1/4") when tested in accordance with ANSI/SDI A250.4. Ensure tests are conducted by an independent nationally recognized accredited laboratory.

2.3. MATERIALS

2.3.1. Steel:

2.3.1.1. Fabricated from tensioned levelled steel to ASTM A924/A924M-18, galvanized to ASTM A653/A653M, Commercial Steel CS, Type B.

2.3.1.2. Steel shall be free of scale, pitting, coil breaks, surface blemishes, buckles, waves, and other defects.

2.3.1.3. Minimum sheet thickness; coated sheet steel complying with ASTM A653/A653M in accordance with Appendix 1: Steel Thicknesses and gauges of CSDMA “Recommended Specifications for Commercial Steel Door and Frame Products”.

2.3.1.4. Galvanneal coating finish, designation ZF120 (A40).

2.3.2. Door Core Materials:

2.3.2.1. Honeycomb:

2.3.2.1.1. Structural small cell, 25 mm maximum Kraft paper 'honeycomb', sanded to required thickness.

2.3.2.1.2. Minimum weight of 36.3 kg per ream.

2.3.2.1.3. Minimum density of 16.5 kg/m².

2.3.2.2. Steel stiffeners:

2.3.2.2.1. Continuous vertical formed steel sections, 0.813 mm minimum thickness, spaced not more than 150 mm apart, welded at 150 mm on center maximum to each face sheet.

2.3.2.2.2. Fill voids with minimum density of 24 kg/m3 fibreglass insulation conforming to with ASTM C665.

2.3.3. Primer: Rust inhibitive for touch-up.

2.3.4. Door Silencers (Bumpers): Single stud rubber/neoprene type.

2.3.5. Fasteners for Stops: Cadmium plated steel, counter sunk flat or oval head sheet metal Phillips screws.

2.3.6. Mortar Guard Boxes: Minimum 0.8 mm thick (22 ga) steel.

2.3.7. Frame Anchors:

2.3.7.1. Floor Anchors: Minimum 3 mm (1/8") thick adjustable floor anchors with 2 holes for bolting to floor.

2.3.7.2. Wall Anchors:

2.3.7.2.1. Masonry T-strap Type Wall Anchors: Minimum 1.2 mm thick (18 ga) steel

2.3.7.2.2. Existing Masonry/Concrete Wall Type Anchors: Minimum 0.912 mm thick (20 ga) steel.

2.3.7.2.3. Masonry Stirrup-strap Type 50 mm x 250 mm (2" x 10"): Minimum 1.519 mm thick (16 ga) steel.

2.3.7.2.4. Steel Stud Type: Minimum 0.912 mm thick (20 ga) steel.

2.3.7.2.5. Steel Stud Tension and Associated Wall Type: Minimum 0.912 mm thick (20 ga) steel.

2.4. FABRICATION

2.4.1. Welding: Carry out welding in accordance with CSA W59.

2.4.2. Grind exposed welds smooth and flush. Fill open joints, seams and depressions with filler or by continuous brazing or welding. Grind smooth to true sharp arises and profiles and sand down to smooth, true, uniform finish.

2.4.3. Hardware Requirements: Blank, mortise, reinforce, drill and tap doors and frames to receive mortised templated hardware. Check hardware list for requirements.

2.4.4. Frames - General:

2.4.4.1. Fabricate frames for doors to profiles indicated.

2.4.4.2. Ensure door frames are welded type construction. Knock-down frames are not permitted.

2.4.4.3. Reinforce frame as required for surface mounted hardware.

2.4.4.4. Protect mortise cut outs with mortar guard boxes. Omit for gypsum board applications.

2.4.4.5. Where frames occur in masonry provide strip strap, T-strap or wire type anchors. Where frames occur in gypsum board provide stud type anchors.

2.4.4.6. Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb. Provide 2 anchors for rebate opening heights up to and including 1500 mm (5') and 1 additional anchor for each additional 760 mm (30") of height or fraction thereof, except as indicated below. For frames in previously placed concrete, masonry or structural steel provide anchors located not more than 150 mm (6") from top and bottom of each jamb and intermediate anchors at 660 mm (26") on centre maximum.

2.4.4.7. Where floor finishes allow, fabricate frames to extend 38 mm (1-1/2") below finished floor level. Where frames are to terminate at finished floor level, provide plates for anchorage to slabs.

2.4.4.8. Prepare each door opening for single stud door silencers: 3 for single door openings placed opposite hinges.

2.4.4.9. Provide 0.912 mm thick (20 ga) steel snap-in or welded-in “Z” type stud anchors for door frames installed in steel stud gypsum board partitions. Ensure snap-in clips are supplied to Section 09 21 16.

2.4.4.10. Factory apply touch-up primer to areas where zinc coating has been removed during fabrication.

2.4.5. Hollow Metal Door Frames:

2.4.5.1. Steel:: Minimum 1.519 mm thick (16 ga) steel.

2.4.5.2. Reinforcements:

2.4.5.2.1. Lock and Strike Reinforcements: Minimum 1.519 mm thick (16 ga) steel.

2.4.5.2.2. Hinge Reinforcements: Minimum 3.4 mm thick (10 ga) steel.

2.4.5.2.3. Flush Bolt Reinforcement: Minimum 1.519 mm thick (16 ga) steel.

2.4.5.2.4. Reinforcement for Surface Applied Hardware: Minimum 1.2 mm thick (18 ga) steel.

2.4.5.2.5. Concealed Door Closer or Holder Reinforcements: Minimum 2.6 mm thick (12 ga) steel.

2.4.5.2.6. Top and Bottom End Channels: Minimum 1.2 mm thick (18 ga) steel.

2.4.5.3. Jamb Shipping Bars: Minimum 0.912 mm thick (20 ga) steel.

2.4.5.4. Mitre corners of frames. Cut frame mitres accurately and weld continuously on returns and inside of frame faces.

2.4.5.5. When required due to site access or due to shipping limitations, fabricate frame Product for large openings in sections, with splice joints for field assembly. Provide alignment plates or angles at each joint, fabricated of same metal thickness as frame. Indicate joints for field assembly on Shop Drawings.

2.4.5.6. Accurately cope and securely weld butt joints of mullions, transom bars, centre rails and sills. Grind welded joints to a smooth, uniform finish.

2.4.5.7. Securely attach floor anchors to inside of each jamb profile.

2.4.5.8. Weld in 2 temporary jamb shipping bars at each frame to maintain alignment during shipment.

2.4.6. Doors - General:

2.4.6.1. Fabricate doors to be swing type flush with 1 continuous face free from joints, tool markings and abrasions and with provisions for glass and/or louvre openings as indicated on Door Schedule and Drawings.

2.4.6.2. Coordinate louvre openings with Mechanical and Consultant.

2.4.6.3. For hollow metal doors, ensure longitudinal edges have continuously welded seams, filled and sanded flush full height of door.

2.4.6.4. Fabricate doors with top and bottom inverted recessed spot welded channels.

2.4.6.5. Reinforce, blank, drill and tap doors for mortised, templated hardware.

2.4.6.6. Reinforce doors for surface mounted hardware.

2.4.6.7. Undercut 19 mm (3/4") for air intake at washrooms.

2.4.6.8. Factory prepare holes 13 mm (1/2") diameter and larger. Factory prepare holes less than 13 mm (1/2") when required for function of device for knob, lever, cylinder, turn pieces or when these holes overlap function holes.

2.4.7. Interior Hollow Metal Doors:

2.4.7.1. Face Sheets: 1.519 mm thick (16 ga) minimum galvannealed steel sheet.

2.4.7.2. Vertical Stiffeners: 0.912 mm thick (20 ga) minimum unprimed steel sheet.

2.4.7.3. Glazing Stops: 1.519 mm thick (16 ga) minimum unprimed steel sheet, formed, drilled and countersunk for fastenings.

2.4.7.4. Fabricate each face sheet for exterior door using a sheet steel laminated under pressure to polyurethane core. Ensure core completely fills inside hollow of door.

2.4.7.5. Fabricate each face sheet for interior door using a sheet steel laminated under pressure to honeycomb core.

2.4.7.6. Reinforce, stiffen and sound deaden doors with core laminated to inside faces of panels. Ensure core completely fills inside hollow of door.

2.4.8. Fabrication Tolerances:

2.4.8.1. Frames:

2.4.8.1.1. Width and Height: +1.6 mm (+1/16”), -0.8 mm (-1/32”).

2.4.8.1.2. Face, Stop and Rabbet: +/-0.8 mm (+/-1/32”).

2.4.8.1.3. Jamb Depth: +/-1.6 mm (+/-1/16”).

2.4.8.2. Doors:

2.4.8.2.1. Width and Height: +/-1.2 mm (+/-3/64”).

2.4.8.2.2. Thickness: +/-1.6 mm (+/-1/16”).

2.4.8.2.3. Edge Flatness: 1.6 mm (1/16”) maximum.

2.4.8.2.4. Surface Flatness: 3 mm (1/8”) maximum.

2.4.8.2.5. Door Twist: +/-1.6 mm (+/-1/16”).

2.4.8.3. Hardware:

2.4.8.3.1. Cutouts: Template dimension +0.38 mm (+0.015”), -0 mm (-0”).

2.4.8.3.2. Location: +/-0.8 mm (+/-1/32”).

2.4.8.3.3. Between Hinge Centrelines: +/-0.4 mm (+/-1/64”).

2.4.9. Prime Painting: Apply factory touch up primer at areas where zinc coating has been damaged during fabrication.

PART 3 - EXECUTION

3.1. INSTALLATION

3.1.1. Hollow Metal Doors:

3.1.1.1. Install hollow metal doors in accordance with manufacturer's instructions.

3.1.2. Hollow Metal Frames:

3.1.2.1. Install hollow metal frames in accordance with manufacturer's instructions.

3.1.2.2. Set frames plumb, square, level and at correct elevation, maintaining uniform door width and height. Check and correct as necessary opening width, opening height, square, alignment, twist and plumb, in accordance with the CSDMA, "Recommended Dimensional Standards for Commercial Steel Doors and Frames".

3.1.2.3. Secure anchorages and connections to adjacent construction.

3.1.2.4. Remove temporary steel shipping jamb spreaders prior to setting 1-piece welded frames. Brace frames rigidly in position while being built in. Use precisely-dimensioned installation spreaders at sill and third-points of door opening height to maintain door opening width during building-in. Follow manufacturer’s instructions regarding proper use of floor and jamb anchors. Remove installation spreaders only after mortar has set, where applicable.

3.1.2.5. Allow for deflection to prevent structural loads from being transmitted to frame.

3.1.2.6. Provide batt insulation to completely fill pressed steel frames of exterior doors and adjacent cavities.

3.1.2.7. Spot Grouting:

3.1.2.7.1. Coordinate spot grouting with Section 09 22 16 - Non-Structural Metal Framing.

3.1.2.7.2. Provide spot grout to increase rigidity of frame and improve resistance to frame rotation caused by weight of door.

3.1.2.7.3. Comply with manufacturer’s recommendations for surface preparation, cleaning, forming, mixing, placement and curing of grout.

3.1.2.7.4. Mix grout in accordance with ASTM C305 requirements.

3.1.2.7.5. Spot grout at strike and hinge side jambs at steel door frames set in gypsum board partitions, walls and other similar locations in accordance with manufacturer's recommendations. Immediately insert gypsum panels into jamb and attach to framing. Do not terminate gypsum board against trim.

3.1.2.7.6. Do not use pumped slurry method to perform spot grouting.

3.1.2.8. Continuous Grouting:

3.1.2.8.1. Coordinate continuous grouting with Section 04 20 00.

3.1.2.8.2. Comply with manufacturer's recommendations for surface preparation, cleaning, forming, mixing, placement and curing of grout.

3.1.2.8.3. Mix grout in accordance with ASTM C305 requirements.

3.1.2.8.4. Provide grouting employing established procedures recommended by manufacturers. Use minimum water required to produce placement consistency.

END OF SECTION

PART 1 - GENERAL

1.1. SUMMARY

1.1.1. Section Includes: Work requirements for flooring restoration including but not limited to following:

1.1.1.1. Refurbish and repair existing terrazzo flooring where indicated in the drawings

1.2. REFERENCES

1.2.1. Terrazzo, Tile and Marble Association of Canada: Specification Guide, Tile Installation Manual

1.3. ADMINISTRATIVE REQUIREMENTS

1.3.1. Pre-Installation Meetings:

1.3.1.1. Prior to commencement of work, arrange for Project site meeting of all parties associated with work of this Section in accordance with project meetings specified in Section 01 10 00.

1.3.1.2. Include manufacturer’s technical representative, Contractor, Installers performing work of this Section, subcontractors installing finishes over these products (if applicable).

1.3.1.3. Review Specification for work included under this Section and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of placement and other matters affecting construction.

1.4. SUBMITTALS

1.4.1. Submittals in accordance with Submittal Procedures specified in Section 01 10 00.

1.4.2. Product Data:

1.4.2.1. Submit manufacturer's Product data, performance criteria, application instructions, and other documentation for each material specified in this Section proposed for use.

1.4.2.2. Include product characteristics, performance criteria, finish and limitations.

1.4.2.3. Safety: Provide WHMIS Material Safety Data Sheets.

1.5. QUALITY ASSURANCE

1.5.1. Execute work of this Section by professionals who are specialized in the use of specific equipment and materials, trained in terrazzo finishing, and have minimum 5 years experience in this work.

1.5.2. Applicator to be a member of the Terrazzo, Tile and Marble Association of Canada (TTMAC). Submit evidence of this if requested.

1.6. DELIVERY, STORAGE AND HANDLING

1.6.1. Deliver materials in manufacturer's packaging including application instructions.

1.7. SITE CONDITIONS

1.7.1. Ventilation: Provide continuous ventilation during and after coating application.

PART 2 - PRODUCTS

2.1. MATERIALS

2.1.1. Terrazzo refurbishing materials:

2.1.1.1. Stripper: propose environmentally friendly cleaner.

2.1.1.2. Grout: General Polymers 5271 Terrazzo Grout Filler.

2.1.1.3. Sealer: General Polymers 4401 Terrazzo Sealer.

2.1.1.4. Water: clean and potable.

PART 3 - EXECUTION

3.1. PREPARATION

3.1.1.1. Thoroughly clean surfaces by scrubbing to remove dirt, dust, and wax. Use stripper in accordance with manufacturer's printed instructions.

3.1.1.2. Remove dirty solution with wet vacuum or mop.

3.1.1.3. Rinse with clean water and allow to dry thoroughly.

3.2. REFURBISH EXISTING TERRAZZO

3.2.1. Grind existing terrazzo floor and base with No. 80 grit abrasive stones using floor machine and base grinding machine for base. Keep area wet with water at all times. Wash surfaces with clean water.

3.2.2. Remove excess rinse water and apply grout to fill pinholes, cracks and voids. Allow grout to remain on surface and cure for minimum 24 hours before final grinding.

3.2.3. Grind existing terrazzo floor and base with No. 120 grit carborundum using floor machine and base grinding machine for base. Keep area wet with water at all times. Wash surfaces with a neutral cleaner. Rinse with clean water and allow to dry thoroughly.

3.2.4. Apply 2 coats sealer.

END OF SECTION

PART 1 - GENERAL

1.1. SUMMARY

1.1.1. Section Includes:

1.1.1.1. Testing and preparation of substrate for installation of flooring.

1.1.1.2. Moisture vapour control topping.

1.1.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:

1.1.2.1. Filling of major holes, crack repairs, patching chases and trenches in concrete substrate Flatness and levelness requirements for floor to receive resilient sheet flooring: Section 03 01 30 – Repairs to Concrete.

1.1.2.2. Ceramic and porcelain tile: Section 09 30 00 - Tiling

1.1.2.3. Vinyl flooring: Section 09 65 19 – Resilient Tile Flooring

1.2. ADMINISTRATIVE REQUIREMENTS

1.2.1. Coordination:

1.2.1.1. Coordinate preparation of concrete flooring with installation of flooring materials. Ensure that proposed materials are compatible and will achieve correct results.

1.2.1.2. Determine acceptable limits for moisture vapour emissions, and pH with each of the finish flooring manufacturers.

1.2.1.3. Schedule surface preparation work with the concrete trade and flooring installation trade.

1.2.2. Preinstallation Meeting:

1.2.2.1. Prior to start of concrete work, arrange for Project site meeting of all parties associated with work of this Section, including Contractor, various flooring installers, and concrete finisher in accordance with Section 01 10 00.

1.2.2.2. Review Specification for work included under this Section and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions flooring installation and other matters affecting construction, to permit compliance with intent of this Section. Ensure Division 03 requirements for concrete are compatible with requirements of this Section; floor flatness and floor levelness requirements for various floor finishes and their acceptability by flooring manufacturer; surface texture of finished floor required for various floor finishes; acceptable approaches to remediation of high moisture and high pH floors; adhesive application and floor covering installation.

1.3. SUBMITTALS

1.3.1. Product Data Sheets:

1.3.1.1. Submit product data sheets for all products proposed for use in this Section.

1.3.1.2. Submit WHMIS Safety Data Sheets for each product.

1.3.2. Shop Drawing: submit floor plan showing the locations of all field testing of concrete floors.

1.3.3. Test and Evaluation Reports:, submit field test reports from recognized approved independent testing laboratory for following requirements:

1.3.3.1. Submit letters of acceptance from each manufacturer of flooring products specified in related Sections that the combination of products and methods used in the overall flooring preparation and installation are compatible and appropriate for their intended application.

1.3.3.2. Submit moisture vapour emissions testing for all concrete floor areas.

1.3.3.3. Submit calcium chloride test results in accordance with requirements specified herein.

1.3.3.4. Submit pH test results and verify their acceptability to resilient sheet flooring manufacturer in accordance with requirements specified herein.

1.4. CLOSEOUT SUBMITTALS

1.4.1. Update floor plan shop drawing with notes to confirm field testing locations and final test readings.

1.5. QUALITY ASSURANCE

1.5.1. Qualifications:

1.5.1.1. Field Testing Inspectors: Independent 3rd party inspectors with minimum three years experience with concrete testing.

1.5.1.2. Installers: Provide work of this Section executed by competent installers with minimum of 5 years experience in concrete preparation and application of concrete Products specified.

1.6. DELIVERY, STORAGE AND HANDLING

1.6.1. Delivery and Acceptance Requirements:

1.6.1.1. Deliver materials in good condition to site in manufacturer's original unopened containers that bears name and brand of manufacturer, Project identification, shipping and handling instructions.

1.7. SITE CONDITIONS

1.7.1. Ambient Conditions:

1.7.1.1. Maintain appropriate environmental conditions and protect work during and after installation. Comply with trade standards and manufacturer's Product instructions. Follow Product SDS and label instructions concerning safety, health and other related precautionary and environmental protection.

1.7.1.2. Maintain relative humidity in accordance with manufacturer's instructions.

1.7.1.3. Exhaust temporary heaters to building exterior to prevent health hazards and damage to work from toxic fumes and emanations.

1.7.1.4. Maintain ambient air temperature and temperature of floor covering areas at not less than 10 deg C (50 deg F) or more than 29 deg C (85 deg F) 48 hours before, during installation and for 48 hours after application unless otherwise required in Product instructions.

1.8. WARRANTY

1.8.1. Manufacturer Warranty: Warrant work of this Section for period of 25 years 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, at no expense to Owner.

1.8.2. Defects include but are not limited to; failure of floor finish remaining in place and bonding to structural slab and finish becoming defective and spalling and/or cracking.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:

2.1.1.1. Ardex Canada, Inc.; www.ardex.ca

2.1.1.2. Flextile Ltd.; www.flextile.net

2.1.1.3. Laticrete International, Inc.; www.laticrete.com

2.1.1.4. Mapei Corporation; www.mapei.ca

2.2. MATERIALS

2.2.1. Concrete Moisture Emission Reducer: Characteristics, performance requirements:

2.2.1.1. Epoxy cement, compliant with ASTM F3010.

2.2.1.2. Antimicrobial additive

2.2.1.3. Reduce the moisture vapour emission rate of concrete slabs ≤ 3 lbs. per 1,000 ft^2 per 24 hours.

2.2.1.4. Reduce the surface alkalinity of concrete slabs down to pH levels of 9

2.2.1.5. Provide 1 of following:

2.2.1.5.1. “Planiseal™ VS” by Mapei Corporation.

2.2.1.5.2. “Sikafloor® 81 EpoCemCA” by Sika Canada Inc.

2.2.1.5.3. “Ardex MC Rapid” by Ardex Canada

2.2.2. Primer:

2.2.2.1. Provide 1 of following:

2.2.2.1.1. “4040 Acrylic Primer” by Flextile Ltd except where epoxy moisture mitigation systems.

2.2.2.1.2. “Primer X” by Mapei Corporation

2.2.2.1.3. “Sikafloor 155 WN” by Sika Canada

2.2.2.1.4. “Ardex P4” by Ardex Canada

PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Verification of Conditions for New Concrete:

3.1.1.1. Ensure new concrete slab has been properly cured and dry for minimum of 28 Days and has reached minimum compressive strength of 25 MPa (3625 psi) and a minimum of 1.5 MPa (218 psi) in tension.

3.1.1.2. Ensure no curing and sealing compounds, hardeners or other chemical additives have been used on concrete.

3.1.1.3. Notify Consultant in writing of any conditions which would be detrimental to the installation.

3.2. TESTING FOR ALL CONCRETE FLOORS:

3.2.1. Conduct concrete testing on all concrete floors prior to application of moisture vapour control topping and following corrective work.

3.2.2. Moisture Vapour Testing:

3.2.2.1. Perform calcium chloride test no earlier than 28 Days after concrete has been placed in accordance with requirements of ASTM F1869 for new and existing concrete floors, and in-situ probe RH testing in accordance with ASTM F2170 for new concrete prior to installation of flooring material.

3.2.2.2. Conduct 3 tests for each of the RH test methods for first 93 m2 (1000 sq ft) and 1 additional test for every 93 m² (1000 sq ft) of flooring. Ensure moisture emission from concrete floor does not exceed 2.27 kg/93 m² (5 lbs/1000 sq ft) in 24 hours or has a maximum RH of 80%.

3.2.2.3. Provide results to Consultant prior to commencement of installation including diagram of area tested showing location of each moisture test.

3.2.2.4. When concrete moisture emission rate is between 2.27 kg/93 m² (5 lbs/1000 sq ft) and 6.79 kg/93 m² (15 lbs/1000 sq ft) and in 24 hours use a concrete moisture emission reducer.

3.2.2.5. Do not proceed with installation until moisture problem has been corrected.

3.2.3. Alkalinity Testing (pH):

3.2.3.1. Measure pH of concrete in accordance with ACI PRC-364.17: How to Measure pH of a Concrete Surface Prior to Installation of a Floor Covering.

3.2.3.2. Perform pH test no earlier than 28 Days after concrete has been placed to ensure alkali salt residue is within limitation acceptable to manufacturer and to avoid adhesive failure, discoloration, shrinkage and softening of floor covering. If pH results are higher than 9.0, report to Consultant, Contractor or Owner for investigation and remedial work.

3.2.3.3. Perform at least three pH tests must be performed for the first 93 m² (1,000 square feet) of space. One additional test should be performed for each additional 93 m² (1,000 square feet 0 thereafter.

3.2.3.4. Refer to manufacturer for ways to neutralize floor prior to beginning of installation. Neutralize by sanding, vacuuming and/or by water plus mild sulfuric or sulfamic acid application as recommended by manufacturer.

3.2.3.5. Retest to assure pH has been neutralized.

3.2.4. Capillary Moisture Testing:

3.2.4.1. Moisture content of concrete substrate must be ≤ 4 % by mass (PBW – part by weight) as measured with a Tramex®CME / CMExpert type concrete moisture meter.

3.2.4.2. Before proceeding with application, test surfaces for moisture content in accordance with ASTM D4263 and in consultation with manufacturer to ensure they are suitable for application.

3.2.4.3. Provide all test results to Consultant prior to commencement of installation including diagram of area tested showing location of each moisture test, alkalinity test and capillary moisture test.

3.2.5. Evaluation and Assessment:

3.2.5.1. Report all testing results to manufacturer's representative and submit written acceptance of these results approval before proceeding.

3.2.5.2. Commencement of work implies acceptance of previously completed work.

3.3. SURFACE PREPARATION

3.3.1. For all new and existing concrete floor areas:

3.3.1.1. Prepare existing and new concrete floors over entire area with steel shot blasting or other method recommended by manufacturer. Remove uneven joints, rough areas, foreign and

projection off surfaces. Surface to be hard, sound and roughened to irregular surface with weak concrete removed and surface holes and voids exposed. Equip dry blasting machine with vacuum to minimize dust.

3.3.1.2. Shot blast floor to remove soft material and to achieve a profile equivalent to ICRI / CSP 3 – 4.

3.3.1.3. Shot blast to expose cracks in concrete surface. For cracks lesser than 1.5 mm (1/16") employ crack reinforcing tape in accordance manufacturer's recommendations. Repair cracks, holes or other deficiencies in accordance with manufacturer's recommendations.

3.3.1.4. Blow clean control joints, sawcuts and cracks with compressed air.

3.3.1.5. Prepare concrete floors to receive sheet flooring in accordance with requirements of ASTM F710. Achieve CSP of #2 - #3. Consult individual manufacturer for their specific recommendations and follow them as required.

3.4. MOISTURE BARRIER APPLICATION

3.4.1. If moisture levels exceed acceptable limit, apply moisture emission reducer in accordance with ASTM F710 and ASTM F3010.

3.4.2. Follow manufacturer's recommendations to determine whether cracks are filled before or after application of moisture barrier cement.

3.4.3. Mix moisture barrier in accordance with manufacturer's printed instructions.

3.4.4. Material components minimum 15°C (60°F) at time of mixing.

3.4.5. Apply coating using roller to achieve thickness as per manufacturer's instructions. Allow to cure.

3.4.6. Apply second coat of moisture barrier coating, dry film thickness of 12.8 mils. Allow to cure.

3.4.7. Re-test for moisture vapour emission and pH level.

3.5. CLEANING

3.5.1. Remove excess adhesive from floor, base and wall surfaces without damage.

3.5.2. Clean floor and base surface to flooring manufacturer's instructions.

3.6. PROTECTION

3.6.1. Protect installed flooring as recommended by flooring manufacturer against damage from rolling loads, other trades or placement of fixtures and equipment.

3.6.2. Prohibit foot traffic on floor for 24 hours after installation. Prohibit heavy traffic, rolling loads and furniture or appliance placement for a minimum of 72 hours after installation.

END OF SECTION

PART 1 - GENERAL

1.1. SUMMARY

1.1.1. Section Includes: Provide gypsum board assemblies work including but not limited to following:

1.1.1.1. Gypsum board ceilings, partitions and repairs to existing gypsum board.

1.1.1.2. Corner beads, casing beads, trim, control joints and corner reinforcement.

1.1.1.3. Taping and filling.

1.1.1.4. Sound attenuation batts.

1.1.1.5. Installation of access doors, and panels supplied by other Sections in gypsum board walls and ceilings as required.

1.2. QUALITY ASSURANCE

1.2.1. Qualifications:

1.2.1.1. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

1.3. DELIVERY, STORAGE AND HANDLING

1.3.1. Storage and Handling Requirements:

1.3.1.1. No outside storage permitted. Store in clean, dry area, off ground. Provide adequate ventilation to avoid excess moisture, surface relative humidity and mould or fungal growth. Remove immediately any board showing signs of mould, mildew or fungal growth.

1.3.1.2. Stack gypsum board flat on level and dry surface without overhanging boards. Prevent sagging and damage to edges, ends and surfaces. Protect bagged Products from moisture or wetting.

1.4. SITE CONDITIONS

1.4.1. Ambient Conditions:

1.4.1.1. Do not install work of this Section in any area unless satisfied that work in place has dried out and that no further installation of materials requiring wetness, moisture or dampness is contemplated. Ensure relative humidity in area of work of this Section does not exceed 55% for duration of Project.

1.4.1.2. Ensure temperature of surrounding areas is min 13 deg C (55 deg F) and max 21 deg C (70 deg F) for 7 Days before and during application of gypsum board; maintain for 4 Days thereafter. Ensure heat is provided at appropriate time before work has started to bring surrounding and adjacent materials up to required temperature and maintained as specified. Avoid concentrated or irregular heating during drying by means of deflectors or protective screens.

1.4.1.3. Ensure ventilation is provided for proper drying of joint filler and adhesive and to prevent excessive humidity. Do not force dry adhesives and joint treatment.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:

2.1.1.1. Bailey Metal Products Ltd.; www.bmp-group.com

2.1.1.2. CertainTeed Corporation; www.certainteed.com

2.1.1.3. CGC Inc; www.cgcinc.com

2.1.1.4. Georgia-Pacific Canada, Inc.; www.gpgypsum.com

2.1.1.5. Johns Manville; www.jm.com

2.1.1.6. Roll Formed Specialty; www.rollformed.com

2.1.1.7. Trim-Tex Inc.; www.trim-tex.com

2.2. GYPSUM BOARD

2.2.1. Gypsum Board: Conforming to ASTM C1396/C1396M. Unless indicated otherwise use 1200 mm (4') wide standard facing board in maximum continuous lengths up to 3600 mm (12'), beveled and/or tapered edges to suit design requirements with butted square ends:

2.2.1.1. Gypsum Board (Walls): Provide 15.9 mm (5/8") thick with tapered edges unless otherwise specified as follows:

2.2.1.1.1. Provide 9.5 mm (3/8") thick gypsum board on curved walls.

2.2.1.2. Gypsum Board (Ceiling): Provide 15.9 mm (5/8") thick with tapered edges unless otherwise specified as follows:

2.2.1.2.1. Use anti sag sheets.

2.2.2. Moisture Resistant Gypsum Board: ASTM C1658/C1658M, glass mat faced, silicone treated core gypsum board, ASTM D3273 with a rating of 10, no mould growth after 4 weeks exposure, 12.7 mm (1/2") or Type X, 15.9 mm (5/8"). Acceptable products:

2.2.2.1. “DensArmor Plus® High Performance Interior Panel” by Georgia-Pacific Canada, Inc.

2.2.2.2. “CGC Sheetrock® Brand Glass-Mat Panels Mold Tough®” by CGC Inc.

2.2.3. Fire Rated Gypsum Board having Testing Agency Fire Rating Identification Stamp on Each Sheet: ASTM C1396/C1396M, Type X, 12.7 mm (1/2") and/or 15.9 mm (5/8") thick gypsum board 1200 mm (4') wide, maximum practical length and tapered edge as required by each fire resistance assembly. Acceptable products:

2.2.3.1. “Gyproc Fireguard Type X or Type C” by Georgia-Pacific Canada, Inc.,

2.2.3.2. “CGC Sheetrock Firecode X or Firecode C” by CGC Inc.

2.2.3.3. “ProRoc Type X or Type C” by CertainTeed Corporation.

2.2.4. Gypsum Board Tile Backer Board: ASTM C1178/C1178M, glass mat faced, water-resistant gypsum core board, with a rating of 10 in accordance with ASTM D3273, no mould growth after 4 weeks exposure, 15.9 mm (5/8") thick plain or Type X;. Acceptable products:

2.2.4.1. “DensShield® Tile Backer” by Georgia-Pacific Canada, Inc.

2.2.4.2. “Durock® Glass-Mat Tilebacker” by CGC Inc.

2.2.4.3. “GlasRock® Diamondback® Tile Backer” by CertainTeed Corporation.

2.2.5. Abuse Resistant Gypsum Board: Provide 1 of following:

2.2.5.1. Enhanced gypsum core encased in heavy duty paper facers on front and back, 15.9 mm (5/8"), conforming to ASTM C1396/C1396M and attaining a maximum of 0.014" as tested to ASTM D4060 (H-18 abrasion wheel, 500 grams, 200 cycles), a maximum of 0.123" indentation as tested to ASTM D5420 (72 in lbs) and a minimum of (133 ft lbs) as tested to ASTM E695 (50 lb bag) and ASTM C1629/C1629M Type X in fire rated assemblies. Acceptable products:

2.2.5.1.1. “Extreme Abuse with M2Tech” by CertainTeed Corporation

2.2.5.1.2. “CGC Sheetrock® Brand Mold Tough® AR Firecode Core” by CGC Inc.

2.2.5.2. Enhanced gypsum core encased in fibreglass facers on front and back, 15.9 mm (5/8"), conforming to ASTM C1396/C1396M and attaining a maximum of 0.014" as tested to ASTM D4060 (H-18 abrasion wheel, 500 grams, 200 cycles), a maximum of 0.123" indentation as tested to ASTM D5420 (72 in lbs) and a minimum of (133 ft lbs) as tested to ASTM E695 (50 lb bag) and ASTM C1629/C1629M Type X in fire rated assemblies. Acceptable products:

2.2.5.2.1. “DensAmor Plus® Abuse Guard” by Georgia-Pacific Canada, Inc.

2.2.5.2.2. “Sheetrock Mold Tough Glass Mat Abuse Resistant” by CGC Inc.

2.3. FASTENERS

2.3.1. Screws for Sheet Steel Members: ASTM C954, self-drilling, self-tapping gypsum board screws, 25 mm (1") long #6 for single layer application, 41 mm (1-5/8") long #7 for double layer application and as follows:

2.3.1.1. For single layer application over steel framing; self-drilling, self-tapping, case hardened, No. 6 contoured Phillips head or Type S bugle head, sized for minimum 15.9 mm (5/8") penetration into steel framing. Ensure fasteners are corrosion resistant. Use drill point screws for abuse resistant gypsum fibre panels.

2.3.1.2. For double layer application over gypsum backing board and existing gypsum board; 38 mm (1-1/2") Type G bugle head. For each additional layer of board, increase length of fasteners proportionally.

2.3.2. Screws; for exterior sheathing board: in accordance with manufacturer’s installation instructions to comply with design wind loads.

2.3.3. Laminating Compound: Asbestos-free, as recommended by manufacturer. Manufacturer's standard, multi-purpose construction adhesive. At fire-rated construction, use adhesive which conforms to that used in applicable fire tests. Acceptable products:

2.3.3.1. “Sheetrock Brand Laminating Compound” by CGC Inc.,

2.3.3.2. “Dehydratine 9T” by Grace Construction Products

2.3.3.3. “Stangard Foamastic” by Standard Chemicals Ltd.

2.4. JOINT TREATMENT MATERIALS

2.4.1. Joint Tape: Conforming to ASTM C475/C475M, provide following:

2.4.1.1. Regular Gypsum Board: Use kraft paper joint tape with feathered edges and minute perforations 50 mm (2") wide.

2.4.1.2. Moisture Resistant Gypsum Board or Cement Board: Use glass fibre tape only, open weave, with pressure sensitive adhesive 1 side. Acceptable products:

2.4.1.2.1. “Durock Cement Board Tape” by CGC Inc.

2.4.2. Joint Fillers and Topping Compound: Either slow or fast setting, low shrinkage type free of asbestos fillers and as recommended by manufacturer. Use “Gyproc 90" by Georgia-Pacific Canada, Inc. or “Durabond 90" by CGC Inc. at exterior soffits.

2.4.3. Finish coat for level 5 finish: vinyl acrylic latex based coating to ASTM C840, spray applied, “Tuff-Hide Primer-Surfacer” by CGC Inc.

2.5. ACCESSORIES

2.5.1. Dust Barrier: Minimum 0.152 mm (6 mil) polyethylene, CAN/CGSB-51.33-M, Type 2.

2.5.2. Resilient Sponge Tape: Self-sticking adhesive on 1 side, closed cell neoprene sponge tape. Acceptable products:

2.5.2.1. "Rubatex®" by Rubatex Corp.,

2.5.2.2. "Foamflex # 1220" by Jacobs & Thompson Inc.; www.foamparts.com

2.5.2.3. "Backerseal™ (Greyflex)™" by Emseal LLC; www.emseal.com.

2.5.3. Sealant for Moisture Resistant Gypsum Board Edges: "Sheetrock Brand W/R Sealant" by CGC Inc., or similar type acceptable to Consultant.

2.5.4. Corner Beads: "PG1 Platinum Square Nose Tape-On Trims" by Bailey Metal Products Ltd. "No-Coat®" by CertainTeed or "Fast Edge" paper by Trim-Tex at corners, reveals, or similar. Provide custom shapes of similar materials and design as noted.

2.5.5. Trim: "PG4 Platinum Tape-On L-Trims" by Bailey Metal Products Ltd.

2.5.6. Flexible Casing Beads: 0.531 mm (25 ga) steel, wipe coated, angle shaped in size to fit over edge of gypsum board, to suit curved applications.

2.5.7. Control Joints: Pre-fabricated control joints prepared to suit site conditions. Certified by manufacturer for use at fire resistance rated assemblies. Acceptable products:

2.5.7.1. "No. 093" zinc alloy control joint by CGC Inc.

2.5.7.2. "DRM-50-25 2-PC" by Fry Reglet

2.5.7.3. "093V Expansion Bead" by Trim-Tex Drywall Products Inc.

2.5.8. Access Doors and Panels:

2.5.8.1. Supplied as part of Section 08 31 13 and Divisions 21, 22, 23, 26, 27 and 28 for installation as part of this Section.

2.6. SOUND CONTROL MATERIALS

2.6.1. Acoustical Insulation: CAN/ULC S702, Type 1, of sufficient thickness to meet required STC rating for sound-rated partitions and of width to suit metal framing spacing

2.6.1.1. Acoustical Insulation Batts in non-fire rated assemblies: glass fibre

2.6.1.1.1. Acceptable Products:

2.6.1.1.1.1. "EcoTouch™ QuietZone® PINK™ FIBERGLAS® Acoustical Insulation" by Owens Corning Canada LP; www.insulation-owenscorning.ca

2.6.2. Strip Impalement Clips: 25 mm (1") wide strip of "Insul-Hold" by Insul-Hold Co., Inc.; www.insulhold.com, fabricated from 0.531 mm (25 ga) galvanized sheet metal in 30 m (100') rolls with punch-out insulation securement arrows. Alternatively, use special studs with punch-out impalement strips.

2.6.3. Acoustic Sealant:

2.6.3.1. Concealed locations: Single component, non-hardening, non-skinning synthetic rubber sealant; "Tremco Acoustical Sealant" by Tremco Canada; www.tremcosealants.com.

2.6.3.2. Fire resistance locations: Smoke-seal sealant with flame-spread not more than 25 and smoke developed classification not more than 50 to CAN/ULC-S102.

2.6.4. Elastomeric Sealant: As recommended by manufacturer of fibre-reinforced gypsum sheathing board.

2.6.5. Gaskets: Closed cell neoprene, 3 mm (1/8") thick x 64 mm (2-1/2") wide.

PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.

3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. PREPARATION

3.2.1. Ensure that services, blocking and supports to be installed in partitions have been installed and inspected before closing in with gypsum board.

3.2.2. Vacuum clean stud track, suspended support framing, and spaces to be concealed before starting the days installation.

3.3. INSTALLATION

3.3.1. Gypsum Board Application:

3.3.1.1. Provide gypsum board in accordance with manufacturer's written installation instructions and finish to requirements of ASTM C840. Install Moisture Resistant Gypsum Board on any wall/partition with a paint finish containing a plumbing fixture (i.e. water closets, sinks, tubs, etc.). Install gypsum board tile backer board on any wall partition or ceiling requiring a tile finish.

3.3.1.2. Provide metal trim casing bead at junctions with dissimilar materials. Provide reveals at junctions with dissimilar materials where indicated.

3.3.1.3. Provide finished work plumb, level and true, free from perceptible waves or ridges and square with adjoining work.

3.3.1.4. Cut and fit gypsum board to accommodate or fit around other parts of the Work. Provide work of this Section accurately and neatly.

3.3.1.5. Butt gypsum board sheets together in moderate contact. Do not force into place. Place tapered or wrapped edges next to 1 another.

3.3.1.6. Provide gypsum board perpendicular to framing and in lengths that will span ceilings and walls without creating end (butt) joints. If butt joints do occur stagger and locate them as far from centre of walls and ceilings as possible. Accurately fit exposed butt joints together and make edges smooth.

3.3.1.7. Support ends and edges on framing.

3.3.1.8. Fasten gypsum board to metal furring and steel studs with screws. Space screws at 200 mm (8") oc at board edges and 300 mm (12") oc on board field.

3.3.1.9. Gypsum Board - Single Layer:

3.3.1.9.1. Ceilings: Apply gypsum board to metal furring with screws. Erect board with long dimension parallel to supports. Locate end joints over supporting members. Space screws at 200 mm (8") oc.

3.3.1.9.2. Partitions: Apply gypsum board to steel studs with screws. Erect board with long dimension parallel to supports. Locate end joints over supporting members. Locate vertical joints at least 300 mm (12") from jamb lines of openings. Space screws at 200 mm (8") oc at board edges and 300 mm (12") oc on board field.

3.3.1.9.3. Ceiling and Partition Fasteners: Ensure perimeter screws are not less than 9 mm (3/8") nor more than 13 mm (1/2") from edges and ends are opposite

screws on adjacent boards. Drive screws with power screw-gun and set with countersunk head slightly below surface of board.

3.3.1.9.4. Joints: Finish all joints unless specified otherwise.

3.3.1.10. Gypsum Board - Double Layer:

3.3.1.10.1. Lay out work to minimize end joints on face layer; to offset parallel joints between face and base layers by at least 250 mm (10") and to apply face layer at right angles to base layer.

3.3.1.10.2. Base Layer: Ensure base layer is same as face layer, or backing board, and applied at right angles to framing members. Secure base layer with screws spaced 300 mm (12") oc to each member. Ensure perimeter screws are not more than 13 mm (1/2") from edges and ends are opposite screws on adjacent boards. Ensure surface of erected base layer is straight, plumb or level and without protrusions before face layer is applied.

3.3.1.10.3. Face Layer: Apply face layer at right angles to base layer with screws.

3.3.1.10.4. Joints: Finish joints in face layers only, unless otherwise required to achieve fire resistant ratings indicated, as hereinafter specified. Ensure setting compound for fire rated construction conforms to requirements of authorities having jurisdiction to obtain fire rating shown on Drawings.

3.3.2. Interior Ceilings:

3.3.2.1. Comply with recommendations of CGC Drywall Steel-Framed Systems Folder 09250-SA 923.

3.3.2.2. Provide hanger wires spaced at maximum 1200 mm (4') oc along carrying channels and within 150 mm (6") of ends of carrying channel runs. Secure hanger wires to inserts in structure above.

3.3.2.3. Provide carrying channels maximum 1200 mm (4') oc and within 150 mm (6") of walls. Secure with hanger wire saddle-tied along channels. Provide 25 mm (1") clearance between runners and walls. Provide splicers behind joints. Level channels to a maximum tolerance of 3 mm (1/8") over 3600 mm (12').

3.3.2.4. Provide metal furring channels at right angles to carrying channels at maximum 600 mm (24") oc and within 150 mm (6") of walls. Provide 25 mm (1") clearance between furring ends and abutting walls. Attach furring channels to carrying channels with saddle-tie of double strand tie wire.

3.3.2.5. Provide additional cross-reinforcing at bulkheads and other openings.

3.3.2.6. Provide ceiling gypsum board, smooth and level. In areas with a high humidity content (ie. Washrooms, janitor closets, etc.) install MRGB.

3.3.3. Metal Trim and Accessories:

3.3.3.1. Provide metal trim casing beads at reveals; at ceiling-wall intersections and partition perimeters; and at intersection of dissimilar constructions such as gypsum board to concrete.

3.3.3.2. Provide metal trim casing beads where gypsum board abutts against a surface having no trim concealing junction.

3.3.3.3. Provide a 13 mm (1/2") separation gasket between metal trim casing beads and window frames or other cold surfaces or provide sponge tape between gypsum board partition or furring framing, where such framing abuts exterior door or window frame, sponge tape between floor and gypsum board partition track. Ensure tape is either full width or 1 strip 9 mm (3/8") wide on each side of framing member.

3.3.3.4. Provide casing bead and sponge tape where gypsum board abuts materials other than itself and acoustic tile ceilings including at exterior door and window frames, where juncture is not concealed with trim; or elsewhere where indicated on Drawings. Unless indicated otherwise, use tape 3 mm (1/8") narrower than casing bead to provide recess at exposed side. Compress tape by 25%.

3.3.3.5. Provide metal trim casing beads where indicated on Drawings.

3.3.3.6. Access Doors and Panels: Install access doors and panels supplied as part of work of Divisions 22, 23 and 26 and where required as part of work of this Section in walls, bulkheads, ceilings and soffits.

3.3.4. Control Joints:

3.3.4.1. Provide either manufactured control joint devices or field fabricated control joints from suitable materials to suit site conditions in accordance with manufacturer's instructions and/or ASTM C840.

3.3.4.2. Set in gypsum facing board, supporting control joints with studs or furring channels on both sides of joint. Ensure double studs with discontinuous tracks and double suspended ceiling furring channels have been installed prior to commencing board and bead application at control joints. Provide control joints as required to prevent cracks at following locations:

3.3.4.2.1. Where a partition, wall or ceiling traverses a construction joint (expansion, seismic or building control element) in base building structure

3.3.4.2.2. Where a wall or partition runs in an uninterrupted straight plane exceeding 9.1 m (30') (Note: A full height door frame may be considered a control joint).

3.3.4.2.3. interior ceilings with perimeter relief: installed so linear dimensions between control joints do not exceed 15 m (50') and total area between control joints does not exceed 230 m^2 (2,500 sq ft).

3.3.4.2.4. Interior ceilings without perimeter relief: installed so linear dimensions between control joints do not exceed 9.1 m (30') and total area between control joints does not exceed 84 m^2 (900 sq ft).

3.3.4.2.5. Exterior ceilings and soffits: installed so linear dimensions between control joints do not exceed 15 m (50') and total area between control joints does not exceed 230 m^2 (2,500 sq ft).

3.3.4.2.6. At stress points (ie corners of openings or changes in direction of surfaces).

3.3.4.3. Provide additional control joints at long and narrow surfaces.

3.3.4.4. Provide control joints full height floor to ceiling or door header to ceiling in partitions and furring runs.

3.3.4.5. Provide control joints from wall to wall in ceiling areas.

3.3.4.6. Provide continuous polyethylene dust barrier behind and across control joints.

3.3.4.7. Ensure Consultant reviews exact locations of control joints.

3.3.5. Sound Control:

3.3.5.1. Where indicated on Drawings, provide sound rated partitions and ceiling in locations indicated to meet required minimum STC rating. Apply gypsum board on both sides of sound-proofed partitions. Follow manufacturer's details and recommendations.

3.3.5.2. Provide sound attenuation insulation to completely fill height of stud cavities. Tightly butt ends and sides of blankets within cavities. Cut blankets to fit small spaces. Carefully fit blankets behind electrical outlets, bracing, fixture attachments and mechanical and electrical services.

3.3.5.3. Mechanically fasten blankets to back of gypsum board as recommended by gypsum board manufacturer.

3.3.5.4. At sound attenuating suspended ceiling and enclosures having spring isolator hangers, terminate ceiling or enclosure at adjacent construction by providing continuous isolator strip and sealed joint.

3.3.6. Joint Treatment - Gypsum Board:

3.3.6.1. Verify board is firm against framing members and screw heads are properly depressed.

3.3.6.2. Mix joint compound or ready-to-use compounds according to manufacturer's directions. Use pure, unadulterated, clean water for mixing. Permit mixed material to stand 30 minutes before using. Do not mix more material than can be used within 1 hour. Do not use set or hardened compound. Clean tools and equipment after mixing each batch.

3.3.6.3. Tape and fill joints and corners in accordance with gypsum board manufacturer's printed instructions. Fill either manually, using hand tools of trade, or by a mechanical taping and filling machine of proven efficiency.

3.3.6.4. Remove plastic tape from control joints after finishing with joint compound.

3.3.6.5. After final coats of filler have dried at least 24 hours, sand surface lightly with No. 00 sandpaper to leave it smooth, ready for decoration.

3.3.6.6. Provide finished work smooth, seamless, plumb and true, flush and with square plumb neat corners.

3.3.6.7. Levels of Finish: Provide Level 4 finish in accordance with ASTM C840.

3.3.7. Cutting and Patching: Cooperate and coordinate with other Sections to obtain satisfactory gypsum board finish work. Do cutting, patching and Make Good as required by installation of work of other Sections.

3.4. CLEANING

3.4.1. Clean off beads, casings, joint cement droppings and similar items and remove surplus materials and rubbish on completion and as directed.

3.5. PROTECTION

3.5.1. Provide protection of materials and work of this Section from damage by weather and other causes. Perform work in areas closed and protected from damage due to weather. Protect work of other trades from damage resulting from work of this Section. Make Good such damage immediately.

END OF SECTION

PART 1 - GENERAL

1.1. SUMMARY

1.1.1. Section Includes: painting new and existing surfaces as indicated on the drawings and specifications. Work under this contract shall also include, but not necessarily be limited to following:

1.1.1.1. Surface preparation of substrate: cleaning and preparation of surfaces for application of paint systems.

1.1.1.2. Priming except where pre-primed with an approved primer under other Sections of work and painting of structural steel, miscellaneous metal, ornamental metal and primed steel equipment.

1.1.1.3. Priming and back-priming of wood materials as noted herein.

1.1.1.4. Painting of all semi-concealed areas e.g. inside of light troughs and valances, behind grilles, and projecting edges above and below sight lines.

1.1.1.5. Painting and finishing of all door frames.

1.1.1.6. Provision of safe and adequate ventilation as required over and above temporary ventilation supplied by others, where toxic and/or volatile / flammable materials are being used.

1.2. REFERENCES

1.2.1. Definitions:

1.2.1.1. Exposed: Visible in completed work. In case of closets, cabinets and drawers, it includes their interiors.

1.2.1.2. Gloss or Sheen: Capacity of a finish on a surface to reflect light at specific angles as tested in accordance with ASTM D523.

1.2.1.3. Hazardous Waste: Construction and demolition materials that are regulated for disposal by local, city, county, province or federal authorities having jurisdiction.

1.2.1.4. Painting: In this Section refers to application of various types of paint, stain, varnishes and lacquers, etc.

1.2.1.5. Surface Preparation: Cleaning or treating of surface to be painted to ensure best possible bond between surface and painting to be applied to surface; remove surface contaminants that will affect performance of painting, without limitations such as oil, grease, salts, dust, dirt, rust, rust scale, mill scale and old coatings where applicable; remove surface imperfections without limitation including but not limited to such as weld spatter, sharp edges, burrs, slivers, laminations, pits, porosities and crevices; prepare surfaces to provide anchor profile or surface profile which improve mechanical bonding of coating to prepared surface by increasing surface area.

1.3. SUBMITTALS

1.3.1. Product Data:

1.3.1.1. Submit Product data and a Schedule of Finishes listing manufacturer's Product name, colour, textures, SDS and test reports requested for each paint system. Submit test reports for odourless, low or zero VOC Products when requested.

1.3.1.2. Painting Subcontractor to receive written confirmation of specific surface preparation procedures and primers used for fabricated steel items from fabricator/supplier to ensure appropriate and manufacturer compatible finish coat materials prior to commencement of painting.

1.3.1.3. Submit Product data for concrete and concrete block primers.

1.3.2. Samples: Submit samples 30 Days before materials are required.

1.3.2.1. Submit following samples in sizes indicated:

1.3.2.1.1. 2 copies of brushouts minimum 200 mm x 250 mm (8" x 10") of each finish including colour, sheen and texture. Identify each sample with job, finish, colour name, number, sheen and gloss values, substrate to be applied to, date and name of Subcontractor.

1.4. SITE CONDITIONS

1.4.1. Ambient Conditions:

1.4.1.1. Paint and finish in clean, dust-free, properly ventilated and adequately lit areas minimum 323 Lx (30 ft candles) on surfaces to be painted or decorated.

1.4.1.2. Provide each paint materials in accordance with manufacturer's recommended tolerances for:

1.4.1.2.1. Substrate Moisture Content: Perform tests with a properly calibrated electronic moisture meter to ensure compliance with manufacturer’s recommendations. Without limitation, maximum moisture content as follows:

1.4.1.2.1.1. Concrete and Concrete Unit Masonry: Maximum 12 - 14% for solvent coatings and as recommended by manufacturer for each water based system.

1.4.1.2.1.2. Gypsum Based Board and Plaster: Maximum 12 - 14%.

1.4.1.2.1.3. Wood: Maximum 15%.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications

2.1.1.1. Benjamin-Moore www.benjaminmoore.com

2.1.1.2. Dulux Paints www.dulux.ca

2.1.1.3. Sherwin Williams www.sherwin-williams.com

2.1.2. Basis of Design: for interior latex applications (PT-1): “Promar 200 HP Zero VOC” by Sherwin Williams

2.1.3. Substitution Limitations: Substitution Limitations: Comparable Products from other manufacturers not listed herein will be considered provided:

2.1.3.1. They are submitted in accordance with Substitution Procedures specified in Division 01

2.1.3.2. Meet requirements of this Specification.

2.1.3.3. Acceptance by Consultant.

2.2. MATERIALS

2.2.1. General: paint systems for existing surfaces shall be same finish system as for new work as specified below, but primer for existing painted or wallpapered surfaces: 1 coat X-Pert Gripper 250 by PPG, or as otherwise recommended by the finish paint manufacturer.

2.2.2. Finishes:

2.2.2.1. Colours: to be selected by Consultant

2.2.2.2. Gloss Values Definition, as determined by ASTM D523:

		Light Reflection Unit
G1	Gloss Level 1 – Traditional matte finish, Flat	< 5
G2	Gloss Level 2 – High side sheen Flat, “Velvet-like” finish	< 10
G3	Gloss Level 3 – Traditional “Eggshell-like” finish	10 - 25
G4	Gloss Level 4 – “Satin-like” finish	20 - 35
G5	Gloss Level 5 – Traditional Semi-Gloss	35 - 70
G6	Gloss Level 6 – Traditional Gloss	70 - 85
G7	Gloss Level 7 – High Gloss	> 85

2.2.2.3. Gloss Values unless otherwise specified:

2.2.2.3.1. Walls: G4

2.2.2.3.2. Floors: G5 or G6

2.2.2.3.3. Ceilings: G1

2.2.2.3.4. Trim and Doors: G5

2.2.2.3.5. Signage: G1

2.2.3. Mixing and Tinting:

2.2.3.1. Unless otherwise specified herein or pre-approved, all paint shall be ready-mixed and pre-tinted. Re-mix all paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.

2.3. INTERIOR FINISH SCHEDULE:

2.3.1. Concrete Vertical Surfaces:

2.3.1.1. 1 coat primer alkali resistant water based: Dulux Gripper Universal Acrylic Primer/ Sealer code 60000A

2.3.1.2. 2 coats latex: Dulux Lifemaster code 59311

2.3.1.3. Finish: G3 -Eggshell.

2.3.2. Concrete Masonry Units (CMU’s): (concrete block and concrete brick):

2.3.2.1. 1 coat latex block filler: Dulux X-Pert Acryluc

2.3.2.2. 2 coats latex: Dulux Lifemaster code 59311

2.3.2.3. Finish: G3 -Eggshell.

2.3.3. Structural Steel and Metal Fabrications: (with existing shop coat primer):

2.3.3.1. Unexposed: No further finishing required except for touch-up of damaged surfaces.

2.3.3.2. Exposed:

2.3.3.2.1. 1 coat quick dry metal primer: PPG Pitt-Tech Plus EP WB Acrylic Primer

2.3.3.2.2. 2 coats quick dry enamel: PPG HPC Alkyd Industrial Semi-Gloss Enamel code 4336H

2.3.3.2.3. Finish: G5 - Semi-Gloss.

2.3.4. Galvanized Metal (Not Chromate Passivated): (High contact/high traffic areas (doors, frames, railings, pipes, etc.) low contact/low traffic areas (overhead decking, pipes, ducts, etc.):

2.3.4.1. 1 coat waterborne primer: PPG Pitt-Tech Plus EP WB Acrylic Primer

2.3.4.2. 2 coats latex: Dulux acrylic eggshell code 14220

2.3.4.3. Finish: G3 - Eggshell

2.3.5. Gypsum Board:

2.3.5.1. 1 coat latex primer sealer: Dulux X-Pert code 11000

2.3.5.2. 2 coats latex:

2.3.5.2.1. Walls: Dulux Lifemaster code 59311

2.3.5.2.1.1. Finish: G3 - Eggshell

2.3.5.2.2. Ceilings: Dulux Lifemaster code 59111

2.3.5.2.2.1. Finish: G1 - Flat.

2.3.6. Plywood Backer Panels:

2.3.6.1. 2 coats Albi Cote FRL-X

2.3.6.2. Finish: G1 – Flat

PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Verification of Conditions:

3.1.1.1. Do work only when surfaces and conditions are satisfactory for production of quality work. Report to Consultant in writing any surfaces which are found to be unsatisfactory.

3.1.1.2. Ensure temperature of surfaces to be finished are as required for application of finish. Refer to “Temperature and Ventilation” article specified herein. Ensure surfaces are dry and free of dirt, grease or other contaminants that may affect applied finish.

3.1.1.3. Verify moisture content of surfaces with electronic moisture meter. Do not proceed without written directions if moisture reading is higher than as required for application. Refer to “Ambient Conditions” article specified herein for substrate moisture content requirements.

3.1.1.4. If substrate is masonry, allow to cure for 30 to 90 Days. Ensure moisture content is between 12% and 14% and test for alkalinity and neutralize (pH 6.5 - 7.5) before proceeding with priming.

3.1.1.5. If substrate is gypsum board, inspect to ensure joints are completely filled and sanded smooth. Inspect surfaces for "nail popping", screw heads not recessed and taped, breaks in surface or other imperfections and have repaired as required.

3.2. PREPARATION

3.2.1. Protection of In-Place Conditions:

3.2.1.1. Provide scaffolding, staging, platforms and ladders, as required for execution of work. Erect scaffolding to avoid interference with work of other trades. Comply with Occupational Health and Safety Act.

3.2.1.2. During work of this Section, provide drop cloths, plastic, plywood or metal sheets to protect floors in areas assigned for storage and mixing of paints. Cover finished floors, walls, ceilings and other work in vicinity and protect from paint and damage.

3.2.1.3. Protect work of other trades against paint splattering and Make Good at own expense any such damage.

3.2.1.4. Vacuum clean floors in areas to be painted.

3.2.1.5. Remove and securely store miscellaneous and finish hardware and surface fittings, electrical switch and outlet covers, receptacle plates, louvres, fittings and fastenings, to protect from paint splatter. Mask items not removable. Use sufficient drop cloths and protective coverings for full protection of floors, furnishings, mechanical, electrical and special equipment, other components of building which do not require painting or to be removed, from paint spotting and other soiling. Carefully clean and re-install items when paint is dry. Clean any components that are paint spotted or soiled. Do not use solvent or reactive cleaning agents on items that will mar or remove finishes (e.g. lacquer finishes).

3.2.1.6. Prohibit traffic, where possible, from areas where painting is being carried out and until paint is cured. Post “wet paint” or other warning signage during and on completion of work. Provide also warning signs at points of entry to areas where painting is applied and drying.

3.2.2. Surface Preparation:

3.2.2.1. Prepare defective surfaces to obtain a satisfactory substrate and in accordance with paint manufacturer's instructions.

3.2.2.2. Prior to painting, wipe down wall surfaces, vacuum clean floors, ensure all surfaces are dust-free.

3.2.2.3. Clean soiled surfaces to be painted. Wash existing surfaces with a biodegradable detergent, and bleach where applicable, and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants. Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface. Allow surfaces to drain completely and allow to dry thoroughly.

3.2.2.4. Remove efflorescence, chalk, dust, dirt, oil, grease, rust, form oil, release agents, loose mill scale and other extraneous matter from surfaces.

3.2.2.5. Remove mildew by scrubbing affected area with solution of 150 g (5.3 oz) TSP and 125 g (4.4 oz) bleach in 3.5 ℓ (0.92 gal) water. Rinse well with clean water and allow to dry. If condition is serious, source out finishes with extra mildew resistance.

3.2.2.6. Be responsible for surface preparation to suit surface condition and conform to level of cleaning based on SSPC, recommended metal cleaning procedures most commonly used to suit site conditions.

3.2.2.7. Existing surfaces - general: Remove or set screws, nails, hooks, tacks, and fasteners. Make repairs to damaged surfaces.

3.2.2.7.1. Existing gypsum board: Repair cracks and fissures by cutting away broken, damaged or loose material to expose substrate. Fill crack or damaged area with suitable new material in accordance with Section 09 29 00 – Gypsum Board.

3.2.2.8. Concrete and Masonry:

3.2.2.8.1. Form Oil Removal: Remove with Xylol or TSP.

3.2.2.8.2. Efflorescence Removal: Remove by dry brushing or washing with 1 part commercial muriatic acid to 20 parts water by volume and thoroughly rince with clean water.

3.2.2.8.3. Mildew Removal: Remove by scrubbing affected area with 1 part sodium hypochlorite to 3 parts water. Where dirt is also evident, add 1.36 kg (3 lbs) TSP to 6.8 ℓ (1.5 gal) of above solution.

3.2.2.8.4. Concrete Vertical Surfaces: Use sand blasting, high pressure water blasting, high pressure water blasting with abrasives, vacuum blasting with abrasives or alternatively, needle guns or power grinders equipped with suitable grinding stone, to remove concrete, loose mortar, fins, projections and surface contaminants. Vacuum or blow down and remove dust and loose particles from surface. Fill large cracks and/or voids in consultation with design engineer using either polyester, epoxy or acrylic resin, block filler or cement sand mixture in accordance with design engineer's written instructions. Fill only flush to surface and allow to set.

3.2.2.8.5. Concrete Block Masonry: Fill voids and cracks in masonry block wall to provide uniform surface for subsequent coats.

3.2.2.9. Metals:

3.2.2.9.1. Ensure application of paint and coatings occurs within appropriate time frame after cleaning when environmental conditions encourage flash-rusting, rusting, contamination or manufacturer's paint specifications require earlier applications.

3.2.2.9.2. SSPC-SP 3 (Power Tool Cleaning): Use of power sanders and wire brushes, impact tools, grinders and power chipping hammers to remove loose mill scale, loose rust, paint or other foreign matter. Do not employ power tool cleaning excessively causing burnished mill scale preventing primers to adhere properly.

3.2.2.9.3. Ferrous Metal: Clean to SSPC-SP 1/2/3, to suit site conditions. Remove loose rust and prime bare metal with rust inhibitive steel primer. Touch-up damaged shop applied primer using compatible Product. Provide full coat primer only if damage is extensive. Treat weld areas with phosphoric acid (5% solution).

3.2.2.9.4. Structural Steel/Miscellaneous Steel (previously painted and exposed by alterations work): Remove oil, grease, dirt, rust scale, loose mill scale, loose paint or coating by brush-off blast cleaning to SSPC-SP 7.

3.2.2.9.5. Hot Dipped Galvanized Steel (Unweathered): Allow to weather minimum of 26 weeks and Xylene clean to SSPC-SP 1 specified herein prior to coating to remove dust, dirt, grease, oxides and other foreign material. Remove silicates or similar surface treatments or any deposits of white rust by sanding or similar abrasive methods (bronze wool). Use of acetic acid to prepare galvanized surfaces is not acceptable.

3.2.2.9.6. Galvanized Steel (Weathered): Remove dust, dirt, grease, oxides and other foreign material and clean to SSPC-SP 1 specified herein prior to coating.

3.2.2.9.7. Galvanized Steel (Pre-Treated)(Non-Crystal Appearance): Follow manufacturer's recommendations for preparation, priming and coating of pre-treated galvanized steel.

3.2.2.9.8. Light Zinc Coated or Satin Coated Products (ZF075) mostly found in environmentally controlled areas. Follow manufacturer's recommendations for preparation, priming and coating.

3.2.2.9.9. Heavy Coated Zinc Z275 (G90) for high humidity areas and as specified. Follow manufacturer's recommendations for preparation, priming and coating.

3.2.2.9.10. Metal Doors: Remove doors before painting to paint bottom and top edges and re-hang once dry. Do not paint stainless steel or bronze door butts. Paint or

finish top and bottom edges of doors. Touch-up or refinish tops and edges after fitting.

3.2.2.10. Previously Finished Surfaces:

3.2.2.10.1. Clean existing interior and exterior surfaces to be repainted or varnished to provide bond. Remove rust, scale, oil, grease, mildew, chemicals and other foreign matter. Remove loose paint and fill flush with suitable patching material. Clean off bubbled, cracked, peeling or otherwise defective paint by stripping with suitable environmental strippers or by burning. Do not burn off paints suspected of having lead content. Treat residue from stripping as Hazardous Waste.

3.2.2.10.2. Flatten gloss paint and varnish with sandpaper and wipe off dust. If previous coatings have failed so as to affect proper performance or appearance of coatings to be applied, remove previous coatings completely and prepare substrates properly and refinish as specified for new work.

3.2.2.10.3. Remove or set screws, nails, hooks, tacks, and fasteners. Make repairs to damaged surfaces.

3.2.2.10.4. Existing gypsum board: Repair cracks and fissures by cutting away broken, damaged or loose material to expose substrate. Fill crack or damaged area with suitable new material in accordance with Section 09 29 00 – Gypsum Board.

3.2.2.10.5. Leave entire surface suitable to receive designated finishes and in accordance with finish manufacturer's instructions.

3.2.2.11. Woodwork:

3.2.2.11.1. Verify and determine wood species, grain direction and structure, properties of finish, application method and exposure to elements. Check moisture content to avoid movement of wood caused by expansion and contraction due to changes in moisture content. Verify grain cut as it may interfere with adhesion of paint.

3.2.2.11.2. Apply wood finishing Product in following order and as needed for specific appearance and application specified herein. Sanding sealer to control penetration of subsequent coats to create more uniform finish. Stain to colour wood and highlight grain for final finish. Filler to fill pores of wood and control penetration of subsequent coats. Apply filler across grain forcing it into pores followed with rubbing and sanding when dried. For staining requirements mix stain with filler before applying for uniform finish. Finish coats to provide protection to wood.

3.2.2.11.3. Wood work for Opaque Coating: Seal knots and sapwood in surfaces to receive paint with alcohol-based primer-sealer. Seal door edges. Sand smooth rough surfaces of woodwork to be finished using No. 150 grit paper followed by a second sanding using No. 220 grit paper. Sand in direction of grain. Clean surfaces free of dust before applying first coat using brush, compressed air or tack rags. Fill nail holes, splits and scratches with non-shrinking filler after first coat is dry.

3.2.2.11.4. Prepare plywood surface by removing dirt and debris. Fill screw and nail holes or minor imperfections with recommended filler and sand properly to receive finish coating. Ensure plywood requiring stained or painted finish is primed with top quality alkyd primer. Use only penetrating quality stain over plywood.

3.2.2.11.5. Woodwork for Clear Finish or Stain: Sand smooth woodwork to be finished using No. 150 grit paper followed by a second sanding using No. 220 grit paper and clean surfaces free of dust using brush, compressed air or tack rags before applying first coat. Abrade surfaces with stiff brush to remove loose fibres and splinters. Fill nail holes, splits and scratches with non-shrinking filler tinted to

match local grain condition after first coat is dry. Sand lightly between coats with No. 220 grit sandpaper and remove dust.

3.2.2.11.6. Remove salt deposits that may appear on wood surfaces treated with fire retarder.

3.2.2.11.7. Obtain inspection of glue laminated beams by assigned painting inspector to ensure shop sealer has been applied. Where non-specified shop sealer has been applied to beams or columns, remove and refinish in accordance with manufacturer's written instructions.

3.2.2.11.8. Wood Doors: Remove doors before painting to paint bottom and top edges and re-hang once dry. Paint or finish top and bottom edges of doors to be painted or stained. Touch-up or refinish tops and edges after fitting.

3.2.2.12. Gypsum Board:

3.2.2.12.1. Examine and ensure gypsum board surfaces are without defects or deficiencies and suit able to receive painting applications. Commencement implies acceptance of gypsum board work. Examine surfaces after for imperfections showing through and fill small nicks or holes with patching compound and sand smooth. Examine surfaces after priming for imperfections showing through.

3.2.2.12.2. Clean surfaces dry, free of dust, dirt, powdery residue, grease, oil, wax or any other contaminants.

3.3. APPLICATION

3.3.1. Safety Precautions: When handling solvent coating materials, wear approved vapour/particulate respirator as protection from vapours. Dust respirators do not provide protection from vapours.

3.3.2. Material Compatibility: Provide primers and finish coat materials compatible with each other and substrate including fillers.

3.3.3. Obtain colour chart giving colour schemes and gloss value for various areas from Consultant. Ensure colour chart gives final selection of colours and surface textures of finishes and whether finishes are transparent (natural) or opaque (paint).

3.3.4. Provide finish uniform in sheen, colour and texture, free from streaks, shiners and brush or roller marks or other defects.

3.3.5. Apply materials in accordance with manufacturer's directions and specifications paying particular attention to appropriate time frame after cleaning when environmental conditions encourage flash-rusting, rusting, contamination or manufacturer's paint specifications require earlier applications. Do not use adulterants. Do any reduction of coating’s viscosity in accordance with manufacturer’s directions.

3.3.6. Use up paints within period of shelf life recommended by paint manufacturer.

3.3.7. Ensure successive coatings are harmonious chemical compositions and materials of same manufacturer.

3.3.8. Apply primer coat soon after surface preparation is completed to prevent contamination of substrate.

3.3.9. Primer/Sealers: Apply primer-sealer coats by brush or roller. Permit to dry in accordance with manufacturer’s recommendations before applying succeeding coats. Touch up suction spots and sand between coats with No. 120 sandpaper.

3.3.10. Sand and dust between each coat to provide an anchor for next coat and to remove defects visible from a distance up to 1 m (39").

3.3.11. Ensure each coat is dry and hard before a following coat is applied.

3.3.12. Continue through paint finish behind wall-mounted items (e.g. chalk and tack boards).

3.3.13. Finish listed surfaces indicated on Room Finish Schedule(s) and/or noted on Drawing(s) and as specified. Refer to Finish Room Schedule for type, location and extent of finishes required and include touch-ups and field painting necessary to complete work shown, scheduled or specified.

3.3.14. Finishes and number of coats specified in Room Finish Schedule are intended as minimum requirements guide only. Refer to manufacturer's recommendations for exact instructions for thickness of coating to obtain optimum coverage and appearance. Some materials and colours may require additional coats and deeper colours may require use of manufacturers' special tinted primers. Apply additional paint coats, beyond number of coats specified for any surface, to completely cover and hide substrate and to produce a solid, uniform appearance

3.3.15. Painting previously painted surfaces:

3.3.15.1. Paint entire plane of wall or ceiling.

3.3.15.2. Where there has been patching or repair work – paint entire plane of wall or ceiling. Patching is not acceptable.

3.3.16. Do not paint baked paint surface, chrome plated, stainless steel, aluminum or other surfaces finished with final finish in factory. Finish paint primed surfaces.

3.3.17. Metals:

3.3.17.1. Apply primer coat to unprimed ferrous metal surfaces. Where sandblast preparation is specified, apply specified primer immediately after blast cleaning.

3.3.18. Woodwork:

3.3.18.1. Fill open grain woods with filler tinted to match wood and work well into grain. Wipe excess from surface before filler sets.

3.3.18.2. Sand smooth paint and varnish undercoats prior to recoating.

3.3.18.3. Prime woodwork designated for painting as soon as possible after delivery to site and before installation. Prime cut surfaces, whether exposed or not, i.e. 6 edges of wood doors, before installation. Prime cut surfaces of woodwork to receive transparent finish with 1 coat of transparent finish reduced 25% or as directed by manufacturer.

3.3.18.4. Apply final coats on smooth surfaces by roller or brush. Hand brush wood trim surfaces.

3.3.19. Allow each coat of paint to cure and become dry and hard before application of succeeding coats (unless manufacturer's directions require otherwise).

3.3.20. Before finishing paint coats are applied, inspect and touch-up shop coats of primers previously applied by other trades or fabricators.

3.3.21. Provide paint coating thicknesses indicated, measured as minimum DFT.

3.3.22. Apply a minimum of 4 coats of paint where deep or bright colours are used to achieve satisfactory results.

3.3.23. Ledges: Finish projecting ledges, both above and below sight lines, as specified for adjacent surfaces.

3.3.24. Light Coves: Paint light coves white whether a light lens is installed or not, unless otherwise indicated.

3.3.25. Interior Columns: Finish interior columns same as walls of room unless otherwise indicated.

3.3.26. Mechanical and Electrical Services:

3.3.26.1. Co-ordinate painting of mechanical and electrical equipment, piping, conduit, system Identification with appropriate Mechanical and Electrical Specification Sections. Unless otherwise specified or noted, paint "unfinished" conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and texture to match adjacent surfaces, where exposed-to-view in exterior and interior areas.

3.3.26.2. Prime and paint exposed, unfinished electrical raceways, fittings, outlet boxes, junction boxes, pull boxes and similar items.

3.3.26.3. Take steps to protect gauges, identification plates and similar items from being painted over or paint splattered.

3.3.26.4. Remove grilles, covers, access panels for mechanical and electrical systems from installed location and paint separately, if these items are not factory finished. Paint adjacent surfaces after removal and reinstall when surfaces are dry.

3.3.26.5. Paint work to match surfaces they are seen against unless directed otherwise.

3.3.26.6. Paint interior surfaces of air ducts visible through grilles and louvres, with 1 coat of flat black metal paint to limit of sight line.

3.3.26.7. In unfinished areas leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

3.3.26.8. Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

3.3.26.9. Do not paint over nameplates.

3.3.26.10. Paint behind louvres grilles and diffusers for minimum of 460 mm (18”) or beyond sight line, whichever is greater, to be painted with primer and 1 coat of matt black (non-reflecting) paint.

3.3.26.11. Paint each surface inside of light valances.

3.3.26.12. Paint disconnect switches for fire alarm system and exit light systems in red enamel.

3.3.26.13. Paint or band fire protection piping and sprinkler lines in accordance with mechanical requirements. Keep sprinkler heads free of paint.

3.3.26.14. Paint yellow or band natural gas piping in accordance with mechanical requirements.

3.3.26.15. Back prime and paint face and edges of plywood service panels for telephone and electrical equipment before installation to match adjacent wall surface. Leave equipment in original finish except for touch-up as required and paint conduits, mounting accessories and other unfinished items.

3.4. SITE QUALITY CONTROL

3.4.1. Non-Conforming Work:

3.4.1.1. Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction to Consultant at no cost to Owner. Touch up small affected areas, repaint large affected areas or areas without sufficient DFT of paint. Remove runs, sags of damaged paint by scraper or by sanding prior to application of paint.

3.4.1.2. Following are considered non-conforming qualities:

3.4.1.2.1. Lack of Uniformity:

3.4.1.2.1.1. Brush/roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas and foreign materials in paint coatings.

3.4.1.2.1.2. Evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.

3.4.1.2.1.3. Damage due to touching before paint is sufficiently dry or any other contributory cause.

3.4.1.2.1.4. Damage due to application on moist surfaces or caused by inadequate protection from weather.

3.4.1.2.1.5. Damage and/or contamination of paint due to blown contaminants (dust, spray paint, etc.).

3.4.1.2.2. Aesthetic Problems: If following are evident under final lighting source (including daylight) for interior surfaces:

3.4.1.2.2.1. Visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 1 m (39”).

3.4.1.2.2.2. Visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 1 m (39”).

3.4.1.2.2.3. Visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.

3.4.1.2.2.4. When final coat on any surface exhibits a lack of uniformity of colour, sheen, texture and hiding across full surface area.

3.5. CLEANING

3.5.1. Keep waste rags in covered metal drums containing water and remove from building at end of each Day. Remove other combustible rubbish materials and empty paint cans each Day from site and safely dispose of same in accordance with requirements of authorities having jurisdiction.

3.5.2. Clean equipment and dispose of wash water/solvents as well as other cleaning and protective materials (e.g. rags, drop cloths, masking papers, etc.), paints, thinners, paint removers/strippers in accordance with safety requirements of authorities having jurisdiction.

3.5.3. Clean containers used for storage, mixing and application of materials free of foreign materials and residue.

3.5.4. Keep work area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.

3.5.5. Clean adjacent surfaces which have been painted, soiled or otherwise marred. Remove spilled, splashed, splattered or sprayed paint as work progresses using means and materials that are not detrimental to affected surfaces.

3.5.6. Remove masking and other protection provided under this Section.

3.5.7. Remove temporary protective wrappings provided by others for protection of work after completion of painting operations unless instructed otherwise.

3.5.8. Painting work will not be considered complete until spatters, drippings, smears and overspray have been cleaned and removed to satisfaction of Consultant.

3.5.9. Make Good any damage to structure building surfaces or furnishings resulting from painting operations at no cost to Owner.

3.5.10. Waste Management:

3.5.10.1. Dispose paint waste in accordance with local regulations.

3.5.10.2. Set aside and protect surplus and uncontaminated finish materials not required by Owner and deliver or arrange collection for verifiable re-use or re-manufacturing.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

1.1.1 Comply with mechanical and electrical drawings.

1.1.2 Contractor shall be responsible for proper performance of Work.

1.1.3 Provide all labor, materials, products, equipment and services for commissioning all building systems to ensure building is operating according to requirements of Contract Documents.

1.1.4 Refer to the Commissioning Team Responsibilities for more details.

1.1.5 The Commissioning Authority (CxA) shall develop a Commissioning Plan.

1.2. REFERENCES

1.2.1. CSA Z320-11: Building Commissioning

1.2.2. ASHRAE Standard 202-2024: Commissioning Process for Buildings & Systems

1.2.3. ASHRAE Guideline 0-2019: The Commissioning Process

1.2.4. ASHRAE Guideline 1: Guidelines for Commissioning of HVAC Systems

1.2.5. ASHRAE Guideline 1.1-2007: HVAC&R Technical Requirements for the Commissioning Process

1.2.6. ASHRAE Guideline 4-2019: Preparation of O&M Documentation for Building Systems

1.3. DEFINITIONS and ACRONYMS

1.3.1. Commissioning (Cx): Is a systematic process of ensuring that all building systems designed, installed, functionally tested, performs and capable of being operated and maintained according to the design intent & owner's operational needs.

1.3.2. Commissioning Authority (Cx A): Owner's appointed commissioning professional.

1.3.3. Commissioning Consultant: (See Commissioning authority).

1.3.4. Consultant (Design Team): Member of the professional design team.

1.3.5. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources and documentation requirements of the commissioning process.

1.3.6. ME Contractor: refers to mechanical and /or electrical contractor.

1.3.7. Commissioning team: consist of various participants involved in the commissioning process. The commissioning documentation and tasks of each team member will be coordinated through the Commissioning Authority

1.3.8. Contractor Start-up: Contractor start-up and verification activities are conducted by the contractors and/or their sub-trades and equipment vendors. Contractor / vendor checking of the physical installation of the work and equipment and reviewing the completion of system installation and readiness, is completed prior to the CxA functional performance testing and verification activities.

1.3.9. TAB: Testing, Adjusting and Balancing.

1.3.10. BAS: Building Automation System.

1.3.11. FPT: Functional Performance Test

1.3.12. PFT: Pre-functional test

1.3.13. Pre-Functional & Functional Performance Testing (PF / FPT): Pre-Functional & Functional Performance Tests are specific hands-on tests, used to verify that the equipment and associated systems meet the specified design parameters and operate as fully integrated components or systems through its respective level of automation. This testing also confirms each systems capability of operating to the requirements of the facility and the Owner's Project Requirements.

1.3.14. Sampling: Performing observation, review, testing or other verification on only a fraction of the total number of identical or near identical pieces of equipment, drawings, events, etc. Sampling techniques include random statistical sampling and less formal professional judgment methods

1.3.15. Seasonal testing: Performance tests that are deferred until the system(s) will experience conditions closer to their design criteria based on weather conditions.

1.4. CONSULTANT TEAM

1.4.1. The Consultant Team for the Project is responsible for developing a set of performance objectives and providing a design that meets those objectives. The Consultant Team will be required to assist with developing and witnessing the system tests and integrated systems tests. Consultants are to advise the Contractor as to which tests require witnessing.

1.5. COMMISSIONING TEAM

1.5.1. Members of the team should include the followings:

- Owner Representative(s)
- CxA
- Mechanical Engineer
- Electrical Engineer
- General Contractor
- BAS Contractor/Vendor
- Mechanical Contractor
- Electrical Contractor
- TAB Contractor
- Manufacturer's Representatives

1.6. COMMISSIONING TEAM RESPONSIBILITIES

1.6.1. Owner Representatives:

- Attending commissioning meetings (as required).
- Receive commissioning reports and final commissioning report.
- Engaging a Commissioning Authority that does not include individuals directly responsible for project design or construction management.
- CxA reports directly and receive directions from the Owner representatives.
- Supporting the commissioning process.

1.6.2. Design Team:

- Prepare the contractors' M & E drawings and specifications.
- Reviewing shop drawings.
- Reviewing test reports from the contractors and verifying testing results.
- Inspecting the installations for general conformance with the contract documents, Codes and Standards.
- Review operating and maintenance manuals.
- Witnessing selected contractor's acceptance/demonstration tests.
- Review as-built documentation.
- Review performance testing results for general conformance with the contract documents.

1.6.3. CxA:

- Prepare the commissioning specification section.
- Review of the mechanical and electrical drawings and specifications.
- Develop and implement the commissioning plan
- Review equipment shop drawing submittals
- Chairs the commissioning meetings and records/ distributes meeting minutes.
- Assisting with the commissioning schedule.
- Conducting selected installation reviews as they pertain to commissioning and issuing deficiency reports.
- Review and monitor equipment start-up process.
- Receiving and evaluating the contractors' test forms.
- Preparing FPT forms for contractor (s) use.
- Issuing commissioning progress reports.
- Witness and verify contractor's performance verification tests (sampling technique)
- Co-ordinating with the TAB, BAS contractors and M&E Contractors.
- Reviewing O&M manuals.
- Review training schedule and agenda.
- Final commissioning reporting.
- Verifying seasonal performance during the opposite season of original performance testing.

1.6.4. General Contractor:

- Cooperate fully with CxA in execution of the Commissioning Process and Commissioning Plan.
- Incorporate all commissioning related activities and milestones in the construction schedule.
- Schedule all related commissioning activities in coordination with the CxA, subcontractors and vendors.
- Participating in commissioning meetings.
- Distribute contractors issued shop drawings.
- Include the CxA in all correspondences that affect the commissioning process and activities (e.g. schedules, site instructions, change orders, meeting minutes, etc.)
- Provide CxA with a copy of the ME O&M manuals for their review.
- Coordinates owner training with subcontractors and CxA.
- Ensure that sub-contractors and OEMs (Original Equipment Manufacturers) have completed all system start-ups and documentation as required by individual specification sections.
- Ensures the subcontractors perform their commissioning responsibilities.
- Collects, assembles and manages commissioning documentation from subcontractors.
- Works with subcontractors to correct commissioning deficiencies as quickly as possible.
- Provides support and participate in the functional testing as needed.

1.6.5. ME Contractors:

- Cooperate fully with CxA in execution of the Commissioning process
- Coordinates with the GC to confirm commissioning responsibilities at bid time.
- Review the commissioning plan and provided comments.
- Coordinates with GC on scheduling of commissioning tasks.
- Demonstrates proper system installation and operation.
- Corrects system deficiencies in a timely fashion.
- Preparing equipment start-up and testing schedules.
- Conducting all tests as identified in the mechanical and electrical specifications.
- Notifying all parties of scheduled test dates.
- Completing and sign off all PFT (Pre-Functional Test) forms and make it ready for CxA review and approval.
- Arranging for the CxA and the consultants to attend and witness tests.
- Support CxA with the necessary resources (individuals and equipment) for completing all commissioning testing activities.
- Issuing test forms and progress reports to the CxA on a regular basis.
- Coordinates with vendors for the proper equipment start-up, documentations and report issuing.

- Provide declaration in writing to the CxA that installation is complete and ready for the CxA pre- functional check review and Functional Performance Testing as per the Commissioning Plan.
- ME contractor (s) and vendor(s) shall perform a complete 100% functional performance test for all equipment and systems and provide completed and signed off FPT sheets.
- Cooperate with CxA to assist with implementing all seasonal and deferred commissioning activities.
- Contractor (s)to submit valid calibration certificate for all instruments to be used;
- Preparing operating and maintenance (O&M) manuals.
- Preparing training schedules in coordination with the General Contractor.
- Preparing as-built drawings.
- Conducting acceptance/demonstration tests.

1.6.6. Building Automation System Vendor:

- The BAS Contractor will install, commission, and demonstrate their system to the requirements of the specification.
- BAS contractor to submit valid calibration certificate for all testing instruments to be used
- Provide BAS point to point and other verifications report for CxA and consultants' review.
- The BAS Contractor will coordinate closely with the mechanical contractor, electrical contractor, the TAB Contractor, and the CxA.
- The BAS contractor to provide work progress to the commissioning team.
- Completing and sign off all FPT (Functional Performance Test) forms and make it ready for CxA review and approval.
- Provides detailed operations & maintenance manuals for all aspects related to the Building Automation system.
- Provide list of all schedules and set points
- Coordinates control system functional checks with the CxA and demonstrates the sequences of operation to the CxA as required in the functional check sheets.
- The BAS vendor in cooperation with other contractors and vendors shall perform a complete 100% functional performance test for all equipment and systems related to the BAS and provide completed and signed off FPT sheets.
- Prepare training materials as defined in section 1.4 for operational staff training.
- The BAS Contractor will participate in the CxA performance tests and the seasonal performance tests.
- The BAS will attend selected commissioning /construction meetings.

1.6.7. TAB Contractor:

- Complete an initial project review prior to start any TAB activity to attempt to identify any construction issues preventing proper balancing of the systems.
- Performs a job walk prior to start balancing to identify any construction issues preventing proper balancing.
- The TAB contractor will test and balance the mechanical systems to the requirements of the project specification and in line with TAB standards.
- TAB contractor will prepare a schedule for their work and coordinate with the construction manager to include these activities with in the construction schedule.
- Provides all TAB documentation and associated reports.
- Reports on operation and programming issues discovered in the field while balancing.
- Issue report for the initial project review to the construction manager /mechanical contractor and copied CXA and mechanical engineer.
- The TAB contractor will attend selected commissioning /construction meetings.
- TAB contractor to submit valid calibration certificate for all instruments to be used;
- Coordinate with the CxA to witness selective percentage of the water and air balancing process.

1.6.8. Equipment Vendors

- Provides all documentation on furnished equipment, including complete submittals, equipment data, installation manuals, O&M manuals, start-up procedures, and warranties.
- Performs factory start-up when required.
- Provides support for troubleshooting systems issues.
- Provides technical training services for equipment as supplied, based on outline training program prepared by CxA.
- Conducting acceptance/demonstration tests.
- Contractor will submit completed test forms and attend selected construction meetings when required.

1.7. **PRODUCTS**

1.7.1. The contractor shall provide all material, equipment and instrumentation to complete the contractors' commissioning process identified in this section and the mechanical and electrical specification sections.

1.8. SUBMITTALS

1.8.1. Submittal Drawings and Equipment Data - to be submitted by contractor – refer to related specification section (s). The Commissioning Authority will review submittals to ensure the systems and equipment being supplied is consistent with the required commissioning test procedures, and if not, that the variances are acceptable to the Team, and that commissioning checklists are revised accordingly.

1.8.2. As- Built Record Drawings- related specification section (s) the various trades shall mark-up the consultants' drawings to clearly indicate the approved changes in the design or layout that took place during construction.

1.8.3. O&M Manuals - related specification section (s). The contractor shall compile as specified in the contract documents. O & M manuals shall be reviewed by the commissioning Authority (CxA).

1.8.4. Training Agenda and training materials, Contractor, through the manufacturers, will provide training agenda and training materials for each system.

1.9. MANUFACTURER'S INSTRUCTIONS

1.9.1. Unless otherwise indicated in the specifications, operate Products in accordance with manufacturer's instructions. Obtain written instructions directly from manufacturers.

1.9.2. Notify the Consultant in writing, of conflicts between the specifications and manufacturer's instructions, so that the Consultant may establish the course of action.

1.9.3. Improper operation of Products, due to failure in complying with these requirements, authorizes the Consultant to require removal and re-installation at no change in Contract Price or Contract Time.

1.10. REPORTS

1.10.1. Submit field test reports for the Project's electrical and mechanical equipment /systems, including but not limited to; boilers, chemical treatment, Rooftop Units, pumps, Switchboards, Panel boards, Transformers, BAS point to point verification, BAS field panels and devices. Also, system's megger test, piping flushing, piping cleaning and piping pressurization test reports.

1.10.2. The Commissioning Authority (CxA) will issue commissioning reports following all commissioning activities on site. The Contractor is responsible for completion of deficiencies as listed in the Commissioning Reports and shall return signed- off copies of issued commissioning reports noting action taken on items.

1.10.3. All commissioning deficiencies will be tracked to resolve and final sign-off by the Commissioning Consultant.

1.10.4. Contractors to feedback on items listed in the commissioning issue log developed by the Commissioning Consultant.

1.11. QUALITY ASSURANCE

1.11.1. Contractors to feedback on items listed in the commissioning issue log developed by the Commissioning Consultant.

1.11.2. Use personnel for starting, equipment and starting procedures who have experience in electrical and mechanical equipment and systems commissioning and are able to interpret results of readings and tests and report state of systems in a clear and concise manner.

1.11.3. Major electrical and mechanical equipment to be started and checked by OEM as defined in section 1.4 certified personnel.

1.11.4. Maintain a file for all PFT and FPT sheets and make it ready for CxA review and approval.

1.11.5. Contractors to submit valid calibration certificate for all testing instruments to be used.

1.12. OPERATION AND MAINTENANCE MANUALS

1.12.1. Provide additional requested documentation, prior to normal O&M manual submittals, to the Commissioning Authority for development of start-up and functional testing procedures. Typically, this will include detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, full details of any Owner-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation and checkout materials that are shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Authority. These documents will also be included in the O&M manuals.

1.12.2. The Commissioning Authority may request further documentation necessary for the commissioning process. This data request may be made prior to normal submittals.

PART 2 - EXECUTION

2.1. OVERVIEW

2.1.1. In general terms, commissioning (Cx) is the process of assuring and verifying that all building systems designed, installed, functionally tested, performs and capable of being operated and maintained according to the design intent & owner's operational needs

2.1.2. Contractor shall be responsible for proper performance of work.

2.1.3. The Commissioning Authority (CxA) shall plan, organize and implement the commissioning process.

2.2. COMMISSIONING PROCESS

2.2.1. Commissioning process can be defined as a series of actions and activities by the project participants at various times over the complete life cycle of the project. These actions and activities can be regarded as fundamental to a sound commissioning program and are included in the following phases of the commissioning process shall be responsible for proper performance of work.

2.2.2. Pre-Construction /Design Phase:

- Developing initial outline for the commissioning plan
- Developing Commissioning –Focused design review.
- Review ME drawings and specifications.
- Develop Commissioning Requirements for the Specifications.

2.2.3. Construction Phase:

- Update and implement the commissioning plan.
- Conducting commissioning meetings.
- Commissioning schedule incorporated into the project master schedule
- Reviewing shop drawing submittals for the commissioning related equipment
- Conducting installation inspections
- Reviewing equipment start-up reports
- Reviewing operation and maintenance manuals
- Complete verification checklists
- Issuing site commissioning reports
- Conduct sample functional /performance testing on BAS and mechanical system(s).
- Assist with the coordination and delivery of the training activities. Receive completed attendance sheets and report on the completion of the training requirements.

2.2.4. Occupancy and Operation Phase

- Cx A Develop final commissioning report
- Help resolve outstanding commissioning issues
- Perform seasonal testing in the opposite season of the original performance testing.

2.3. STARTUP AND TESTING COST

2.3.1. Contractors (s) pay costs associated with starting, testing/ re testing, adjusting, preparation for balancing and cleaning, including supply of calibrated instruments, equipment, supplies and consumable materials.

2.4. MANUFACTURER'S RECOMMENDATIONS

2.4.1. Prior to starting equipment or systems, obtain and review manufacturer's installation, starting and operating instructions. Read in conjunction with procedures specified herein.

2.4.2. Use manufacturers' and supplier's trained personnel where necessary to maintain validity of manufacturer's warranty.

2.4.3. Compare actual installation with manufacturer's recommended installation. Record discrepancies. Correct deviations detrimental to equipment performance prior to starting equipment.

2.5. TESTING INSTRUMENTS AND EQUIPMENT

2.5.1. Provide calibrated testing instruments and equipment, and ancillary equipment such as two-way radios and ladders required to perform starting of mechanical equipment and systems.

2.5.2. Instruments used in equipment start-up must be calibrated and accurate. Provide valid calibration certificates if requested by the Commissioning Authority.

2.6. TOLERANCE

2.6.1. As specified by the mechanical engineer, otherwise refer to the below table of acceptable variations from the design value that will be acceptable for the performance verification.

Sensor	Tolerances (±)
Cooling coil, chilled and condenser water temperature	0.4 F
AHU wet bulb or dew point	2F
Hot water coil and boiler water temperature	1.5F
Outside air, space air, duct air temperature	0.4 F
Watt hour, voltage and amperage	1% of design
Pressure (air water and gas)	3% of design
Flow rate. Air	10% of design
Flow rate, water	4% of design
Relative humidity	4% of design
CO sensor	0.01 % pts
Natural gas and oil flow rate	1% of design
Steam flow rate	3% of design

2.7. BUILT-IN CONTROLS

2.7.1. The built-in controls of all equipment will be tested by the respective Supplier/Contractor to prove its intended sequence of operation in presence of the CxA/Consultant. This testing will be carried out in appropriate weather condition as specifiedaccess to all system equipment being commissioned.

2.8. BAS CONTROLS TESTING

2.8.1. The Controls Contractor will submit a point-to-point checklist and calibration verification to CxA for review. CxA may suggest addition/changes to the checklists and the reviewed checklist will be utilized by the Contractor to complete the control's testing.

2.8.2. Contractor will test and record results for each equipment and component of the building automation system. On completion of the test, Contractor will submit a detailed test and calibration report to the Consultant and CxA for verification. CxA will physically verify the test report for at least one of each type of system/equipment commissioned. The non-conformities will be corrected by the Contractor and the test and verification procedure will be repeated for that system.

2.8.3. The controls contractor will test the sequence of operation for all HVAC equipment and devices and submit test reports accordingly. Complete sequence of operation shall be submitted as part of the complete controls shop drawings for engineer's approval and the review of the commissioning authority.

2.8.4. BAS contractor shall submit complete system shop drawings including graphics, system structure, sequence of operation, point list for each equipment/device, controls valves, sensors, etc.

2.9. COMMISSIONING REVIEW

2.9.1. Provide access to all system equipment being commissioned.

2.9.2. Do not conceal or cover equipment or systems prior to scheduling commissioning reviews.

2.10. PRE-FUNCTIONAL AND FUNCTIONAL CHECK SHEETS

2.10.1. Record all data gathered on site on a PFT sheets (start-up report forms) and commissioning check sheets.

2.10.2. Make copies of all starting and testing data before equipment and system start-up personnel leave site. Maintain one copy of all data taken during starting on site.

2.10.3. Maintain one copy of all final starting, testing, adjusting and balancing reports on site up to Substantial Completion of the Work for reference purposes.

2.10.4. Make copies of all red-line record drawings available for Commissioning Agents to review.

2.10.5. Complete and Sign off all PFT and FPT sheets and make it ready for CxA review and approval.

2.11. COMMISSIONING SCHEDULE

2.11.1. The Commissioning Authority will prepare commissioning schedule milestones to be incorporated in the approved project construction schedule by the general contractor.

2.11.2. General contractor will ensure all commissioning related activities and milestones are inserted in the project schedule, including all critical path activities.

2.11.3. The Contractor shall provide schedule for equipment start-up in coordination with the general contractor.

2.11.4. During construction phase, commissioning meetings will be scheduled by the Commissioning Authority on site for coordination of commissioning activities and schedule.

2.11.5. Prior to commencement of each particular testing procedure, coordinate all sub-trades, manufacturers, suppliers and other specialties to ensure all phases of work are properly completed. Establish necessary manpower requirements.

2.12. START-UP

2.12.1. The installing contractor shall under their own direction, plan, execute and document the installation verification and perform start up and checkout (Major systems /equipment start-up by OEM personnel). The contractor needs to verify that other building systems being installed will not compromise the operation and functional performance of the commissioned systems. Notify the Cx A minimum of 5 days in advance of equipment and system start up and/or installation verification testing. The CxA verifies the completed checklists and the startup checks.

2.12.2. Complete and sign off all start up test sheets and make it ready for Cx A review and approval.

2.13. PERFORMANCE VERIFICATION

2.13.1. The contractor(s) and vendor(s) shall be fully responsible for 100% actual system(s) functional performance tests and documentation of this testing. Changes to approved test procedures must be approved by the Cx A. The Cx A will conduct sample verification on tested systems after the Contractor and Controls Vendor have completed their complete Functional Performance Test (FPT).

2.13.2. Provide skilled technicians to execute starting of equipment and to execute the functional performance tests.

2.13.3. Contractor's testing shall include all system and equipment.

2.13.4. Contractor's testing shall include 100% BAS point to point verification, programming, sequence of operation, calibration, scheduling, trending, graphics, commands and any other required test deemed necessary to complete the FPT process.

2.13.5. Contractor(s) and BAS vendor(s) to provide completed and signed off FPT sheets and make it ready for CxA review and approval.

2.14. RE TEST

2.14.1. Deficiency Resolution & Warranty Review: Items of non-compliance in material, installation or setup are corrected at the contractor's expense and the system retested. Failed tests will be repeated as required. Deficiencies, once identified are to be corrected expeditiously. Warranty issues will be identified and resolved by the contractor with the Owner.

2.14.2. Contractor (s) and vendor (s) shall bear all required costs for deficiency correction and retesting.

2.15. TRAINING OF OWNER STAFF

2.15.1. Training is to be led by an OEM factory trained technician directly involved and familiar with the site. Training materials, agenda and O+M manuals are to be provided at least 5 business days prior to training. Training sessions are to occur prior to substantial. Time to be used at owner's discretion.

2.15.2. Provide on-site training sessions including classroom and terminal hands on, half day each, for personnel designated by the owner/owner's service provider prior to and at substantial completion or when system starts affecting conditions in tenant spaces that owner/owners service provider must respond to.

2.15.3. Train the designated staff of owner's representative and owner to enable them to do the following:

a. Day-to-day Operators

b. Proficiently operate the system

c. Understand control system architecture and configuration

d. Operate the BAS workstation, peripherals and other interface terminals

e. System troubleshooting

f. Conduct routine maintenance

g. Understand system drawings and Operation and Maintenance manual

h. Now start-up, normal operation, shut down, unoccupied operation, seasonal changeover, manual operation, controls set-up and programming, troubleshooting and alarms

2.16. TESTING, ADJUSTING AND BALANCING

2.16.1. Comply with the TAB Specification and related sections in the contract document.

2.16.2. Contractor will submit a TAB process schedule.

2.16.3. Contractor will submit a preliminary TAB report and correct all deficiencies prior to start the balancing process.

2.16.4. Contractor to submit a final balancing report for all water and air systems.

2.17. COMPLETION OF COMMISSIONING REQUIREMENTS

2.17.1. Upon completion of commissioning, the Independent Commissioning Authority shall ensure the contractor leaves all systems in normal operating mode.

2.17.2. Except for identified seasonal commissioning activities to be conducted during the first year of operation, all commissioning shall be complete prior to Substantial performance of the work.

2.17.3. Commissioning shall be considered complete only when the final Commissioning Report has been received and approved by the client.

2.18. SYSTEMS TO BE COMMISSIONINED

2.18.1. Mechanical

- Hot Water Boilers
- Pumps
- Variable Frequency Drives
- Domestic Hot Water Heater

2.18.2. Testing, Adjusting & Balancing work

- Water Balancing

2.18.3. Building Automation System (BAS)

- Controllers
- Field devices
- Networking
- Sequence of operation
- System Graphics
- Hardware systems
- Operator Interface

2.18.4. Electrical

- Switchboards and Panelboards (include setting of digital breakers according to coordination study)

END OF SECTION

CFMS-WEST CONSULTING INC.
Serving South Western Ontario

COMMISSIONING PLAN

HILL PARK LEARNING CENTRE
HVAC AND PLUMBING UPGRADES

HAMILTON-WENTWORTH DISTRICT SCHOOL BOARD

CFMS-West Consulting Inc.

2 Pelham Town Square,
Fonthill, Ontario L0S 1E0

905 304 3644
info@cfmswest.ca

PARTNERING TO PROVIDE **QUALITY CONTROL**

TABLE OF CONTENTS

1. INTRODUCTION & CONTENT

When implemented effectively, a thorough Commissioning Program contributes towards reducing facility life cycle costs, facilitates the establishment of measurable benchmark standards for all energy related systems, and validates that the project's mechanical, electrical and other building systems have been installed, operated, calibrated and are capable of performing as intended and stated in the Owners Project Requirements.

The Commissioning Plan document has been prepared for the Hill Park Learning Centre HVAC And Plumbing Upgrades project by CFMS West Consulting Inc. hereby titled the Commissioning Authority (CxA), to provide the owner with a detailed description of the building systems commissioning process and the responsibilities of the commissioning team.

The CxA will update the document several times throughout the commissioning process and provide the team with information in a timely manner. As the plan evolves, information to be added will include definitions of commissioning terms, descriptions of project commissioning processes, a comprehensive team directory, detailed information on roles & responsibilities, project and system descriptions, lists of documents related to commissioning, details of commissioning documents, commissioning schedule milestones, detailed commissioning forms, and coordination, communications and resolution pathways.

The commissioning plan will be completed and delivered to the owner with the final commissioning report. This final report will contain a history of all test results and will provide a valuable reference to the owner.

2. COMMISSIONING OBJECTIVES & GOALS

The commissioning process is a quality control program which will be implemented on the project during the Preconstruction, Construction and Occupancy & Operation phases.

The commissioning process is conducted by the commissioning team which is made up of the design team, the construction team, CxA, and the Owner's project team. The process is managed by the CxA who will also conduct tasks within the commissioning process.

The commissioning process will begin during the Design Phase and continues through the first year of operation. The objective is to verify the design intent performance during the heating and cooling seasons and under varying load conditions.

The overall benefits of the commissioning process include:

- Additional control over quality.
- Additional control over construction costs
- Additional control over the construction schedule
- Smooth turnover process.
- Building systems that work.
- Well trained operating staff
- Proper and useful O&M manuals
- Reduced number of problems and complaints

The commissioning plan that follows outlines the process to achieve these objectives and goals

3. PROJECT INFORMATION AND DESCRIPTION

Refer to the below fact sheet for the building information:

Project Name	Hill Park Learning Centre – HVAC and Plumbing Upgrades
Project Address	465 E 16th St, Hamilton, ON L9A 4K6
Owner /Client	Hamilton Wentworth District Schoolboard

4. DOCUMENTATION PROGRESS UPDATE

Refer to the below table for the status of documents pertaining to the project:

	DOCUMENT	STATUS
1	Commissioning Plan	March 4, 2025
2	Commissioning Kickoff Meeting	TBA
3	Construction Checklists	TBA
4	Equipment Startup Reports	TBA
5	TAB Report Review Report	TBA
6	Functional Performance Test Reports	TBA
7	O & M Manuals Review Report	TBA
8	Training Program	TBA
9	Final Commissioning Report	TBA

5. COMMISSIONING TEAM & RESPONSIBILITIES

The commissioning team consists of representatives from the owner, the design team, the construction (contractors) team, and the CxA. The CxA will manage the commissioning team and the commissioning process and reporting directly to the owner.

Owner Representative

The owner has overall responsibility for this project and has engaged a Commissioning Authority (CxA) that does not include individuals directly responsible for project design or construction management. The CxA reports directly to the owner and takes direction from project team.

Commissioning Team

Key members of the integrated commissioning team are listed below. These individuals will be extended invitations to all commissioning meetings, as well as testing and training:

Role	Primary Contact	Company	Contact (Email, Cell)
Owner			
Owner Representative	Jillian McCardle	HWDSB	jmccardl@hwdsb.on.ca
Design Team			
Architect	Amra Janjusevic	AJA	amra@aja.design
Consultant		SEI	
Conultant	Steven Howard	ARC	showard@arcengineering.ca
Cx Team			
Commissioning Agent	Kevin Pellerin	CFMS-West	kevinpellerin@cfmswest.ca
General Contractor and Subcontractors			
General Contractor			
Mechanical Representative			
Electrical Representative			
BAS			
TAB			

Responsibilities

The Owner

The owner's responsibilities consist of:

- Engaging a Commissioning Authority that does not include individuals directly responsible for project design or construction management
- CxA reports directly and receive directions from the Owner /representatives(s) team.
- Attending commissioning meetings (as required)
- Receive commissioning reports and final commissioning report
- Supporting the commissioning process

The Design Team

The design team consists of ME Consultants. Their responsibilities in the commissioning process include:

- Prepare project drawings and specifications, including testing requirements
- Reviewing shop drawings
- Reviewing test reports from the contractors and verifying results
- Receiving commissioning reports from the CxA
- Inspecting the installations for general conformance with the contract documents, codes and standards
- Review operating and maintenance manuals
- Review/approve as-built documentation
- Review performance testing results for general conformance with the contract documents

The Building Commissioning Authority (CxA)

- Assist with the development of the OPR
- Review basis of design including project drawings and specifications
- Develop and implement the commissioning plan
- Prepare and issue the team responsibility matrix
- Review equipment and systems submittals
- Chairs the commissioning meetings and records/ distributes meeting minutes
- Assisting with the commissioning schedule
- Conducting select installation reviews and issuing deficiency reports
- Review and monitor equipment start-up process
- Receiving and evaluating the contractors' test forms
- Preparing FPT forms for contractor (s) use
- Issuing commissioning progress reports
- Witness and verify contractor's performance verification tests (sampling technique)
- Co-ordinating with the TAB and M&E Contractors
- Reviewing O&M manuals
- Review training schedule and agenda.
- Final commissioning reporting

The General Contractor Team

- Cooperate fully with CxA in execution of the Commissioning Plan including testing requirements outlined in the project specifications.
- Incorporate all commissioning related activities and milestones in the construction/project schedule
- Directs all subcontractors to provide resolution to constructions issues
- Schedule all related commissioning activities in coordination with subcontractors and vendors
- Participating in commissioning meetings
- Distribution of contractor issued shop drawings
- Provide completed static and dynamic reports to the CxA
- Include the CxA in all correspondences that affect the commissioning process and activities (e.g. schedules, site instructions, change orders, meeting minutes, etc.)
- Ensure that sub-contractors and OEMs (Original Equipment Manufacturers) have completed all system start-ups and documentation as required by individual specification sections
- Ensures the subcontractors perform their commissioning responsibilities
- Collects, assembles and manages commissioning documentation from subcontractors
- Provides support and participate for functional testing as needed
- Corrects any installation deficiencies in a timely manner with cooperation with other related contractors
- Provide the CxA with a copy of the O&M manuals for review
- Provide necessary information for the system manual
- Coordinates owner training with subcontractors and CxA

ME Contractors

- Cooperate fully with CxA in execution of the Cx Plan and the associated commissioning activities
- Coordinates with the general contractor to confirm commissioning responsibilities at bid time
- Coordinate with the GC and other trades to issue equipment start-up schedule
- Review the commissioning plan and provided comments
- Coordinates with general contractor on scheduling of commissioning tasks
- Demonstrates proper system installation and operation
- Corrects system deficiencies in a timely fashion
- Preparing testing schedules
- Conducting all tests identified in the specifications
- Notifying all parties of scheduled test dates
- Completing and sign off all PFT (Pre-Functional Test) forms and make ready for CxA review
- Arranging for the CxA and the consultants to attend tests
- Support CxA with the necessary resources (individuals and equipment) for completing all commissioning testing activities
- Issuing test forms and progress reports to the CxA on a regular basis
- Coordinates with equipment vendors for proper documentations and procedures.
- ME contractor(s) and vendor(s) shall perform a complete 100% functional performance test for all equipment and systems and provide completed and signed off FPT sheets
- Cooperate with CxA to assist with implementing all seasonal and deferred commissioning activities
- Contractor(s) to submit valid calibration certificate for all test instruments
- Preparing operating and maintenance (O&M) manuals
- Preparing training schedules in coordination with the general contractor
- Conducting operator training
- Coordination and execution of Integrated Systems Testing Activities
- Preparing as-built drawings
- Conducting acceptance/demonstration tests

Testing Adjusting & Balancing Contractor:

- Complete an initial project review prior to start any TAB activity to attempt to identify any construction issues preventing proper balancing of the systems
- The TAB contractor will test and balance the mechanical systems to the requirements of the project specification and in line with TAB standards
- TAB contractor will prepare a schedule for their work and coordinate with the GC to include these activities with in the construction schedule
- Provides all TAB documentation and associated reports
- Reports on operation and programming issues discovered in the field while balancing
- Issue report for the initial project review to the general contractor/mechanical contractor and copied CxA and mechanical engineer
- The TAB contractor will attend selected commissioning/construction meetings
- TAB contractor to submit valid calibration certificate for all instruments to be used
- Coordinate with CxA to witness selective percentage of water and air balancing process

Equipment Vendors

- Provides all documentation on furnished equipment, including complete submittals, equipment data, installation and O&M manuals, start-up procedures, and warranties
- Performs factory start-up when required
- Provides technical training services for equipment as supplied, based on outline training program prepared by CxA
- Conducting acceptance/demonstration tests
- Contractor will submit completed test forms and attend selected construction meetings when required

Responsibility Matrix

Product	Description	Responsibility of:								
		CxA	BECxP	OR	A/E	GC	MC	EC	BAS	TAB
BOD document	Narrative system description, including function, capacity and major components.	R			P					
System design and schematics	Single line diagram, flow diagram and other design considerations, floor plans indicating location of equipment and configuration of system installation.	R	R		P					
Commissioning Plan	Document includes, commissioning process, team, responsibilities and deliverables.	P	P	R/A	R/I	R/I	R	R	R	R
Commissioning schedule	Commissioning schedule included in the project work schedule. Including all milestones, other M&E activities.	I/R	I/R	R	R	P	P	I	I	I
Commissioning meetings	Cx meetings will be scheduled as needed or on regular basis.	Pe	At	At	At	At	At	At	At	At
Shop Drawings /Submittals	Reviewing the shop drawings for all equipment under the commissioning scope. Review will be conducted after final approval of the EOR.	R	R		R		S	S	S	
Pre-Functional Test Forms	Static and dynamic test forms. Will not replace the OEM test sheets.	R			R		Pe	Pe	P/Pe	Pe
Functional test Forms	Performance verification test forms used by the Cx A to verify system operation with the BAS.	P/A					Pe		Pe	
Static testing	Includes, pipe pressure tests, air duct pressure test, flushing and cleaning	R					Pe	Pe		
Installation & above ceiling inspections	Reviewing equipment installation and above ceiling M/E services inspections	R			Pe					
Dust free environment (Clean building)	Achieving a dust free environment is a key step to start air moving devices (AMD)/Equipment.	A				Pe	Pe			
Equipment Start-up and start-up plans, check sheets	This is the OEM starting-up mechanical /electrical equipment and issue report.	R			R		P/Pe			Pe
BAS Programming, Point to point verification and Graphics	This is a process by the BAS vendor to verify all equipment are communicating to BAS	R/W							Pe	
System Air and Water balancing	Process to balance the air and water volume and set the correct designed pressure in the system. Verify the outlet and terminals air quantities.	R			R				Pe	Pe
Functional Performance testing	Complete verification and testing of the system and individual components and as integrated systems.	Pe/ W/A	W/A		W		Pe		Pe	
Final Commissioning report	Report will outline the commissioning activities and the outcome of this process, listing of all concerns and pending issues.	P/A	P/A	R/A						
O & M manuals	This is the equipment and systems operating and maintenance manuals as per technical specifications.	R	R				P/S	P/S	P/S	I
Training Program	Topics to be covered during the training session	R	R	At	Pe /W	Pe	Pe	Pe	Pe	
System Manual	Documents includes system as built, descriptions, re commissioning requirements	P		A	A	A	A	A	A	
Seasonal Testing	Opposite season test	Pe	W	At	W	At	At	At	Pe	
Post occupancy	11-month post SC date to discuss warranty issues and FM feedback	At	At	At	At	At	At	At	At	

Legend:

A	Responsible to Approve	Pe	Responsible to Perform	I	Responsible to give Input	S	Responsible to Submit
At	Responsible to Attend	R:	Responsible for Review	P	Responsible to Prepare	W:	Responsible to Witness

6. BUILDING COMMISSIONING PROCESS

Building Commissioning is the process of bringing the project from a static state to a dynamic operating condition to meet the intended use. More specifically, commissioning includes bringing the project to a working and fully operational condition in compliance with the design intent and project documents. Therefore, commissioning involves those actions and activities that convert the buildings mechanical & electrical components into a fully functioning facility.

Design Phase (Pre-Construction Phase)

Development of Design Documents:

The Design Team shall generate several phases of design documents, including schematics, design development, and various levels of construction documents.

Pre-Tender Design Set Review:

The CxA will review the complete pre-tender set of design and construction document (Drawings and specifications) for the mechanical & electrical discipline. The review will encompass aspects related to the commissioning and maintainability of the installed mechanical systems and equipment.

The Construction Phase

Development of the Commissioning Plan:

The Commissioning Plan will be developed for the Cx Team to review. The Commissioning Plan provides an overview of the commissioning process and responsibilities. The Commissioning Plan includes preliminary project specific information on the team, systems to be commissioned, and project schedule milestones. The team shall review the plan and provide comments to the CxA. This plan will continue to be developed and refined through the commissioning process.

Commissioning Kick-off Meeting:

The CxA will schedule a kick-off meeting with the entire Commissioning Team to introduce the players, review commissioning scope, review the commissioning process, discuss team responsibilities, and develop a team specific approach to commissioning.

Review of Contractor and Vendor Startup Forms:

The contractor shall provide any standard forms wished to be used during the commissioning process of the project such as contractor standard pressure test documentation, equipment starts- up forms, etc. The CxA will review/approve the forms and incorporate them into the Commissioning Plan. Startup forms can be provided by the contractor or equipment manufacturer. In cases where forms do not exist but are required, the CxA shall provide start-up forms.

Static Test Forms and Reports include:

- Pipe pressure testing
- Flushing and cleaning reports
- Chemical treatment sign off

Dynamic Test Forms are required for all systems identified under submittal review:

- Mechanical Equipment Startup

Managing the Construction Schedule:

The general contractor develops the project schedule for the project and the CxA shall provide list for commissioning milestones and testing. The CxA also reviews the schedule to look for potential conflicts and to ensure there is sufficient time for testing towards the end of the project.

The CxA will work with the project team to help in preparing contractors commissioning schedules. The schedules will identify equipment and systems by area and the various commissioning tasks. The schedules will include key starting dates such as 'power availability' and 'clean building'. Each Contractor's schedule will be reviewed, and updated as required, at the construction meetings or the commissioning meetings.

Commissioning Schedule milestones for the project:

- Commissioning Plan
- Commissioning Kick off Meeting
- Submittal Review
- Commissioning Schedule
- Static Testing Activities
- Power On
- Dynamic Testing Activities
- Functional Performance Testing Activities
- O&M Manual Submission
- Training
- Substantial Completion
- Seasonal Testing (If required)
- Final Commissioning Report

Functional Test Sheets:

The functional performance test (FPT) sheets will be developed by the CxA – CFMS West Consulting and to be used with the contractors to fully test the sequences of operation of all commissioned systems. The test

forms will include the test procedure and expected results of each test point. The contractors shall review the forms and confirm functional tests can be performed in a manner that does not compromise the safety of the equipment or personnel performing the test. FPT sheets shall be prepared for all systems identified under submittal review.

Commissioning Meetings:

During the early stages of the construction process, the CxA will integrate the first commissioning discussions at the regular site meetings; attendance as required. The initial meetings will deal with the commissioning process, responsibilities, and the reporting methodology.

During the construction process, commissioning issues, scheduling, pre-functional test forms, functional test forms and results will be discussed as required at the construction meetings; attendance as required. During the dynamic testing process and the time leading up to substantial performance, separate commissioning meetings shall be held if required.

On-going Construction Observations & Installation Checks:

The CxA will conduct periodic jobsite visits. During these visits the CxA will perform site inspections, commenting on installation quality and attend site meetings to remain informed on construction progress and to update parties involved in commissioning process. A written jobsite inspection report shall be provided and distributed to the contractors, owner and other team members as determined during the kick- off meeting.

The following list of activities will be performed by the CxA during a visit to the jobsite:

- Attending jobsite meeting
- Complete equipment installation check and above ceiling inspections
- Witness static and dynamic activities
- Verify site cleanness and dust free environment
- Complete required checklists;(PFT)
- Conduct Functional performance test (FPT)

Static & Dynamic Testing

The CxA will review the static and dynamic testing reports and report on any items of concern from a commissioning or operations point of view.

Water and Air Balancing

The CxA will co-ordinate with the Balancing Contractor to ensure that a balancing plan and schedule are prepared and reports are submitted. The TAB contractor shall visit the site and issue a report for the visit listing any comments, concerns or requirements for the balancing process. CxA will review the final balancing report and comment.

Functional Performance Test

The FPT is to verify that equipment, systems, and sub-systems functions and perform to meet the OPR and project documents. They are means to determine that different systems interact as required to achieve an overall operating and functioning facility.

The FPT typically involve forcing the system into a series of operating modes, and observing the system's response. The CxA will accurately record all their activities and observations on the FPT sheets and then ensure all systems returned to a "normal' state. The CxA will use the Issue list to log any performance issues might arise during the test and their resolutions.

If desired, it is possible to have the current or future building operators attend the Functional Performance Testing.*"Having the building operators participate in testing enhances the process and is a unique opportunity to deepen their understanding of the systems and controls".*

Prior to conducting FPT, the following must be satisfied:

- All static and dynamic start-up reports completed successfully;
- Controls system with all its graphics, verifications, calibrations, schedules, alarms and programs are completed and relevant reports and check sheets completed
- Water balancing process completed and reports submitted
- All corrections and re starting of start-ups completed successfully
- Maintaining a dust free environment in the building
- Occupancy and other schedules are provided
- Set points provided
- Ensuring the FPT can be performed in a manner that does not compromise the safety of the equipment or personnel performing the test or witnessing it

Development of the Commissioning Issues List:

The Cx A will manage, distribute and review a Commissioning Issues of Concern List (IOC) with the team. The Commissioning Issues Log will document all issues impacting the successful completion of the commissioning process. The CxA will assist the commissioning team to bring resolution to commissioning issues in a timely manner.

Operator Training Program:

Operations and maintenance documentation and training are vital to the long-term operational health of the facility. The Commissioning Authority (CxA) reviews agenda with the owner's representative(s) -operators- to ensure that training agendas meet the specifications in the contract documents and the OPR.

The following steps will help the development and implementation of the training program

- The GC shall develop and submit a Training Plan to the project team for review and approve.
- The training plan shall identify systems requiring training, required instructor (s), time period for training, and location of training;
- Technical content for the training exercises shall be provided by a combination of the equipment manufacturers, Sub-trade contractors, and design team personnel;
- The GC shall coordinate with the relevant personnel – including at minimum the OR, A/E, CxA to schedule required training exercises and confirm appropriate personnel to receive training;
- Detailed training agendas will be issued to the commissioning team prior to the scheduled sessions;
- Training Agenda will include at the minimum the following:

    - Review of drawings to demonstrate the relationship between the installed devices and the drawings
    - Provide walk through outlining the major components associated with the training session
    - Overview of the operation of system/component, and its interface with the Building Automation System
    - Preventative maintenance procedures & routines. (Dealing with alarms and trends)
    - Review the SOO and describe the adjustments that can be made by an operator
    - Review system adjustment and calibration
    - Troubleshooting procedure and system diagnostic
    - Attendees Q & A

O&M Manuals Review:

The CxA will review the submitted O&M manuals for commissioned systems to verify compliance with the OPR and contract document. CxA - CFMS West Consulting – will review the O&M manuals for warranty certificates, availability of all reports, maintenance requirements, single line diagrams, valve charts, TAB reports and required contact information and warranties.

The O & M manuals shall include at the minimum the following sections:

- Basis of design document as issued by the EOR
- Warranties and applicable to the project
- Contractors contact list
- Equipment start up reports
- Test reports (Authority test Reports)
- Shop drawings, troubleshooting and PM literatures for all equipment and systems
- Air and water balancing reports and single line diagrams
- Building Automation System shop drawings and sequence of operation

Commissioning Report:

The CxA- CFMS West consulting will provide a Final Commissioning Report upon completion of all commissioning activities. The final commissioning report will contain the executive summary, summary of the design review process, summary of the submittal review process, the current copy of the Commissioning Plan, completed commissioning issues list, meeting minutes, completed check forms, and O&M documentation and training process.

Occupancy and Operation Phase

The following activities will be performed during the Operation Phase of the project:

Completion of Seasonal and Deferred Systems tests (If required):

The CxA may determine that certain sequences may not be thoroughly tested unless the ambient conditions are correct. These functional tests may be deferred until the appropriate conditions are available.

7. SYSTEM INCLUDED IN THE COMMISSIONING

Refer to below list for a full list of the equipment included in the project:

Mechanical Systems	Electrical Systems
Hot Water Boilers	Switchboards/Panelboards
Pumps	
Variable Frequency Drives	
Domestic Hot Water Heater	

8. COMMUNICATIONS PROTOCOL

CFMS West consulting as the Commissioning Authority, our primary focus is to act as an advocate for the owner ensuring that modern methods of construction and leading-edge commissioning are successfully delivered. Essential to this process is the establishment of a communications protocol – prepared for and reviewed during the commissioning kick-off session. Below is the communications protocol:

Issue	Communication Protocol
Requests for information (RFI) or formal documentation requests	The CxA goes first: through OR and copied GC, A/E
Minor or verbal information and clarifications:	The CxA goes direct to the GC, with correspondence copied to the OR/ A/E
Notifying contractors of noted Cx issues	The CxA documents issues through the OR & GC, but may not discuss issues with contractors prior to notifying the GC and A/E. Issues Logs are issued regularly to the Commissioning Team.
Scheduling functional tests	The CxA may provide input for and coordination of testing through the OR & GC, but does not directly schedule contractors or subs.
Scheduling commissioning meetings	The CxA with GC selects the date and schedules the meetings with the Owner and Design Team
Making requests for significant changes:	The CxA **has no authority** to issue change orders or direct the contactors or their subs as it pertains to design related modifications. Design Team issues instructions.
Making small changes in specified sequences of operations	The CxA **may not** make small sequences of operations changes to improve efficiency or control or to correct issues, through the responsible contractor. The CxA shall document the change and provide all information of specified sequences to the OR, GC and A/E. The CxA **may not** make changes to specified sequences without approval from the A/E.
Contractors or Subs disagreeing with requests, findings or interpretations by the CxA:	Contractors or Subs will not try and resolve with the CxA first. Contractors or Subs will work through the GC who will work with the CxA directly. The OR will be included in the correspondence /discussion as needed.
Witnessing systems and equipment training	The CxA may provide input for and assistance in the coordination of training and testing through the GC, but **does not** directly schedule contractors or subs.
Weekly site reports and updates	The CxA issues site reports and update documents through the OR, with copy to the, GC and A/E.
Suspected design issues found during the Cx process	The CxA documents issues first through the GC and A/E, but may not discuss design issues with contractors or subs prior to notifying the OR and GC.

9. NEXT STEP

The Commissioning plan is a live document that will be updated throughout the project. The OR, A/E, contractors and other project team shall be responsible for providing updates for the information in this document. CFMS West consulting will review the updates and issue revisions accordingly.

Revision No.	Date Issued	Issued By
R00	March 4, 2025	CFMS-West Consulting

APPENDIX A – Door Hardware Schedule

P01957 Hill Park Learning Center Boiler Room Renovation & HVAC Upgrades

465 East 16th Street, Hamilton, ON

Heading 01 (HwSet)

		Hand	Degree Act	Degree InAct
1 PR	DOOR(S) D006A EX. STAIR 10 FROM EX. BOILER ROOM 0006 1830 x 2135 x 44 x HMD x HMF x NON-RTD Opening Remark: UNEQUAL PAIR INACTIVE LEAF 1070MM, ACTIVE LEAF *760MM.	RHRA/LHRI	90	180

Totals	Each	Assembly to have:					Act	InAct
(6)	6	EA	HINGE	5BB1 127 X 102	652	IVE	3	3
(2)	2	EA	FLUSHBOLT	F65 304MM	26D	SMH		2
(1)	1	EA	DUST PROOF STRIKE	DP1	626	IVE		1
(1)	1	EA	STOREROOM LOCK	ND80JD RHO	626	SCH	1	
(1)	1	EA	PERMANENT CORE	23-030 C124 '1' BITTED	626	SCH	1	
(1)	1	EA	SURFACE CLOSER	4040XP.EDA	689	LCN	1	
(1)	1	EA	KICKPLATE	K10A 305 X 1045 TAPE MTG	32D	SMH		1
(1)	1	EA	KICKPLATE	K10A 305 X 735 TAPE MTG	32D	SMH	1	
(1)	1	EA	CV HD WALL STOP	S120	26D	SMH		1
(1)	1	EA	CC HD WALL STOP	S122	26D	SMH	1	

PLEASE NOTE: NARROW 760MM LEAF IS ACTIVE.
FOR 180° INACTIVE LEAF SWING THE FRAME FACE MUST BE FLUSH WITH THE WALL ON THE STAIR SIDE.

End of Schedule