

Addendum 1

Issued February 28, 2025

The following information changes the competitive process documents issued on Monday, February 10, 2025.

CLOSING DATE CHANGE

Change of closing date to Thursday, March 13, 2025, on or before 2:00:00 PM local time.

GENERAL INFORMATION

Item 1: Refer to RFT Document, Instructions to Bidders
REMOVE and REPLACE Section 1.5 Project Schedule with below:

1.5 PROJECT SCHEDULE

- .1 The Successful Bidder will adhere to section GC 3.4 in regard to milestone dates set below.
- .2 The following are Project milestone dates:

a. Tender Issued	Monday, February 10, 2025
b. Site Walkthrough at 4:00 PM	Wednesday, February 19, 2025
c. Closing for Questions	Wednesday, February 26, 2025
d. Tender Closing at 2:00 PM	Thursday, March 13, 2025
e. Anticipated Award Date	Friday, May 9, 2025
f. Elevator Shop Drawings Submitted by	10 Business Days after Award Date
g. Anticipated Construction Commencement	Friday, June 27, 2025
h. Substantial Performance of the Work	
i. Phase 1: Washroom, Chairlift and Elevator Shaft	Friday, August 15, 2025
ii. Phase 2: Elevator Installation/Commissioning	Friday, October 31, 2025
i. Ready-For-Takeover	
i. Phase 1: Washroom, Chairlift and Elevator Shaft	Friday, August 22, 2025
ii. Phase 2: Elevator Installation/Commissioning	Friday, November 21, 2025
- .3 Any Work remaining after August 17, 2025, noisy Work or Work which would cause a safety hazard (including work that generates odours) must be completed outside school operational hours 8:30 AM – 3:45 PM, after hours and weekends and cannot be disruptive to the school and operations of the school in any way
- .4 Any Work remaining after the Substantial Performance of the Work date will need to be completed after hours and weekends and cannot be disruptive to the school and operations of the school in any way.

Item 2: See attached Addendum 1, Jason Fung Architect Inc, February 27, 2025, (4 pages).

Item 3: See attached 2025-111-P02103 Specification, Jason Fung Architect Inc, February 26, 2025, (321 pages).

End of Addendum 1

Feb 27, 2025

2025-111-P02103 Bennetto RFT Questions Addendum 1

- Q1 Is there BAS work required and if so, please provide contact for base BAS vendor.
R1 **BAS connect to elevator. Base building BAS provider for Bennetto is Siemens.**
- Q2 On M-03 there is an existing radiator to be relocated. Please confirm whether or not this radiator has water/hydronic piping component.
R2 **Existing radiator has cold and hot water connection.**
- Q3 Can you please provide specifications for the chair lift.
R3 **Added section 14 42 00 for inclined chair lift in the updated specifications 2025-111-P02103 Bennetto Elementary School Accessibility Project Specification attached.**
- Q4 Can you please provide skylight specifications?
R4 **Added section 08 62 00 for skylight in the updated specifications 2025-111-P02103 Bennetto Elementary School Accessibility Project Specification attached.**
- Q5 Can you please provide elevation showing window dimension (height) at the vestibule area, 2nd floor?
R5 **See window schedule on A1.02 for window at vestibule area, 2nd floor.**
- Q6 Are there any electrical specs on the chairlift?
R6 **Power requirements per manufacturer's shop drawings, refer to added section 14 42 13 for inclined chair lift in the updated specifications 2025-111-P02103 Bennetto Elementary School Accessibility Project Specification attached.**
- Q7 Are there any electrical specs on the elevator?
R7 **Power requirements per manufacturer's shop drawings and electrical drawings and refer to Response 6.**
- Q8 Are there any specs for lighting and emergency lighting (manufacturer, wattage, etc)?
R8 **Lighting specs - section 26 50 00
Emergency lighting specs - section 26 52 13.13**



Q9 Will there be any fire alarm involved? There are no devices listed to add in the shaft pit and ceiling. No riser diagram or recall system? F/A signaling device in the accessible washroom.

R9 **Elevator to comply with OBC and fire code. Manufacturer to provide shop drawings for review. F/A signaling device is required in accessible washroom.**

Q10 Who is the base building fire alarm contractor?

R10 **Hamilton Fire is the base building fire alarm contractor.**

Q11 Who is providing the call to assist kit? Are there any manufacturers or specs?

R11 **GC to provide manufacturer shop drawings for call to assist kit.**

Q12 Electrical plans show 1x4 fixtures in the new washroom and elevator machine room. Architectural show 2x2. Which are we to use?

R12 **Refer to architectural drawings for lighting fixture size and location.**

Q13 Clarify power requirements for the pumps in the sump pit. Specified pumps in the mechanical drawings do not match electrical.

R13 **Mechanical Pumps listed as (2) Barnes 2SEV2022L Submersible Pumps, 2hp, 3450RPM, 240V, 1-phase, 20' cords
Electrical Panel is 120/208V with pumps on 15A breaker and 2#12 AWG + ground wire.**

Q14 Is the new occupancy sensor in the elevator vestibule to operate with the BAS, existing hallway controls, or stand alone? If so, who is the base building BAS contractor?

R14 **Elevator vestibule to connect with BAS. Refer to response 1.**

Q15 Is there a spec for the elevator? We are assuming LULA but the basis of the design section lists spec of a full commercial elevator.

R15 **Elevator spec – section 14 26 00
Any proposed alternative by GC must be approved by HWDSB and JFA.**



Q16 May we know what type of HVAC unit to be removed and relocated? Do you have photos of this equipment? Refer M-03.

R16 Existing HVAC unit to be removed and relocated is a ceiling-mounted, ventilator unit with rooftop intake penthouse. The selected GC will be provided a copy of all the existing drawings, including the mechanical drawings.



Q17 Can you provide more information on the specifics of the metal siding wall composition for this reno?

R17 Added section 07 46 00 for metal siding in the updated specifications 2025-111-P02103 Bennetto Elementary School Accessibility Project Specification attached.

Q18 The wall tiles are specified to be 10mm x 40mm porcelain by Olympia. This is probably intended to be 100mm x 400mm, can you please confirm the size, and also whether there is a particular tile series requested.

R18 Wall tiles to be 100mm x 400mm.

Q19 What is the distance from electrical room to elevator room (if new panels will be installed)?

R19 Distance from nearest electrical room to elevator machine room is approximately 30 metres.



- Q20 There are 3 panels shown on Electrical drawings (are they existing? If not where are they being fed from)?
- R20 **New electrical panels are to be fed from the electrical room. Electrical rooms were reviewed during site walkthrough. Engineering drawings note that circuit numbers are for design purposes only, and GC shall establish a correct connection circuit number on site during construction.**
- Q21 Where is locate mechanical room for elevator?
- R21 **Elevator machine room is located on the ground floor adjacent to elevator shaft. See Drawing 3 on A3.11.**
- Q22 Drawings and spec do not give enough details for skylights. Please confirm the following: Finish of skylight, glazing make up of skylight, approved supplier.
- R22 **Refer to response 4.**
- Q23 What is the access for equipment to remove the hollow core plank?
- R23 **Access for equipment is through the front door as per the hoarding drawings.**
-

End of Addendum 1



Project Specification for

**BENNETTO ELEMENTARY SCHOOL
ACCESSIBILITY PROJECT**

at

43 Simcoe St E, Hamilton, ON L8L 3N2

For

Hamilton-Wentworth District School Board

20 Education Court

Hamilton, Ontario

HWDSB No: 2025-P02103

JFA Project: 2428

February 26th, 2025

Jason Fung Architect Inc.

211-675 King St W, Toronto ON, M5V 1M9

647 948 9176 www.jasonfung.ca

I GENERAL

I.1 OWNER

.1 Owner for the Project is:

Hamilton-Wentworth District School Board
20 Education Court
Hamilton, Ontario
L9A 0B9

I.2 CONSULTANTS

.1 The following firms comprise the Consultant team for the Project:

.1 Architect

JASON FUNG ARCHITECT INC.

211-675 King St W,

Toronto ON, M5V 1M9

647 948 9176

www.jasonfung.ca

.2 Hazardous Building Materials Assessment (Pre-construction)

MTE Consultants Inc.

1016 Sutton Drive, Unit A

Burlington, ON L7L 6B8

905 639 2552

.3 Mechanical and Electrical Engineer

YMSD Consulting

226 Pacific Ave.

Toronto, ON M6P 2P5

416 763 2144

.4 Structural Engineer

Contact Engineering

209-675 King St W,

Toronto ON, M5V 1M9

647 366 9776

www.contactengineering.ca

END OF SECTION

I GENERAL

I.01 Section list

SECTION	TITLE
00 01 03	Project Directory
00 01 10	Table of Contents
01 11 00	Summary of Work
01 14 00	Work Restrictions
01 21 00	Allowances
01 29 00	Payment Procedures
01 31 19	Project Meetings
01 32 16.19	Construction Progress Schedule - Bar (GANTT) Chart
01 33 00	Submittal Procedures
01 35 29.06	Health and Safety Requirements
01 41 00	Regulatory Requirements
01 45 00	Quality Control
01 56 00	Temporary Barriers and Enclosures
01 71 00	Examination and Preparation
01 74 00	Cleaning
01 77 00	Closeout Procedures
01 78 00	Closeout Submittals
02 22 10	Existing Building Condition Assessments
02 26 00	Hazardous Material Assessment
02 41 19	Selective Demolition
02 82 00	Asbestos Abatement
04 05 00	Common Work Results for Masonry
04 05 13	Masonry Mortaring and Grouting
04 22 00	Concrete Masonry Units
07 11 13	Bituminous Damproofing
07 13 52	Modified Bituminous Sheet Waterproofing
07 46 16	Aluminum Siding
07 84 00	Firestopping
07 92 00	Joint Sealants
08 71 00	Door Hardware
08 62 00	Skylight
09 21 16	Gypsum Board Assemblies
09 22 00	Supports for Plaster and Gypsum Board
09 23 00	Gypsum Plastering

SECTION	TITLE
09 30 13	Ceramic Tiling
09 51 13	Acoustical Panel Ceilings
09 91 23	Interior Painting
10 14 00	Signage
10 28 00	Toilet and Bath Accessories
10 44 00	Fire Protection Specialties
14 26 00	Passenger Elevator
14 42 13	Incline Wheelchair Lift
22 05 00	Common Work Results for Plumbing
22 10 10	Plumbing Pumps
23 34 00	HVAC Fans
23 37 13	Diffusers, Registers and Grilles
26 05 00	Common Work Results for Electrical
26 05 05	Selective Demolition for Electrical
26 05 29	Hangers and Supports for Electrical Systems
26 05 34	Conduits, Conduit Fastenings and Conduit Fittings
28 08 00	Commissioning of Electrical
26 09 24	Lighting Control Devices Low Voltage
26 27 26	Wiring Devices
26 50 00	Lighting
25 52 13.13	Emergency Lighting
26 52 13.16	Exit Signs

1.02 APPENDIX

.1 Appendix A, Designated Substance Audit Report

2 PRODUCTS – Not Used

3 EXECUTION – Not Used

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

I.02 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises general replacement and installation of ceilings of the listed corridors and specified stairwells located at Bennetto Elementary School, 43 Simcoe Street East, Hamilton, ON L8L 3N2 , and further identified in the Contract Documents.

I.03 CONTRACT METHOD

- .1 Construct Work under contract.
- .2 Relations and responsibilities between Contractor and subcontractors assigned by HWDSB are as defined in HWDSB's front end document.

I.04 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit Project construction progress schedule in accordance with 01 32 16.19 - Construction Progress Schedule - Bar (GANNT) Chart.

I.05 WORK BY OTHERS

- .1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Consultant.
- .2 Co-ordinate work with other contractors. If any part of work under this Contract depends for its proper execution or result upon work of another contractor, report promptly to Consultant and Hamilton-Wentworth District School Board (HWDSB), in writing, any defects which may interfere with proper execution of Work.

I.06 FUTURE WORK

- .1 Not Used.

I.07 WORK SEQUENCE

- .1 Construct Work in stages to accommodate HWDSB's intermittent use of premises during construction.
- .2 Co-ordinate Progress Schedule and co-ordinate with HWDSB Occupancy during construction.
- .3 Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.
- .4 Maintain fire access/control.
- .5 Protect workers and public safety.

I.08 CONTRACTOR USE OF PREMISES

- .1 Site Superintendent MUST SIGN IN with school office, Duration of work must be described, complete with timeline of completion. Sign-in and sign-out is required daily for all subtrades.

Sign-in sheets will be provided to HWDSB on a monthly basis.

- .2 Refer to Hamilton-Wentworth District School board Construction Site Specific Information Sheet for Work Hours.
- .3 Limit use of premises for Work and for access, to allow:
 - .1 HWDSB occupancy.
 - .2 Partial HWDSB occupancy.
 - .3 Work by other contractors.
 - .4 Public usage.
 - .5 The school cannot be used as a site office and site trailers are permitted
 - .6 Contractor to provide hoarding, fencing, signage, etc. to facilitate the execution of the work.
 - .7 Contractor is responsible for site security, including the security of materials, equipment, portable toilets, bins, vehicles, etc.
- .4 Co-ordinate use of premises under direction of HWDSB.
- .5 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .6 Coordinate with HWDSB for temporary facilities, access roads and parking areas, traffic regulations, and utilities.
- .7 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .8 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Consultant and HWDSB.
- .9 Ensure that operations conditions of exiting work at completion are still the same, equal to or better than that which existed before new work started.
- .10 Caretaking equipment and supplies are note to be used by the Contractor.

1.09 OWNER OCCUPANCY

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Co-operate with HWDSB in scheduling operations to minimize conflict and to facilitate HWDSB usage.

1.10 PARTIAL OWNER OCCUPANCY

- .1 Schedule and substantially complete designated portions of Work for HWDSB's occupancy prior to Substantial Performance of entire Work.
- .2 Designated areas for Owner's occupancy as directed on site.
- .3 Owner will occupy designated areas for purpose of storage of furnishings and equipment and installation of equipment.
- .4 Execute Certificate of Substantial Performance for each designated portion of Work prior to Owner occupancy. Contractor shall allow:
 - .1 Access for Owner personnel.
 - .2 Use of parking facilities.
 - .3 Operation of HVAC and electrical systems.

- .5 Execute Partial Interim Certificate of Completion for each designated portion of Work prior to Owner occupancy. Contractor shall allow:
 - .1 Access for Owner personnel.
 - .2 Use of parking facilities.
 - .3 Operation of HVAC and electrical systems.
 - .4 Maintenance.
 - .5 Security.

I.11 PRE-PURCHASED EQUIPMENT

- .1 Ensure that the purpose for pre-purchasing these equipment is to ensure delivery to Site within required Project completion schedule.
- .2 Obtain necessary shop drawings and proceed to co-ordinate details for installation, expedite, receive, unload, install, connect and test specified equipment, and be responsible for warranty.
- .3 Include equipment specifications for pre-purchased items at end of project specification, printed on coloured paper for confirmation only.
- .4 Notify Consultant and HWDSB in writing at least 5 business days in advance of date on which materials and equipment are required.
 - .1 Pick up materials and equipment no later than 10 business days after such date.
- .5 Receive equipment Free on Board (F.O.B.), store and maintain equipment until installation.

I.12 OWNER FURNISHED ITEMS

- .1 Owner Responsibilities for Owner Furnished Items only:
 - .1 Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor.
 - .2 Deliver supplier's bill of materials to Contractor.
 - .3 Arrange and pay for delivery to site in accordance with Progress Schedule.
 - .4 Inspect deliveries jointly with Contractor.
 - .5 Submit claims for transportation damage.
 - .6 Arrange for replacement of damaged, defective or missing items.
 - .7 Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties and bonds to Contractor.
- .2 Contractor Responsibilities:
 - .1 Designate submittals and delivery date for each product in progress schedule.
 - .2 Review shop drawings, product data, samples, and other submittals. Submit to Consultant notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
 - .3 Receive and unload products on Site.
 - .4 Inspect deliveries jointly with HWDSB; record shortages, and damaged or defective items.
 - .5 Handle products on Site, including uncrating and storage.
 - .6 Protect products from damage, and from exposure to elements.

- .7 Assemble, install, connect, adjust, and finish products.
- .8 Provide installation inspections required by public authorities.
- .9 Repair or replace items damaged by Contractor or subcontractor on site (under their control).

I.13 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 Execute work with least possible interference or disturbance to building operations, occupants, and normal use of premises. Arrange with Consultant and HWDSB to facilitate execution of work.

I.14 EXISTING SERVICES

- .1 Notify HWDSB and utility companies of intended interruption of services and obtain required permission. Refer to HWDSB Construction Site Specific Information Sheet.
- .2 Where Work involves breaking into or connecting to existing services, give HWDSB at least 5 days of notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian, vehicular traffic and building operations.
- .3 Provide alternative routes for personnel, pedestrian and vehicular traffic.
- .4 Establish location and extent of service lines in area of work before starting Work. Notify Consultant and HWDSB of findings.
- .5 Submit schedule for approval by Consultant and HWDSB for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .6 Provide temporary services to maintain critical building and tenant services.
- .7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .8 Where unknown services are encountered, immediately advise Consultant and HWDSB, and confirm findings in writing.
- .9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .10 Record locations of maintained, re-routed and abandoned service lines.
- .11 Construct barriers, as required.
- .12 Refer to Construction Contact Site Information Sheet for procedures on shutdown of services.

I.15 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy of each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.

- .8 Field Test Reports.
- .9 Copy of Approved Work Schedule.
- .10 Health and Safety Plan and Other Safety Related Documents.
- .11 Other documents as specified.

2 PRODUCTS

2.01 NOT USED

- .1 Not used.

3 EXECUTION

3.01 NOT USED

- .1 Not used.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Refer to RFT.

I.02 ACCESS AND EGRESS

- .1 Design, construct and maintain temporary “access to” and “egress from” work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

I.03 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with HWDSB to facilitate work as stated. All trades to follow Hamilton by-laws in terms of noise, dust and debris as required to facilitate the work.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Access to school washrooms is not permitted. Contractors to provide their own portable restroom units. Location to be provided by Contractor and reviewed and approved by HWDSB via email prior to construction.
- .5 Closures: protect work temporarily until permanent enclosures are completed.
- .6 Work can be facilitated at any time from June 30th, 2025 to August 19th, 2025. Before and after this timeline, work is to be facilitated outside of school hours (8:30 am – 3:45 pm).

I.04 SECURITY

- .1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

I.05 BUILDING SMOKING ENVIRONMENT

- .1 Smoking, vaping, drugs and alcohol are not permitted on school board property. Anyone seen doing these activities will be removed from the property and not allowed to return at no expense to the Owner and no interruption to the schedule. The Contractor is to ensure subcontractor compliance.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

I GENERAL

1.01 REFERENCE STANDARDS

- .1 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC 2-2020, Stipulated Price Contract, and covered in RFT.

1.02 CASH ALLOWANCES

- .1 Refer to CCDC 2.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

I GENERAL

I.01 REFERENCE STANDARDS

- .1 HWDSB front end document.

I.02 APPLICATIONS FOR PROGRESS PAYMENT

- .1 Refer to CCDC 2 and HWDSB front end document.
- .2 Make applications for payment on account as provided in Agreement monthly as Work progresses.
- .3 Date applications for payment last day of agreed monthly payment period and ensure amount claimed is for value, proportionate to amount of Contract, of Work performed and Products delivered to Place of Work at that date.
- .4 Submit to HWDSB at least 14 days before first application for payment. Schedule of values for parts of Work, aggregating total amount of Contract Price, to facilitate evaluation of applications for payment.

I.03 SCHEDULE OF VALUES

- .1 Refer to CCDC 2 and HWDSB front end document.
- .2 Provide schedule of values supported by evidence as JASON FUNG ARCHITECT INC. may reasonably direct and when accepted by JASON FUNG ARCHITECT INC., be used as basis for applications for payment.
- .3 Include statement based on schedule of values with each application for payment.
- .4 Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as JASON FUNG ARCHITECT INC. may reasonably require to establish value and delivery of products.

I.04 PROGRESS PAYMENT

- .1 Refer to CCDC 2 and HWDSB front end document.
- .2 JASON FUNG ARCHITECT INC. will issue to HWDSB, no later than 10 days after receipt of an application for payment, certificate for payment in amount applied for or in such other amount as Consultant determines to be due. If JASON FUNG ARCHITECT INC. amends application, JASON FUNG ARCHITECT INC. will give notification in writing giving reasons for amendment.

I.05 SUBSTANTIAL PERFORMANCE OF WORK

- .1 Refer to CCDC 2 and HWDSB front end document.
- .2 Prepare and submit to JASON FUNG ARCHITECT INC. comprehensive list of items to be completed or corrected and apply for a review by JASON FUNG ARCHITECT INC. to establish Substantial Performance and Interim Completion of Work or substantial performance of designated portion of Work when Work is substantially performed if permitted by lien legislation applicable to Place of Work designated portion which Owner agrees to accept separately is substantially performed. Failure to include items on list does not alter responsibility to complete Contract.
- .3 No later than 10 days after receipt of list and application, JASON FUNG ARCHITECT INC. will

review Work to verify validity of application, and no later than 7 days after completing review, will notify Contractor if Work or designated portion of Work is substantially performed.

- .4 JASON FUNG ARCHITECT INC.: state date of Substantial Performance of Work or designated portion of Work in certificate.
- .5 Immediately following issuance of certificate of Substantial Performance of Work, in consultation with Consultant, establish reasonable date for finishing Work.

I.06 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK

- .1 Refer to CCDC 2 and HWDSB front end document.
- .2 After issuance of certificate of Substantial Performance of Work:
 - .1 Submit application for payment of holdback amount.
 - .2 Submit sworn statement that accounts for labour, subcontracts, products, construction machinery and equipment, and other indebtedness which may have been incurred in Substantial Performance of Work and for which Owner might in be held responsible have been paid in full, except for amounts properly retained as holdback or as identified amount in dispute.
- .3 After receipt of application for payment and sworn statement, JASON FUNG ARCHITECT INC. will issue certificate for payment of holdback amount.
- .4 Release of holdback is 60 days after publication date.

I.07 FINAL PAYMENT

- .1 Refer to CCDC 2 and HWDSB front end document.
- .2 Submit application for final payment when Work is completed.
- .3 JASON FUNG ARCHITECT INC. will, no later than 10 days after receipt of application for final payment, review Work to verify validity of application. JASON FUNG ARCHITECT INC. will give notification that application is valid or give reasons why it is not valid, no later than 7 days after reviewing Work.
- .4 JASON FUNG ARCHITECT INC. will issue final certificate for payment when application for final payment is found valid.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

I.02 ADMINISTRATIVE

- .1 Schedule and administer project meetings throughout the progress of the work at the call of HWDSB.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting four days in advance of meeting date to HWDSB
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within 3 days after meetings and transmit to meeting participants and, HWDSB, JASON FUNG ARCHITECT INC.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

I.03 PRECONSTRUCTION MEETING

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Senior representatives of HWDSB, JASON FUNG ARCHITECT INC., major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of Work: in accordance with Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart.
 - .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
 - .5 Delivery schedule of specified equipment.
 - .6 Site security as necessary.
 - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
 - .8 Owner provided products.
 - .9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

- .10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .12 Monthly progress claims, administrative procedures, photographs, hold backs.
- .13 Appointment of inspection and testing agencies or firms.
- .14 Insurances, transcript of policies.

I.04 PROGRESS MEETINGS

- .1 During course of Work and 2 weeks prior to project completion, schedule progress meetings bi-weekly.
- .2 Contractor, major Subcontractors involved in Work, HWDSB are to be in attendance.
- .3 Notify parties minimum 3 days prior to meetings.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.
- .5 Agenda to include 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 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for affect on construction schedule and on completion date.
 - .12 Other business.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

I.02 DEFINITIONS

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
- .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: overall system operated by HWDSB to enable monitoring of project work in relation to established milestones.

I.03 REQUIREMENTS

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 5 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to HWDSB within 10 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to HWDSB within 5 working days of receipt of acceptance of Master Plan.

I.05 PROJECT MILESTONES

- .1 Project milestones form interim targets for Project Schedule. Contractor and HWDSB to provide further information.

I.06 MASTER PLAN

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 HWDSB will review and return revised schedules within 5 working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

I.07 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Award.
 - .2 Shop Drawings, Samples.
 - .3 Demolition
 - .4 Interior Architecture (Ceiling).
 - .5 Lighting.
 - .6 Electrical.
 - .7 Controls.
 - .8 Heating, Ventilating, and Air Conditioning.
 - .9 Testing and Commissioning.
 - .10 Supplied equipment long delivery items.
 - .11 Engineer supplied equipment required dates.

I.08 PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

I.09 PROJECT MEETINGS

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

2 PRODUCTS

2.01 NOT USED

.1 Not used.

3 EXECUTION

3.01 NOT USED

.1 Not used.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 HWDSB front end document.

I.02 REFERENCE STANDARDS

- .1 Not Used.

I.03 ADMINISTRATIVE REQUIREMENTS

- .1 Submit to JASON FUNG ARCHITECT INC. submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals before submission to JASON FUNG ARCHITECT INC.. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify HWDSB and JASON FUNG ARCHITECT INC., in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify site measurements and affected adjacent Work are coordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by HWDSB and JASON FUNG ARCHITECT INC review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by HWDSB and JASON FUNG ARCHITECT INC. review.
- .10 Keep one reviewed copy of each submission on site.

I.04 SHOP DRAWINGS AND PRODUCT DATA

- .1 Refer to CCDC 2 GC 3.8 and HWDSB front end document.
- .2 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .3 Submit drawings stamped and signed by professional engineer registered or licensed in ONTARIO, Canada.
- .4 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to Contract drawings and specifications.

- .5 Allow 5 days for HWDSB and JASON FUNG ARCHITECT INC. review of each submission.
- .6 Adjustments made on shop drawings by HWDSB and JASON FUNG ARCHITECT INC. are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to HWDSB before proceeding with Work.
- .7 Make changes in shop drawings as HWDSB and JASON FUNG ARCHITECT INC. may require, consistent with Contract Documents. When resubmitting, notify HWDSB and JASON FUNG ARCHITECT INC. in writing of revisions other than those requested.
- .8 Accompany submissions with transmittal letter, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data, and sample.
 - .5 Other pertinent data.
- .9 Submissions to include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of site measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified site dimensions and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .10 After HWDSB and JASON FUNG ARCHITECT INC. review, distribute copies.
- .11 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as HWDSB and JASON FUNG ARCHITECT INC. may reasonably request.
- .12 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by HWDSB and JASON FUNG ARCHITECT INC. where shop drawings will not be prepared due to standardized manufacture of product.

- .13 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by HWDSB and JASON FUNG ARCHITECT INC.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of Contract award for project.
- .14 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by HWDSB and JASON FUNG ARCHITECT INC.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of Contract complete with project name.
- .15 Submit electronic copies of manufacturer's instructions for requirements requested in specification Sections and as requested by HWDSB and JASON FUNG ARCHITECT INC.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Safety Data Sheets concerning impedances, hazards and safety precautions.
- .16 Submit electronic copies of Manufacturer's Site Reports for requirements requested in specification Sections and as requested by HWDSB and JASON FUNG ARCHITECT INC.
- .17 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .18 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by HWDSB.
- .19 Delete information not applicable to project.
- .20 Supplement standard information to provide details applicable to project.
- .21 If upon review by HWDSB and JASON FUNG ARCHITECT INC no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

I.05 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to HWDSB and JASON FUNG ARCHITECT INC
- .3 Notify HWDSB and JASON FUNG ARCHITECT INC. in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by HWDSB and JASON FUNG ARCHITECT INC. are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to HWDSB and JASON FUNG ARCHITECT INC. before proceeding with Work.
- .6 Make changes in samples which HWDSB and JASON FUNG ARCHITECT INC may require, consistent with Contract Documents.

- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

I.06 MOCK-UPS

- .1 Erect mock-ups in accordance with section 01 43 00 - Quality Assurance.

I.07 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of colour digital photography in jpg format, standard resolution weekly with progress statement and as directed by HWDSB.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 2 views per ceiling zone as specified in Architectural drawings.
 - .1 Viewpoints and their location as determined by HWDSB and JASON FUNG ARCHITECT INC.
- .4 Frequency of photographic documentation: weekly as directed by HWDSB.
 - .1 Upon completion of: demolition, framing and services before concealment, and as directed by HWDSB.

I.08 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, review RFT document for submission of necessary certificates and transcripts.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

I GENERAL

I.01 SUMMARY

- .1 Refer to Designated Substance Audit report prepared by MTE CONSULTANTS INC. before proceeding with demolition and renovation Work.

I.02 RELATED REQUIREMENTS

- .1 Section 02 82 00 – Asbestos Abatement.

I.03 REFERENCE STANDARDS

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Province of Ontario
 - .1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. as amended and O. Reg. 213/91 as amended.

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
- .3 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to HWDSB, and authority having jurisdiction.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS Safety Data Sheets (SDS) in accordance with Section 02 81 00 - Hazardous Materials.
- .7 Consultant will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days after receipt of plan. Revise plan as appropriate and resubmit plan to Consultant within 5 days after receipt of comments from Consultant.
- .8 Consultant review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Consultant.
- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

I.05 FILING OF NOTICE

- .1 File Notice of Project with Ontario authorities prior to beginning of Work.
- .2 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

I.06 SAFETY ASSESSMENT

- .1 Perform site specific safety hazard assessment related to project.

I.07 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Consultant prior to commencement of Work.

I.08 REGULATORY REQUIREMENTS

- .1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

I.09 PROJECT/SITE CONDITIONS

I.10 GENERAL REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Consultant may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

I.11 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

I.12 COMPLIANCE REQUIREMENTS

- .1 Comply with Ontario Occupational Health and Safety Act, and Ontario Regulations for Construction Projects, O. Reg. 213/91.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

I.13 UNFORSEEN HAZARDS

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Ontario having jurisdiction and advise Consultant and in writing.

I.14 HEALTH AND SAFETY CO-ORDINATOR

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:
 - .1 Have site-related working experience specific to activities associated with Consultant.
 - .2 Have working knowledge of occupational safety and health regulations.
 - .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
 - .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
 - .5 Be on site during execution of Work and report directly to and be under direction of Consultant.

I.15 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Ontario having jurisdiction, and in consultation with Consultant.

I.16 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Consultant.
- .2 Provide Consultant with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Consultant may stop Work if non-compliance of health and safety regulations is not corrected.

I.17 BLASTING

- .1 Blasting or other use of explosives is not permitted.

I.18 POWDER ACTUATED DEVICES

- .1 Use powder actuated devices only after receipt of written permission from Consultant.

I.19 WORK STOPPAGE

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

2 PRODUCTS

2.01 NOT USED

- .1 Not used.

3 EXECUTION

3.01 NOT USED

.I Not used.

END OF SECTION

I GENERAL

I.01 SUMMARY

- .1 This Section references laws, bylaws, ordinances, rules, regulations, codes, orders of Authority Having Jurisdiction (AHJ), and other legally enforceable requirements applicable to the Work and that are or become enforced during performance of the Work.

I.02 RELATED REQUIREMENTS

- .1 Section 02 22 10 – Existing Conditions Assessment

I.03 DEFINITIONS

- .1 Reference Standards: Means consensus standards, trade association standards, guides, and other publications expressly referenced in the Contract Documents.

I.04 REFERENCE STANDARDS AND REFERENCE DOCUMENTS

- .1 If specified referenced standards do not indicate an edition or version, the latest edition or revision issued by the publisher at the time of bid closing shall apply, except as follows:
 - .1 If a particular edition or revision date of a specified standard is referenced in an applicable code or other regulatory requirement, the edition or version in the regulatory reference shall apply.
- .2 The specified reference standards establish minimum requirements. If Contract Documents indicate requirements that conflict with a reference standard, the more stringent requirements shall apply.
- .3 If multiple reference standards are specified and the standards establish different requirements, the most stringent requirement shall apply.
- .4 In case of discrepancy or uncertainties, refer to JASON FUNG ARCHITECT INC. for interpretation or clarification.

I.05 CODES

- .1 Building Code: Perform Work in accordance with the Ontario Building Code 2012 including amendments up to the time of bid closing and other codes of provincial or local application.
- .2 Fire Code: Perform Work in accordance with the National Fire Code of Canada (NFC) 2020 including amendments up to the time of bid closing and other codes of provincial or local application.
- .3 Plumbing Code: Perform Work in accordance with National Plumbing Code of Canada (NPC) 2020 including amendments up to the time of bid closing and other codes of provincial or local application.
- .4 If there is a conflict or discrepancy between codes, the most stringent requirements shall apply.
- .5 Specific design and performance requirements listed in Specifications and indicated on Drawings may exceed minimum requirements established by referenced Codes; these requirements will govern over the minimum requirements listed in the referenced Codes.

I.06 LAWS

- .1 Not Used.

1.07 FEES

- .1 Regulatory Requirements: Except as otherwise specified, JASON FUNG ARCHITECT INC. shall apply for, obtain, and pay fees associated with permits, licenses, certificates, and approvals required by regulatory requirements and Contract Documents, based on General Conditions of Contract and the following:
 - .1 Regulatory requirements and fees in force at the time of bid closing, and
 - .2 A change in regulatory requirements or fees scheduled to become effective after the time of bid closing and of which public notice has been given before the time of bid closing.

2 PRODUCTS

2.01 EASEMENTS AND NOTICES

- .1 Not Used.

2.02 PERMIT REQUIREMENTS

- .1 Building Permit:
 - .1 JASON FUNG ARCHITECT INC. shall apply for, obtain and pay for building permit on behalf of HWDSB, and other permits required for Work and its various parts.
 - .3 Contractor will require that specific Subcontractor(s) obtain and pay for some permits required by authorities having jurisdiction (AHJ), where their work is affected by work requiring permits including an asbestos abatement and control permit.
 - .4 Contractor shall display building permit and other permits in a conspicuous location at the Place of the Work.
- .3 Occupancy Permits:
 - .1 Contractor shall apply for, obtain, and pay for occupancy permits, including partial occupancy permits where required by AHJ.
 - .2 Contractor shall correct deficiencies in accordance with JASON FUNG ARCHITECT INC.'s instructions. If a deficiency is not corrected, HWDSB reserves the right to make correction and charge Contractor for costs incurred.
 - .3 Contractor shall turn occupancy permits over to HWDSB.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

I GENERAL

I.01 SUMMARY

- .1 This Section describes administrative and procedural requirements for reactive activities to verify that completed Work conforms to Contract Documents requirements.
- .2 Having inspection and testing agencies by Contractor does not relieve the Contractor of their responsibility to perform Work in accordance with Contract Documents.

I.02 RELATED REQUIREMENTS

I.03 ADMINISTRATIVE REQUIREMENTS

- .1 Allow and coordinate access to Work on site, manufacturing off site, and fabrication off site with inspection and testing agencies.
- .2 Retain and pay for inspection and testing that are designated for Contractor's own quality control plan, and when testing and inspection are required by Consultant or Sub consultants.
- .3 Give advanced notice to HWDSB and to each inspection/testing agency for inspection and testing required by Contract Documents or by Consultant or Sub consultants..
- .4 In advance of each test, notify appropriate agency and HWDSB in the order that attendance arrangements can be made.

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit schedule of testing and inspection activities to HWDSB, applicable Subcontractors, testing agencies, and other affected parties. Include the following:
 - .1 List each testing and inspection agency
 - .2 Identify types of tests and inspections for each agency, and cross reference to applicable specification Section number-title in Contract Documents
 - .3 Description of test and inspection
 - .4 Identify applicable reference standard
 - .5 Identify test and inspection method
 - .6 Indicate number of each test and inspection required
- .3 Submit one digital copy of each quality assurance inspection and test report to HWDSB, except where a technical specification Section indicates otherwise.
- .4 Submit reports for inspection and testing required by Contract Documents or by Consultant or Sub consultants. and performed by Contractor-retained inspection and testing agencies within ten days after inspection or test is completed, except where a technical specification Section indicates a different time period.
- .5 Submit one digital copy of each quality control inspection and test report to HWDSB, except where a technical specification Section indicates otherwise.
- .6 Deliver copies of quality control reports to Subcontractor of work being inspected or tested.

I.05 SOURCE QUALITY CONTROL PROCEDURES

I.06 SITE QUALITY CONTROL PROCEDURES

- .1 Provide labour, Construction Equipment, and temporary facilities to obtain and handle test samples and materials on site. Arrange for sufficient space to store and cure test samples.
- .2 Deliver samples and materials required for testing, as requested in technical specification Sections. Submit with reasonable promptness and in an orderly sequence to avoid delays in Work.

I.07 TESTING AND INSPECTION SERVICES

- .1 Provide equipment required for executing inspection and testing by appointed agencies.
- .2 Correct defects and deficiencies when they are revealed during inspection or testing at no change to Contract Price or Contract Time. Pay costs for retesting and re-inspection. Appointed agency will request additional inspections or tests to ensure full degree of defects or deficiencies are revealed and corrected.
- .3 Quality control testing and inspection reports to include the following:
 - .1 Project name and number
 - .2 Testing/Inspection agency's name, address, telephone number, and website
 - .3 Date of issuing report
 - .4 Dates and locations of tests, inspections, or samples
 - .5 Description of the Work and test and inspection method
 - .6 Numbers and titles of associated specification Sections
 - .7 Test and inspection data and interpretation of test results (e.g., pass or fail)
 - .8 Ambient conditions at time of test, inspection, or sampling
 - .9 Recommendations on re-testing and re-inspecting, if applicable

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

I.02 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA-O121-M1978, Douglas Fir Plywood.
- .2 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C'

I.03 INSTALLATION AND REMOVAL

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.
- .3 See diagram of hoarding following Section 01 56 00.
- .4 Exterior staging area, if deemed necessary by GC, is to reasonably protect exterior areas, including grasses, façade material, etc.
- .5 Removal of hoarding (interior and exterior) must include the clean-up of the area, to be made good to the condition at the start of the project.
- .6 Existing areas outside of hoarding is to be maintained tidy, clean, and free of debris from construction.

I.04 HOARDING

- .1 Erect temporary site enclosures using 38 x 89 mm construction grade lumber framing at 600 mm centres and 1200 x 2400 x 13 mm exterior grade fir plywood to CSA O121.
- .2 Apply plywood panels vertically flush and butt jointed.
- .3 Provide at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.
- .4 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.
- .5 Paint public side of site enclosure in selected colours with one coat primer to CAN/CGSB 1.189 and one coat exterior paint to CGSB 1.59. Maintain public side of enclosure in clean condition.
- .6 If exterior enclosure required, then erect temporary site enclosure using new 1.2 m high snow fence wired to rolled steel "T" bar fence posts spaced at 2.4m on centre. Provide one lockable truck gate. Maintain fence in good repair.
- .7 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.
- .8 Provide 1 set of phasing hoarding during the summer construction, and showing Phase 2 adjustments to hoarding to accommodate school usage starting August 15th.

I.05 GUARD RAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair

- wells, open edges of floors and roofs.
- .2 Provide as required by governing authorities.

I.06 WEATHER ENCLOSURES

- .1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3 Design exterior enclosures to withstand wind pressure and snow loading.

I.07 DUST TIGHT SCREENS

- .1 Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.

I.08 ACCESS TO SITE

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

I.09 SCHOOL AND BUILDING USAGE

- .1 Provide access for staff, teachers and students when school is in operation.
- .2 Notify HWDSB of an expected interruptions to HVAC, Electrical and Water supply. Most notably in relation to the Daycare Operations which will occur during the summer months.
- .3 Interruptions to HVAC, Electrical and Water supply may not occur during school operations from 7:30am to 6pm. Owner's to receive 5 days business notice prior to service shut down.

I.10 FIRE ROUTES

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

I.11 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

I.12 PROTECTION OF BUILDING FINISHES

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with HWDSB and JFA locations and installation schedule 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

I.13 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management

and Disposal.

2 PRODUCTS

2.01 NOT USED

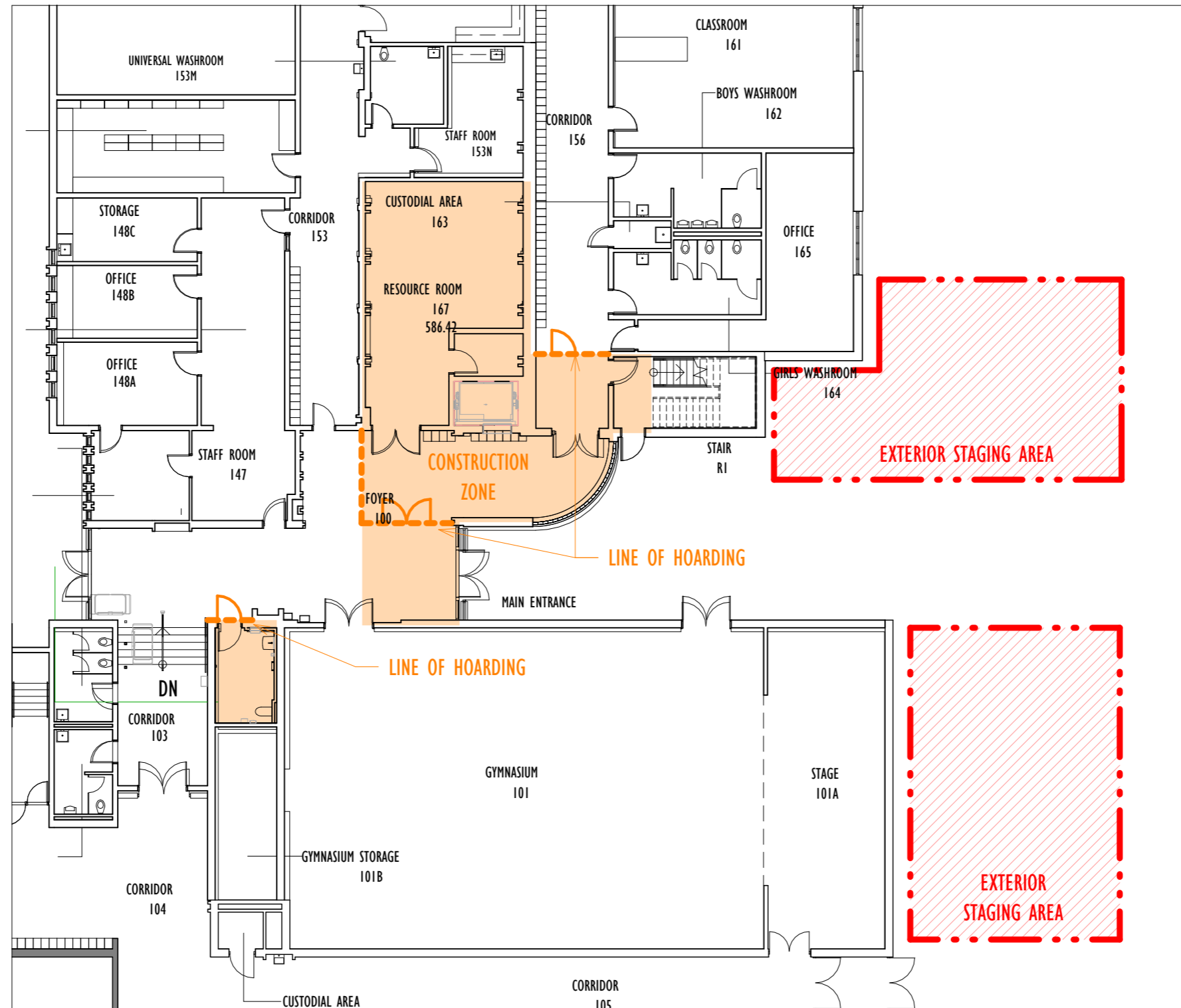
.1 Not Used.

3 EXECUTION

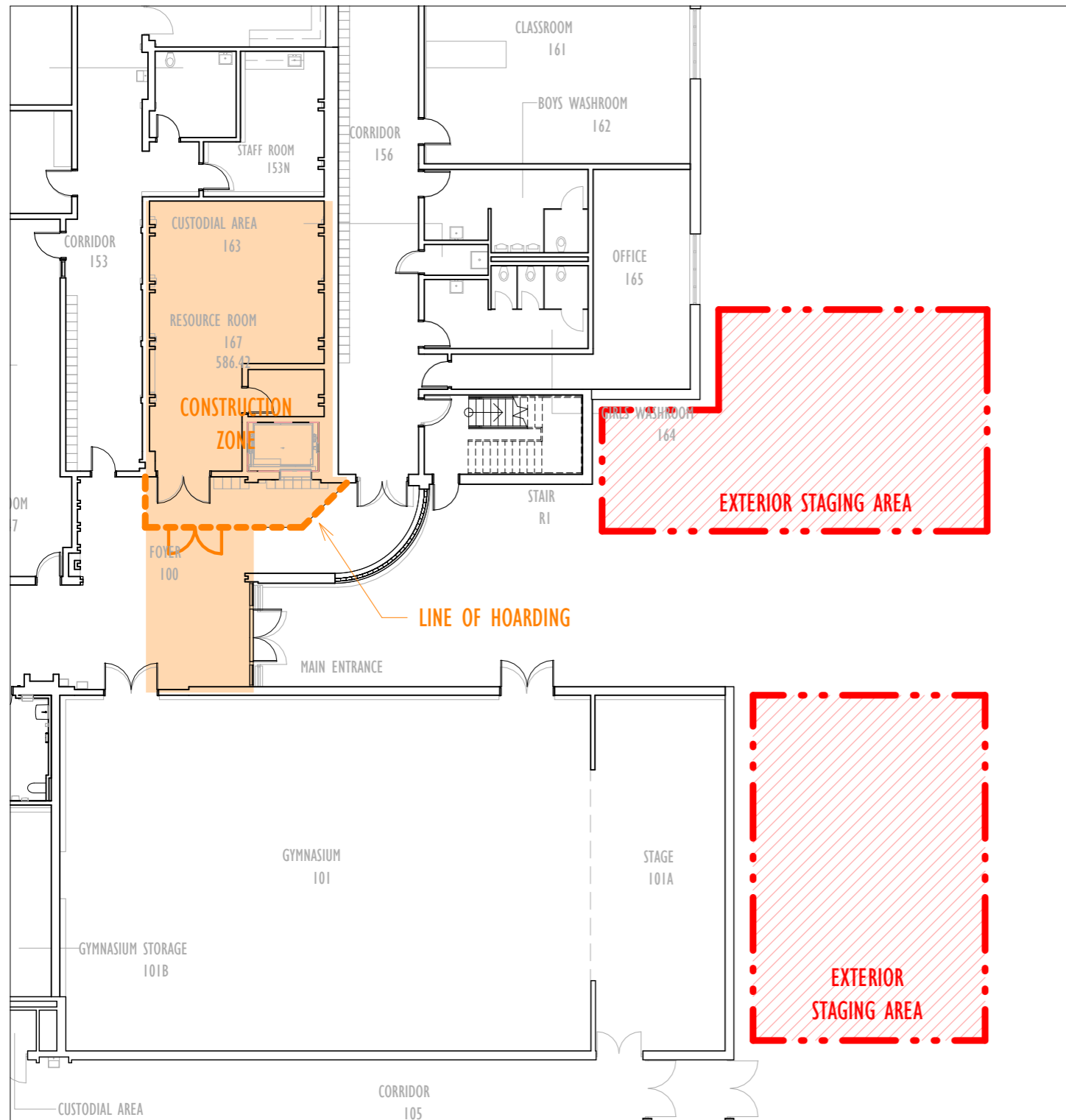
3.01 NOT USED

.1 Not Used.

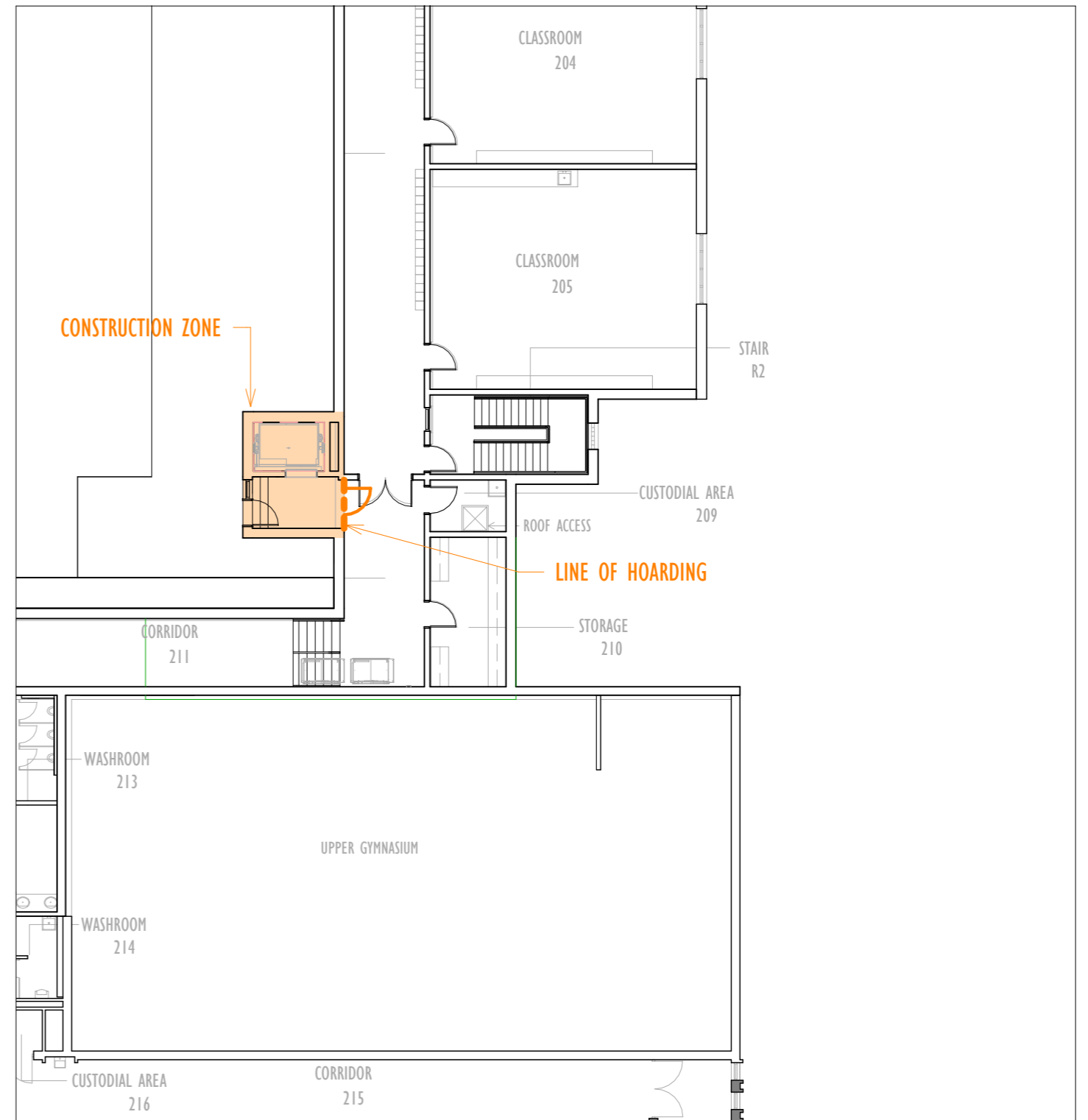
END OF SECTION



PHASE I - GROUND FLOOR HOARDING



PHASE 2 - GROUND FLOOR HOARDING



PHASE 2 - SECOND FLOOR HOARDING

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 09 21 16 – Gypsum Board Assemblies
- .3 Section 09 51 13 – Acoustical Panel Ceilings

I.02 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit the following before work begins at the Place of the Work:
 - .1 Service locations: Document locations and extents of service lines in the work area.
- .3 Submit the following informational submittals as work progresses:
 - .1 Test reports: For manufacturer-recommended pre-installation site tests.
 - .1 Indicate test results meet manufacturer's requirements and recommendations.
 - .2 When manufacturer's requirements are not met, submit manufacturer's corrective recommendations for review.
 - .4 Submit the following when requested by the HWDSB:
 - .1 Site quality control submittals: Documentation to verify accuracy of engineering work.

I.03 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

I.04 QUALIFICATION ASSURANCE

- .1 Not Used.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 EXAMINATION

- .1 Existing Services:
 - .1 Confirm locations and extent of service lines in work area before beginning work on site. Submit findings.
 - .2 Immediately notify the HWDSB if unknown services are encountered. Confirm findings in writing.
 - .3 Record locations of maintained, re-routed, and abandoned service lines after completion of the Work. Submit findings.

- .2 Verify substrate and other conditions are acceptable for installation of materials, assemblies, and systems in accordance with required tolerances and manufacturer's instructions and recommendations.
 - .1 Examine conditions, with installers, for defects affecting performance of the Work. Where work of one Section depends on work of other Sections being properly completed, verify that work is complete and suitable to receive the subsequent work.
 - .2 Verify substrate surfaces are clean, dimensionally-stable, cured, and free of contaminants.
 - .3 Proceed with installation after unacceptable conditions are remedied.
 - .4 Starting to cut, patch, or install work will be considered Contractor's acceptance of existing conditions.
 - .5 Monitor conditions as Work proceeds, including items subject to damage or movement during cutting and patching.
- .3 Perform manufacturer-recommended pre-installation site tests.

3.02 PREPARATION

- .1 Protection of In-Place Conditions:
 - .1 Protect Work and items to remain from damage.
 - .2 Do not load, or permit to be loaded, anything with a weight or force that may endanger the safety or integrity of the Work or items to remain.
 - .3 Support structural integrity of surroundings.
 - .4 Protect exposed work from weather and other potentially damaging conditions. Keep excavations free of water.
 - .5 Promptly remove, replace, clean, or repair elements damaged due to inadequate protection, as acceptable to the HWDSB, and at no change to the Contract Price or Contract Time.
- .2 Surface Preparation:
 - .1 Clean surfaces thoroughly before installation.
 - .2 Prepare surfaces using manufacturer-recommended methods to achieve acceptable substrates under project conditions.

3.03 SURVEY REQUIREMENTS

- .1 Not Used.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 02 80 00 – Hazardous Materials.

I.02 REFERENCE STANDARDS

- .1 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC 2-2020, Stipulated Price Contract.

I.03 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by HWDSB. Do not burn waste materials on site, unless approved by HWDSB.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site 40 yard bin containers for collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling. Refer to Section 01 74 19 - Waste Management and Disposal.
- .7 Dispose of waste materials and debris off site.
- .8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

I.04 FINAL CLEANING

- .1 Refer to CCDC 2.
- .2 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .3 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .4 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .5 Remove waste products and debris including that caused by Owner or other Contractors.

- .6 Remove waste materials from site at regularly scheduled times or dispose of as directed by HWDSB. Do not burn waste materials on site, unless approved by HWDSB.
- .7 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .8 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .9 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
- .10 Clean lighting reflectors, lenses, and other lighting surfaces.
- .11 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .14 Remove dirt and other disfiguration from exterior surfaces.
- .15 Sweep and wash clean paved areas.
- .16 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .17 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .18 Remove snow and ice from access to building.

I.05 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 HWDSB front end document.

I.02 REFERENCE STANDARDS

- .1 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC 2- 2020, Stipulated Price Contract.

I.03 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify HWDSB in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request HWDSB and JASON FUNG ARCHITECT INC. inspection.
 - .2 HWDSB and JASON FUNG ARCHITECT INC. Inspection:
 - .1 HWDSB, JASON FUNG ARCHITECT INC. and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, adjusted and balanced and fully operational.
 - .4 Certificates required by Boiler Inspection Branch, Fire Commissioner, Utility companies: submitted.
 - .5 Operation of systems: demonstrated to Owner's personnel.
 - .6 Commissioning of mechanical systems: completed and copies of final Commissioning Report submitted to HWDSB and JASON FUNG ARCHITECT INC.
 - .7 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by HWDSB and JASON FUNG ARCHITECT INC., and Contractor.
 - .2 When Work incomplete according to HWDSB and JASON FUNG ARCHITECT INC., complete outstanding items and request re-inspection.
 - .5 Declaration of Substantial Performance: when HWDSB and JASON FUNG ARCHITECT INC. considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

- .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work..
- .7 Final Payment:
 - .1 When HWDSB and JASON FUNG ARCHITECT INC. considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
 - .2 Refer to CCDC 2: when Work deemed incomplete by HWDSB and JASON FUNG ARCHITECT INC., complete outstanding items and request re-inspection.
- .8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with HWDSB front end document.

1.04 FINAL CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 HWDSB RFT document.

I.02 REFERENCE STANDARDS

- .1 Not Used.

I.03 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-warranty Meeting:
 - .1 Convene meeting one week before contract completion with Contractor and HWDSB, in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify Project requirements.
 - .2 Review manufacturer's installation instructions and warranty requirements.
 - .2 HWDSB to establish communication procedures for:
 - .1 Notifying construction warranty defects.
 - .2 Determine priorities for type of defects.
 - .3 Determine reasonable response time.
 - .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
 - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures. Refer to the HWDSB front end document.
- .2 Two weeks before Substantial Performance of the Work, submit to the HWDSB, two copies of operating and maintenance manuals in English.
- .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products supplied.

I.05 FORMAT

- .1 Organize data as instructional manual.
- .2 PDF: Letter size, flattened, Black & White.
- .3 When multiple PDFs are used correlate data into related consistent groupings.
 - .1 Identify contents of each binder in file name.
- .4 Cover: Identify each PDF with type or printed title 'Project Record Documents'; list title of project

- and identify subject matter of contents.
- .5 Arrange content by systems under Section numbers and sequence of Table of Contents.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: Provide PDF copy.
 - .1 Bind in with text.
 - .2 Size: 24x36 in., ARCH D, flattened, B&W.

I.06 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to 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 Typewritten Text: As required to supplement product data.
 - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
- .6 Warranty Letters.

I.07 AS-BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, in addition to requirements in General Conditions, at site for HWDSB one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Site test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in site office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

- .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by HWDSB.

I.08 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- .1 Record information on set of black line opaque drawings, and provide reline as-built drawings in PDF format.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured 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 Site changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 Referenced Standards to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product 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, site test records, required by individual specifications Sections.
- .7 Provide digital photos, if requested, for site records.

I.09 FINAL SURVEY

- .1 Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

I.10 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

- .2 Panel board 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.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
 - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly 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 list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's coordination 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 list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control.
- .15 Additional requirements: As specified in individual specification Sections.

I.11 MATERIALS AND FINISHES

- .1 Building products, applied materials, and finishes: Include product data, with catalogue number, size, composition, and colour and texture designations.
 - .1 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 recommended schedule for cleaning and maintenance.
- .4 Additional requirements: As specified in individual specifications Sections.

I.12 MAINTENANCE MATERIALS

- .1 Spare Parts:
 - .1 Provide spare parts, in quantities specified in individual specification Sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.

- .1 Submit inventory listing to HWDSB.
- .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit before final payment.
- .2 Extra Stock Materials:
 - .1 Provide maintenance and extra materials, in quantities specified in individual specification Sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to HWDSB.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit before to final payment.
- .3 Special Tools:
 - .1 Provide special tools, in quantities specified in individual specification Section.
 - .2 Provide items with tags identifying their associated function and equipment.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to HWDSB.
 - .2 Include approved listings in Maintenance Manual.

I.13 DELIVERY, STORAGE, AND HANDLING

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by HWDSB.

I.14 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to HWDSB approval.
- .3 Warranty management plan to include required actions and documents to assure that HWDSB receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to HWDSB for approval before each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Obtain warranties and bonds, executed in duplicate by Subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
- .4 Verify that documents are in proper form, contain full information, and are notarized.
- .5 Co-execute submittals when required.
- .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 11 month warranty inspection, measured from time of acceptance, by HWDSB.
- .9 Include information contained in warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, Subcontractors, manufacturers, or suppliers involved.
 - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include HVAC balancing, motors, and commissioned systems such as fire protection, alarm systems, sprinkler systems.
 - .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of manufacturers or suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.
 - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
 - .7 Cross-reference to warranty certificates as applicable.
 - .8 Starting point and duration of warranty period.
 - .9 Summary of maintenance procedures required to continue warranty in force.
 - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
 - .11 Organization, names and phone numbers of persons to call for warranty service.
 - .12 Typical response time and repair time expected for various warranted equipment.
 - .4 Contractor's plans for attendance at 9 month post-construction warranty inspections.
 - .5 Procedure and status of tagging of equipment covered by extended warranties.
 - .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.

- .1 Failure to respond will be cause for the HWDSB to proceed with action against Contractor.

1.15 WARRANTY TAGS

- .1 Tag, at time of installation, each warranted item. Provide durable, oil- and water-resistant tag approved by HWDSB.
- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate the following information on tag:
 - .1 Type of product/material.
 - .2 Model number.
 - .3 Serial number.
 - .4 Contract number.
 - .5 Warranty period.
 - .6 Inspector's signature.
 - .7 Construction Contractor.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Not Used.

I.02 ABBREVIATIONS AND ACRONYMS

- .1 Not Used.

I.03 DEFINITIONS

- .1 Refer to ASTM E631-15 for terms definitions as they are applicable to this Project.

I.04 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM E631-15, Standard Terminology of Building Constructions
 - .2 ASTM E2018-15, Standard Guide for Property Condition Assessments: Baseline Property Condition Assessment Process
- .2 National Research Council of Canada (NRC):
 - .1 National Building Code of Canada (NBC)
 - .2 National Fire Code of Canada (NFC)

I.05 ADMINISTRATIVE REQUIREMENTS

- .1 Arrange for a pre-construction meeting in accordance with Section 01 31 19 - Project Meetings. Meeting to be attended by HWDSB and JASON FUNG ARCHITECT INC. to discuss project's requirements before Work starts.

I.06 RESPONSIBILITY

- .1 Contractor shall exercise every reasonable precaution for the protection of each worker on Site.
- .2 Contractor shall furnish all existing building information to all subcontractors who will be performing work on Site.

I.07 REGULATORY REQUIREMENTS

- .1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.
- .2 Refer to laws, by laws, ordinances, rules, regulations, and orders of authority having jurisdictions, and other legally enforceable requirements applicable to Work at that area; or become in force during performance or work.

I.08 QUALIFICATIONS

- .1 Provide proof of qualifications when requested by HWDSB.

1.10 SITE INFORMATION

- .1 Site located at Bennetto Elementary School, 47 Simcoe St E, Hamilton, ON L8L 3N2, features one existing building.

1.11 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit Site specific Health and Safety Plan, within 7 days after date of Notice to proceed and before mobilization to Site. List any relevant hazards present on Site and need to be included in the Contractor's Site specific Health and Safety plan as required by authority having jurisdiction.
 - .1 Prepare Site specific Health and Safety Plan in accordance with Section 01 35 29.06 - Health and Safety Requirements, refer to any findings of Site specific Designated Substance Reports (DSR), overhead protection and hoarding requirements, roof anchorage testing reports, and building fire evacuation plans.

2 PRODUCTS

2.01 Not Used

- .1 Not Used.

3 EXECUTION

3.01 EXAMINATION

- .1 Conduct a site visit to examine existing site conditions in accordance with Section 01 71 00 - Examination and Preparation.
- .2 Before Work starts verify existing Site and building(s) conditions.

3.02 VERIFICATION OF CONDITIONS

- .1 Assess any on-Site unknown conditions observed through Site walk-through and discuss with HWDSB should any extra work be required beyond the Contract scope of work.
- .2 Notify HWDSB should any extra work beyond the scope of work under this Contract be required, due to hidden and unknown conditions observed upon Contractor Site observation.
 - .1 Do not proceed with any extra work without obtaining HWDSB written approval.
- .3 Contractor to verify and compare the current conditions of each of the following Site components:
 - .1 Current Site conditions, including: driveways, parking lots, sidewalks, fencing, handrails, exterior stairs, retaining walls, planting and landscaping.
 - .2 Building Structure: walls, columns, floor slabs.
 - .3 Building Exteriors: exterior walls, windows, cladding, caulking, sealants.
 - .4 Building Interior: walls, floors, ceilings, equipment, painting.
 - .5 Electrical Systems: distribution panels, transformers, door systems, fans.

- .6 Lighting Systems: emergency lighting, exterior lighting system, interior lighting systems.
- .7 Mechanical Systems: heating and cooling, ventilation, exhaust, air-conditioning.
- .8 Plumbing Systems: plumbing fixtures, domestic water supply and distribution, sanitary waste sewer, stormwater sewer, roof drains.
- .9 Fire Protection Systems: fire alarm, sprinklers.

3.03 PROTECTION OF IN-PLACE CONDITIONS

- .1 Provide in-place protection should the current verified Site conditions be considered unsafe in accordance with the requirements of the Site specific Health and Safety Plan, and to protect on-Site personnel and ensure Site safety during all times of work execution.
- .2 Handle, store and dispose flammable materials on site in a safe manner in accordance with NFC (2020) requirements
- .3 Notify HWDSB of any identified potential risks due to onsite obstacles.
 - .1 Do not remove any obstacles before obtaining HWDSB written approval.

END OF SECTION

I GENERAL

I.01 SUMMARY

- .1 Section Includes:
 - .1 Demolition and disposal of select building items.
 - .2 Removal and reinstallation of select building items.
 - .3 Removal and turning over to the HWDSB, of select building.
 - .4 Repair and restoration work after completion of work of this Section.
- .1 Refer to Designated Substance Audit report prepared by MTE CONSULTANTS INC. before proceeding with demolition and renovation Work.

I.02 RELATED REQUIREMENTS

- .1 Section 02 82 00 – Asbestos Abatement.

I.03 DEFINITIONS

- .1 Hazardous Materials: Products, mixtures, materials, or substances classified as physical hazards or health hazards in accordance with Schedule 2 of the Hazardous Products Act.

I.04 REFERENCE STANDARDS

- .1 CSA Group (CSA):
 - .1 CSA Z783:12, Deconstruction of Buildings and Their Related Parts
- .2 Department of Justice Canada:
 - .1 Hazardous Products Act

I.05 ADMINISTRATIVE REQUIREMENTS

- .1 Coordinate work of this Section with:
 - .1 Refer to Designated Substance Audit report prepared by MTE CONSULTANTS INC.
 - .2 Section 25 05 05 Selective Demolition for Electrical
- .2 Pre-Demolition Meetings: Conduct site meeting in accordance with Section 01 31 19 – Project Meetings and attended by the HWDSB and related Subcontractors to:
 - .1 Verify project requirements, including existing construction conditions affected by work of this Section, scope of selective demolition work, demolition sequencing, and protection of in-place conditions.
 - .2 Review scheduling of utility disruptions that may affect building occupants.
 - .3 Coordinate with other Subcontractors.
- .3 Scheduling:
 - .1 Maintain project schedule without compromising specified minimum material diversion rates.
 - .2 Notify the HWDSB of unforeseen delays, in writing.

I.06 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures. Refer to HWDSB front end document.
- .2 Submit the following action submittals before starting work of this Section:
 - .1 Schedule of Demolition Activities: in accordance with Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart.
- .3 Submit the following when requested by the HWDSB:
 - .1 Qualification statements: Information about companies and personnel indicating their experience and capabilities to perform demolition work; include lists of completed projects with project names and addresses, and names and addresses of consultants for work of similar complexity and extent.
- .5 Submit soft copies of the following, when required by the authority having jurisdiction:
 - .1 reviewed shop drawings;
 - .2 reviewed demolition procedures.

I.07 QUALITY ASSURANCE

- .1 Licensed Professional Qualifications: In accordance with Section 01 43 00 – Quality Assurance.

I.08 SITE CONDITIONS

- .1 Hazardous Materials are listed in DSA report completed by MTE CONSULTANTS INC.. Contractor to review report and account to remediation.
- .2 Review the hazardous materials assessment in accordance with Section 00 31 00 – Available Project Information.
- .3 Stop work immediately and take preventative measures if material resembling spray- or trowel-applied asbestos or other Hazardous Materials are encountered.
 - .1 Notify the HWDSB immediately.
 - .2 Proceed with Work after receipt of written instructions from the HWDSB.

2 PRODUCTS

2.01 MATERIAL OWNERSHIP

- .1 Coordinate material ownership with the HWDSB
 - .1 The Owner will retain ownership of:
 - .1 items to remain;
 - .2 items to be re-used;
 - .3 items to be re-installed;
 - .4 items to be removed and turned over to the HWDSB
 - .5 historic items, relics, and similar objects;
 - .6 cornerstones and their contents;
 - .7 commemorative plaques and tablets;
 - .8 antiques;

- .9 other items of interest or value to the Owner that may be encountered during demolition.
- .2 Take possession of demolished materials and remove from site.

2.02 REPAIR MATERIALS

- .1 Use repair materials identical to existing materials.
 - .1 If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces as closely as possible.
 - .2 Use materials whose installed performance equals or surpasses that of existing materials.

3 EXECUTION

3.01 EXAMINATION

- .1 Review existing conditions and coordinate with indicated requirements to determine extent of demolition required.
- .2 Review record documents of existing facility available from the HWDSB.
- .3 The HWDSB does not guarantee record documents are accurate, complete, or appropriate.
- .4 Inventory and record the condition of items being removed and turned over to HWDSB. Promptly submit a written report to the HWDSB.
- .5 When unforeseen structural, mechanical, electrical, or other issues are encountered that interfere with demolition or removal, investigate and measure the nature and extent of the interference.
- .6 Promptly submit a written report to the HWDSB.
- .7 Perform an engineering review of building conditions to determine whether removing any element might result in structural deficiency, deformation, or unplanned collapse of any portion of the building or structure, or adjacent buildings or structures, during demolition operations.
- .8 Verify Hazardous Materials have been abated or remediated before proceeding with work of this Section.

3.02 PREPARATION

- .1 Protection of In-Place Conditions:
 - .1 Use methods, certified by a qualified licensed professional to prevent movement, settlement, or damage to adjacent properties and buildings, landscaping to remain in place. Provide temporary bracing and shoring as required.
 - .2 Minimize noise, dust, vibration, and inconvenience to occupants in accordance with Section 01 14 00 – Work Restrictions. Provide temporary negative air pressure in demolition areas relative to adjacent occupied areas.
 - .3 Protect building systems, utilities, equipment, landscaping, and other items to remain.
 - .4 Provide temporary dust screens, covers, railings, supports, and other protection in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.
 - .5 Protect interior items exposed to the weather.
 - .6 Maintain access to egress, walkways, corridors, exits, and other adjacent occupied or partially-occupied facilities, unless approved, in writing.

- .1 Submit copy of written approval.

3.03 DEMOLITION AND REMOVAL REQUIREMENTS

- .1 Demolish or remove select building items in accordance with CSA Z783.

3.04 DEMOLITION

- .1 Demolish items as indicated on the Drawings.
- .2 Contractor to confirm what washroom accessories are to be handed over to HWDSB.

3.05 REMOVE AND REINSTALL

- .1 Remove items indicated on the Drawings.
- .2 Examine removed items. HWDSB's acceptance required for reinstallation if removed items appear in poor condition.
- .3 Temporarily store, protect, and prepare removed items for re-use.
- .4 Reinstall removed items as indicated on the Drawings.

3.06 REMOVE AND SALVAGE

- .1 Remove items indicated on the Drawings.
- .2 Store and protect removed items where acceptable to HWDSB.

3.07 REPAIRS AND RESTORATION

- .1 Promptly repair damage to adjacent construction caused by work of this Section. Patch existing surfaces to make suitable for new materials.
- .2 Restore exposed finishes on patched surfaces. Extend restoration to adjoining construction to eliminate evidence of patching and refinishing.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Read this section in conjunction with all other sections so as to conform to Division 1, and the General Requirements of the project.
- .2 Inform all sub-trades of the presence of Asbestos Containing Materials identified in the documents.
- .3 The Contractor involved directly or indirectly with the removal, handling, management, transportation and disposal of Asbestos Containing Materials and Asbestos Waste in any and all aspects shall take all reasonable precautions, due care and diligence to prevent asbestos from becoming airborne and shall take all reasonable precautions to control and prevent the spread of airborne asbestos in the event of an incident, accidental release or loss of containment. Cost of additional work by the Contractor and/or Consultant to rectify unsatisfactory conditions, shall be charged to the Contractor.
- .4 No allowance will be made for any difficulties encountered or any expenses incurred on account of any conditions of the site or any item existing thereon that is visible or known or can be reasonably anticipated.
- .5 The Contractor shall be prepared to respond throughout the duration of the project in order to repair, encapsulate remove or otherwise manage additional asbestos as required. The abatement contractor shall provide an emergency contact phone number and be on call to provide emergency services.
- .6 The abatement contractor shall control all water migration (including leakage and spillage) from the abatement work area to areas below/adjacent. It is the responsibility of the contractor to protect all items from damage caused by water used in the abatement work area(s). The abatement contractor must immediately mitigate any and all damage to the satisfaction of the owner and Consultant resulting from water used in the abatement work area(s) at their own expense. No allowances shall be made as a result of lost time, resources, materials or equipment.
- .7 It is the Contractor's responsibility to ensure all construction aspects of the project are conducted in accordance with applicable construction safety legislation, regulations and general approved practice. This includes, but is not limited to; all means, methods, techniques, sequences, procedures, safety programs and precautions used.

1.2 DEFINITIONS

- .1 Asbestos Containing Material: Materials that contain 0.5 percent or more asbestos by dry weight.
- .2 Asbestos Waste: is material that contains asbestos in more than a trivial amount or proportion as defined by Ontario Regulation 347 as amended by Ontario Regulation 558/00 and includes the following:
 - .1 Solid or liquid waste that results from the removal of asbestos-containing construction or insulation materials and contains asbestos;
 - .2 Commercial waste and/or domestic waste that contains asbestos;

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- .3 Non-hazardous solid industrial waste that contains asbestos; and
- .4 Materials determined or deemed contaminated with asbestos.
- .3 Authorized Visitors: The Consultant or their representative, Architect, Owner's representatives, and persons representing regulatory agencies.
- .4 Contractor: Contractors or Sub-Contractor performing work included in this specification.
- .5 Consultant: Owner's Representative providing inspection and air monitoring.

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Contact: Gavin Oakes Cell: 905-719-5217

PART 2 – SCOPE OF WORK

2.1 SUMMARY OF MATERIALS

- .1 Refer to the following documents regarding Designated Substances within the work areas. The survey and documentation of Designated Substances is required by Section 30 of the Occupational Health and Safety Act and shall be read in conjunction with these specifications.
 - .1 "Bennetto Street Elementary School, Accessibility Project, Designated Substance Audit Report – 47 Simcoe Street East, Hamilton, ON" dated November 29, 2024 prepared by MTE Consultants Inc.
 - .2 Removal and/or disturbance of asbestos-containing materials shall be performed in accordance with Ontario Regulation 278/05 – Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations.
 - .3 Removal and/or disturbance of lead-containing materials shall be performed in accordance with the Environmental Abatement Council of Canada's Lead Guideline for Construction, Renovation, Maintenance and Repair (2014)
 - .4 Removal and/or disturbance of mercury-containing materials shall be performed in a manner which maintains the mercury intact, with no on-site crushing. Following removal, mercury-containing materials shall be safely stored on-Site until the Contractor can safely dispose of the materials at a licensed landfill.
 - .5 Removal and/or disturbance of silica-containing materials shall be performed in accordance with the Ministry of Labour's Guideline Silica on Construction Projects.
 - .6 Suspect PCB-containing equipment, including light ballasts, shall be assessed upon removal from service to determine PCB content. If identified as PCB-containing, equipment shall be appropriately stored and disposed of by the Contractor in accordance with SOR 2008-273 - PCB Regulations.
- .2 ACM may be present in concealed locations and become apparent during construction, renovation, alteration, or maintenance activities. Should any suspect ACM be discovered during the course of regular construction, renovation, alteration, or maintenance activities,

work should cease and the materials should not be disturbed. Suspect ACM must be treated as asbestos-containing or sampled and proven to not contain asbestos. Any activities that require disturbance of ACM must be performed in accordance with Ontario Regulation 278/05. It is the responsibility of the constructor to provide supervision and training and undertake due care and diligence in situations where such discoveries can and would occur.

- .3 Upon discovery of suspect or known ACM not identified or referred to in Section 2.0 or the reports referenced, the constructor shall immediately notify, orally and in writing; an inspector at the office of the Ministry of Labour nearest the workplace, the owner/representative, the Contractor and the joint health and safety committee or the health and safety representative, if any, for the workplace. The written notice shall include the following:
 - .1 The name and address of the person giving the notice;
 - .2 The name and address of the owner of the place where the work will be carried out;
 - .3 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;
 - .4 A description of the work that will be carried out;
 - .5 The starting date of the work that will be carried out; and
 - .6 The name and address of the supervisor in charge of the work.
- .4 No work that is likely to involve handling, dealing with or disturbing or removing the discovered materials shall be done unless it has been determined whether the material is asbestos-containing; or, the work is performed in accordance to Ontario Regulation 278/05 as though the materials were asbestos-containing materials and, in the case of sprayed-on friable material, as though it contained a type of asbestos other than Chrysotile.

2.2 SUMMARY OF MATERIALS

- .1 Where required to complete the scope of the proposed renovations, disturbance of Asbestos-Containing Materials shall be performed as follows, in accordance with Ontario Regulation 278/05:

Location	ACM	Asbestos Operation	Notes
Room 102	Mastic Associated with 12" x 12" Vinyl Floor Tiles Grey with Brown Fleck **Although the tiles are non- asbestos, separation from the underlying mastic is not possible. Removal and disposal of the tiles should also be performed as though they are asbestos- containing	Type 1	Removal using non-powered hand tools in conjunction with dust suppression or chemical mastic remover
		Type 2	Removal using power tools with HEPA-attachment

2.3 SCHEDULING

- .1 The Contractor shall schedule and perform work in accordance with the Contract Time established in the agreement.

2.4 INSPECTION

- .1 From project set-up to completion of clean-up, the Asbestos Abatement Consultant will be present on both the inside and outside of the work area.
- .2 Inspections will be conducted to confirm the Contractor's compliance. Failure to comply with the specified requirements may result in a stoppage of work at no additional cost to the Owner.
- .3 Promptly notify the Consultant of any ACM or potential ACM discovered during the work and not apparent in the audit, specifications or site meeting(s). DO NOT disturb such material until given direction by the Consultant. Assume such material to contain asbestos of a type other than Chrysotile until proven otherwise. Failure to notify the Consultant of ACM prior to removal will result in the dispute of payment of fees for any extra work performed.
- .4 The following inspections will be conducted at the Owner's cost. Provide Consultant with minimum of 24 Hours verbal notice:
 - .1 Pre Start Inspection: conducted after completion of work area set-up and prior to start of contaminated work.
 - .2 Contaminated Work Inspections: inspections and routine monitoring of the abatement will be conducted for the duration of the work.
 - .3 Final Inspection: conducted after removal of all ACM, and application of lockdown agent to confirm cleanliness. Additional labour or materials expended by the Asbestos Abatement Contractor to provide satisfactory performance to the level specified shall be at no additional cost.

2.5 SUBMITTALS

- .1 Submit to the Consultant upon request:
 - .1 AAW and AAS certification and relevant training for all workers/supervisors on-site and involved in the project.
 - .2 Names, credentials and contact information of Site superintendent and shift supervisors.
 - .3 All necessary permits, certificates, and documents for all aspects of the work to be completed.
 - .4 Ministry of Labour Notice of Project if applicable.
 - .5 Certificate of Approval for transportation of asbestos waste.
 - .6 Negative air unit performance leak tests.
 - .7 HEPA/P100 filtered vacuum performance leak tests.
 - .8 Any and all proposed changes, alterations, deviations intended to be made in scope, procedures and/or measures from these specifications or associated regulations, guidelines and standards.
- .2 The contractor shall have all asbestos waste transported under a current and valid Certificate of Approval or Provisional Certificate of Approval that specifically authorizes the transportation of asbestos waste in bulk. A copy of the Certificate of Approval will be maintained on-site and within the transport vehicle(s) and will be provided to the Consultant upon request.

2.6 PERMITS AND REGULATIONS

- .1 Comply with all federal, provincial and local requirements, Regulations and Acts as well as client/owner corporate policies and procedures pertaining to asbestos and health and safety, provided that in any case of conflict among these requirements or with these specifications the more stringent requirements shall apply.
- .2 Comply will all aspects of the Occupational Health and Safety Act Revised Statues of Ontario, 2005.
- .3 Comply with Ontario Regulation 278/05 "Asbestos on Construction Projects and in Buildings and Repair Operations", made under the Occupational Health and Safety Act.
- .4 Comply with "Handling, Transportation and Disposal of Asbestos Waste' in accordance with Ontario Regulation 347 as amended by Ontario Regulation 558/00, under the Environmental Protection Act (General-Waste Management), June 1992.
- .5 Before varying a measure or procedure described in Ontario Regulation 278/05, or these specifications, the contractor/constructor must ensure that the varied measure(s) and/or procedure(s), affords protection for the health and safety of workers and building occupants that is at least equal to the protection that would be provided by complying with Ontario Regulation 278/05. Written notice of the varied measure(s) and/or procedure(s) shall be given in advance to the joint health and safety committee and safety representative, if any,

for the workplace. Such notice shall also be provided to the Consultant.

2.7 INSTRUCTION AND TRAINING

- .1 It shall be the responsibility of the Constructor to inform all workers involved in this project of the hazards in regard to the work to be performed and ensure appropriate training has been provided to all workers.
- .2 Every worker shall be properly trained in accordance with Section 19 of Ontario Regulation 278/05 in the removal/management of asbestos as a Type 1, Type 2 and Type 3 Operation and have had instruction and training in:
 - .1 Asbestos awareness;
 - .2 The hazards of asbestos exposure;
 - .3 Personal hygiene and work practices;
 - .4 The use, cleaning, maintenance, selection and disposal of respirators and protective clothing; and
 - .5 The measures and procedures prescribed by Ontario Regulation 278/05.
- .3 Instruction and training related to personal protective equipment and hygiene shall include but shall not necessarily be limited to:
 - .1 Limitations of the equipment;
 - .2 Inspection and maintenance of the equipment;
 - .3 Fitting of the equipment; and
 - .4 Disinfecting and decontamination of the equipment.
- .4 The abatement contractor shall ensure that every worker/supervisor involved in a Type 3 operation meets the training and certification requirements of Section 20 of Ontario Regulation 278/05.

2.8 WORKER PROTECTION

- .1 All personal protective equipment shall be used and maintained in accordance to the manufactures specifications and/or federal, provincial, local regulations and Acts and any corporate policies and procedures.
- .2 All Personal protective equipment shall be of a nature that can be readily and effectively decontaminated or shall be of a disposable type.
- .3 Damaged, deteriorated or defective personal protective equipment shall be repaired or replaced immediately and the worker shall not continue with their duties until such damages, deterioration or defects have been corrected.
- .4 All personal protective equipment shall be durable enough and otherwise suitable to withstand the nature of the work being performed and the environmental conditions present within the work area(s).

- .5 The contractor shall provide all workers with personally issued respirators suitable for protection against asbestos and acceptable to the Ministry of Labour.
- .6 It shall be the responsibility of the contractor/constructor to ensure that all procedures for the use of respiratory equipment in accordance with Ontario Regulation 278/05 and manufacturers requirements are complied with. This shall include but shall not necessarily be limited to:
 - .1 The worker being physically able to perform the required duties while wearing the respirator;
 - .2 Respirators must be fit checked by qualitative or quantitative fit testing. Instruction must be provided as defined by the Occupational Health and safety Act;
 - .3 Air purifying respirators will be equipped with Ministry of Labour and NIOSH approved N 100, P 100, R 100 or HEPA hard exterior cassette style filters and shall be fitted so that an effective seal exists between the respirator and the workers face;
 - .4 Supplied air respirators will have supply air meet the Canadian Standards Association (CSA) standard Z180.1-00, Compressed Breathing Air and Systems (March 2000);
 - .5 Cleaning and disinfecting of respirator(s) after each use or more often if needed;
 - .6 Inspection of respirator(s) and/or respiratory equipment before each use;
 - .7 The proper storage in a clean, dry and sanitary location when respirator(s) are not in use; and
 - .8 The development of written procedures regarding selection, use and care of respirators.
- .7 Protective Clothing: The contractor shall provide every worker who enters the work area with disposable coveralls and gloves which:
 - .1 Shall be made of a material that does not readily retain nor permit the penetration of asbestos fibres;
 - .2 Shall consist of head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garment and skin under the protective clothing;
 - .3 Shall include suitable footwear; and
 - .4 Shall be repaired or replaced if torn or damaged.
- .8 The contractor shall provide worker(s) with Canadian Standards Association approved head, hearing and foot protection for the work being performed and as required by applicable construction safety regulations.

2.9 AUTHORIZED VISITOR PROTECTION

- .1 The contractor shall provide all prescribed personal protective equipment to authorized visitors to the work area(s).
- .2 Ensure authorized visitors have received required training prior to entry to the work areas.
- .3 Instruct authorized visitors in all relevant procedures to be followed while in and around the work area(s).

PART 3 - APPROVED PRODUCTS

3.1 MATERIALS AND EQUIPMENT

- .1 Amended Water: Water with a surfactant agent added to reduce water tension for thorough wetting of fibres.
- .2 Decontamination Shower: For the purpose of worker decontamination, a portable self-contained shower equipped with the following shall be utilized:
 - .1 Hot and cold water connections;
 - .2 Interior hot and cold fixtures that can be controlled by the person using the shower; or provide a constant water temperature of not less the 40 Celsius but not greater 50 Celsius;
 - .3 A containment basin of sufficient capacity to collect and contain the quantity of water required for at least one worker to properly decontaminate; and
 - .4 Shall be supplied with soap and clean towels.
- .3 Drop Sheets: Fire retardant Polyethylene: 0.15mm (6mil) minimum thickness or Fire retardant Fibre Reinforced (FR) polyethylene: 0.15mm (6mil) minimum thickness. New Materials Only.
- .4 Exhausted Ducting: For use with Negative Air Unit(s) shall be flexible reinforced heavy duty type duct and be free of tears, punctures and damage and be otherwise suitable for the conditions of the work area(s). The cross sectional area of the ducting shall be maintained during the operation of the Negative Air Unit(s). And reasonable care shall be taken to ensure the ducting does not become damaged.
- .5 Micronic Water Filter: Shall be used to filter contaminated water that is to be discharged to local sanitary sewers. Contaminated water includes but is not necessarily limited to wash down water and decontamination shower water. The filter shall be equipped with a secondary 5 micrometer filter. As an alternative to filtration, contaminated water may be collected in appropriate waste containers for off-site disposal.
- .6 Negative Air Units: Shall be equipped with HEPA/P100 filters and shall have performance leak testing to verify efficiency of filters. Copies of filter tests shall be provided to the consultant upon request.
- .7 Power Tools: Used in the cutting, grinding, drilling, abrading, sanding, vibrating or removal

of Asbestos Containing Material, as a Type 2 Operation, shall be equipped with an effective dust collection device with a HEPA/P100 filtration system capable of capturing all debris and dust generated by the tool. All tools and assemblies of dust collection and filtration equipment will be subject to approval and testing by the Consultant as seen fit prior to use.

- .8 Pressure Differential Measuring Device: Shall be capable of measuring pressure differential of 0.02 inches of water column and shall otherwise measure pressure differential in an appropriate range and interval. The device shall be dedicated to the site/work area, properly calibrated, installed and maintained throughout the duration of work to measure pressure differential between the enclosed removal area and the occupied area and shall be acceptable to the consultant. Daily records shall be kept by the contractor, on site, and made available to the consultant.
- .9 Sealant: A suitable water based post-removal sealer appropriate for the lock-down and sealing of asbestos fibres to polyethylene sheeting and cleaned substrate.
- .10 Sprayer(s): Shall be capable of delivering low velocity mist pattern spray of Amended water or sealant. Sprayers may be hand held reservoir type or powered airless units.
- .11 Surfactant: A commercial or industrial agent that when added to potable water reduces surface tension.
- .12 Tape: Shall be able to create and maintain a suitable seal on polyethylene and other materials within the work area under both wet and dry conditions and ambient temperatures for the duration of the work being performed and shall otherwise be suitable for the work being performed.
- .13 Waste Containers: Waste shall be contained in two overlying dust tight containers impervious to asbestos fibres. The outer container shall be a minimum of 0.15mm (6mil.) thick sealable polyethylene waste bag.
 - .1 Should the waste material include sharp objects/materials, the inner container shall be a sealable metal, cardboard, fibre or plastic type suitable to resist puncturing of the containers;
 - .2 Containers shall be cleaned with a damp cloth or vacuum equipped with a HEPA filter immediately before being removed from the work area;
 - .3 Outer waste containers shall have a pre-printed cautionary asbestos warning identifying it as asbestos waste in both official languages clearly visible and legible in a colour which contrasts with the background on which it is printed; and,
 - .4 Be otherwise suited for the waste being contained.
- .14 Vacuums: Shall be equipped with HEPA/P100 filters and shall have performance leak testing to verify efficiency of filters. Copies of filter tests shall be provided to the consultant upon request.

3.2 SIGNAGE AND PLACARDS

- .1 Before beginning work, post a sufficient number of signs at each entrance/exit to the work area(s) warning of asbestos hazards and restricting access to authorized persons wearing personal protective equipment.

- .2 On both sides of all containers and vehicles used in the transport of asbestos waste in large easily legible letters of a minimum of ten centimetres (10cm) in height which contrast in colour with the background of the container or vehicle the following words shall be clearly displayed:
 - .1 CAUTION: CONTAINED ASBESTOS FIBRES; Avoid Creating Dust and Spillage; and,
 - .2 Asbestos May be Harmful to Your Health; Wear Approved Protective Equipment.

PART 4 - EXECUTION

4.1 GENERAL REQUIREMENTS – ALL PROCEDURES

- .1 Before beginning work, post at each entrance/exit to the work area(s) a sufficient number of signs warning of asbestos hazards and restricting access to authorized persons wearing personal protective equipment.
- .2 Eating, drinking, chewing or smoking shall not be permitted in the work area.
- .3 Where wet removals are to take place de-energize and disable with proper lock-out tag-out procedures electrical systems.
- .4 Temporary electrical distribution systems equipped with Ground Fault Circuit Interrupters (GFCI) shall be supplied and used by the Contractor during wet removals.
- .5 Remove all items from the work area(s). If items are affixed or otherwise cannot be removed from the work area(s), ensure that they are pre-cleaned using a HEPA/P100 filtered vacuum or damp wiping and completely covered and sealed with polyethylene sheeting and otherwise adequately protected.
- .6 Before commencing with work, disable and seal all ventilation to and from the work area and ensure ventilation remains disabled throughout the duration of activities. Seal any and all openings within the work area(s).
- .7 Removal of Asbestos Containing Materials shall commence only after set-up is complete.
- .8 Frequently and at regular intervals during the Work and immediately upon completion of the work clean up and place all asbestos dust, debris and waste in approved waste containers.
- .9 Prevent the spread of dust from the Work Area.
- .10 At completion of Work or at the end of the work day, remove from work area(s) all asbestos waste and in accordance with requirements of Ontario Regulations and these specifications dispose of asbestos waste off-site.

4.2 EXECUTION OF TYPE 1 OPERATION

- .1 Set-Up
 - .1 Ensure adequate signage is posted restricting access to the work area to

authorized personnel.

- .2 Prevent the spread of dust from the work area using measures appropriate to the work to be done. Use single layer rip proof polyethylene drop sheets. In areas with carpeted or textured floors which cannot be readily cleaned use double layer rip proof polyethylene over flooring in work area(s).
- .3 Provide facilities for washing hands and face.
- .4 Allow for inspection by the Consultant to confirm that set-up is sufficient prior to the start of work.

.2 Asbestos Removal

- .1 If a worker requests, the contractor shall supply a respirator in accordance with Ontario Regulation 278/05 Table 2 requirements, suitable for protection against asbestos and protective coveralls and the worker shall wear the respirator and coveralls.
- .2 Perform removal of ACM in a manner to reduce dust creation to lowest level practicable by:
 - Dust and waste shall not be permitted to fall freely from one work level to another
 - Use of hand tools only for the removal of ACM
 - Careful removal of ACM
 - Continual wetting of Asbestos Containing Materials throughout the work
 - Placing removed asbestos waste directly into approved waste containers
- .3 All workers shall proceed to washing facilities and wash hands and face before leaving the work area.

.3 Clean-Up

- .1 After completion of the removal; perform final thorough cleanup of polyethylene, barriers, drop sheets, tools, equipment, items, work area(s) and adjacent areas using HEPA/P100 filtered vacuum or damp wiping methods. Ensuring work area(s) and all items within the work area(s) are clean of visible asbestos dust, debris and waste. Place and seal asbestos dust debris and waste in approved waste containers.
- .2 Where a chemical mastic remover is used, ensure that surfaces are properly degreased to prevent impacts to the installation of new finishes.
- .3 Allow for inspection by Consultant to determine abatement is complete and an acceptable level of cleanliness prior to application of sealant.
- .4 Wet and fold polyethylene drop sheets and barriers in a manner which contains asbestos dust, debris and waste, place and seal in approved waste containers.
- .5 If Personal Protective Equipment was requested and used by the worker prior to leaving the work area(s) clean all asbestos dust, debris and waste from clothing and personal protective equipment (PPE). Remove and place disposable PPE in approved waste container.

- .6 Immediately before their removal from the work area, clean each filled waste container using HEPA/P100 filtered vacuum and place and seal in a secondary clean waste container.

4.3 EXECUTION OF TYPE 2 OPERATION

.1 Set-Up

- .1 Construct an enclosure using polyethylene sheeting that extends from floor to ceiling and encompasses the entire work area where asbestos containing materials will be removed or encapsulated. The enclosure shall include the following:
- Double flap weighted air lock doors at all entrances, exits and doorways of the enclosure and rooms within the enclosure;
 - Transparent windows for inspection purposes from outside the enclosure area;
 - Sealed edges of the entire enclosure using tape or other suitable methods; and
 - Ensure all edges of enclosure are securely fixed.
- .2 Construct a decontamination facility as close as practicable to the work area which shall include the following:
- A room suitable for changing into protective clothing and for storing contaminated protective clothing and equipment; and,
 - A room suitable for changing into street clothes and for storing clean clothing and equipment.
- .3 Arrange configuration of the above-mentioned rooms so that (a) person(s) entering/exiting the work area must pass through each room in the correct order.
- .4 Allow for inspection by the Consultant to confirm that set-up is sufficient prior to the start of work.

.2 Asbestos Removal

- .1 Workers entering the work area shall don all appropriate personal protective equipment including coveralls and respiratory protection prior to entering the work area.
- .2 Before commencing with work and at the beginning and end of each work shift and at a minimum of at least once per day the enclosure shall be inspected for any defects or deficiencies.
- .3 Any defects or deficiencies observed shall be repaired forthwith and no work other than such repairs shall be conducted until repair activities are completed
- .4 Other than loose material which is pulverized, crumbled and or powdered and shall be removed by HEPA/P100 filtered vacuum, Asbestos Containing Materials to be removed or disturbed shall be thoroughly wetted with Amended Water before and during work unless wetting creates a hazard or causes damage.
- .5 Perform removal of ACM in a manner to reduce dust creation to lowest level practicable by:

- Dust and waste shall not be permitted to fall freely from one work level to another;
 - Use of hand tools only for the removal of ACM;
 - Careful removal of ACM;
 - Continual wetting of Asbestos Containing Materials throughout the work; and
 - Placing removed asbestos waste directly into approved waste containers.
- .6 All workers shall proceed to the washing facilities while wearing respirator and shall wash hands and face before leaving the work area.
- .3 Clean-Up
- .1 After completion of the removal; perform final thorough cleanup of polyethylene, barriers, tools, equipment, items, work area(s) and adjacent areas using HEPA/P100 filtered vacuum or damp wiping methods. Ensuring work area(s) and all items within the work area(s) are clean of visible asbestos dust, debris and waste. Place and seal all asbestos dust debris and waste in approved waste containers.
- .2 Allow for inspection by Consultant to determine abatement is complete and an acceptable level of cleanliness prior to application of sealant.
- .3 Apply sealant to all vertical and horizontal surfaces, enclosures, drop sheets and items within the enclosure. Allow sufficient time for sealant to dry.
- .4 Wet and fold polyethylene and barriers in a manner which contains asbestos dust, debris and waste, place and seal in approved waste containers.
- .5 Prior to leaving the work area(s) workers shall clean all asbestos dust, debris and waste from Personal Protective Clothing Using HEPA/P100 filtered vacuum or damp wipe methods prior to removing the clothing. Remove and place disposable Personal Protective Clothing in approved waste containers.
- .6 Immediately before their removal from the work area, clean each filled waste container using HEPA/P100 filtered vacuum and place and seal in a secondary clean waste container.

END

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 04 05 13 - Masonry Mortaring and Grouting
- .2 Section 04 22 00 – Concrete Unit Masonry
- .3 Section 07 84 00 – Firestopping
- .4 Section 07 92 00 – Joint Sealants

I.02 REFERENCE STANDARDS

- .1 CSA Group (CSA):
 - .1 CSA A165 Series, CSA Standards on concrete masonry units
 - .2 CAN/CSA-A179, Mortar and Grout for Unit Masonry
 - .3 CAN/CSA-A371, Masonry Construction for Buildings

I.03 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate with Section 04 05 13 – Masonry Mortaring and Grouting, Section 04 05 19
 - .2 Coordinate with Section 07 84 00 – Firestopping for through penetration firestopping systems
 - .3 Coordinate with the Sections described in Part 2.
- .2 Pre-Installation Meetings: Conduct a meeting in accordance with Section 01 31 19 - Project Meetings a minimum one week before beginning masonry installation to:
 - .1 Verify Project requirements, including mock-up requirements and mock-up location.
 - .2 Verify minimum acceptable substrate conditions, established during review of mock-up, required for performance of work.
 - .3 Coordinate products and installation methods.
 - .4 Coordinate mortar and grout testing.
 - .5 Sequence work of related Sections.
 - .6 Coordinate lines, levels, and coursing with other affected Subcontractors
 - .7 Obtain items to be built-in before beginning masonry work.
 - .8 Review manufacturer’s installation instructions.
 - .9 Review masonry cutting tools, methods, and temporary barriers and review Owner’s safety and protection requirements from dust during cutting operations.
 - .10 Review methods to prevent excess mortar from entering cavity space, and method for removing excess mortar from cavity space.
 - .11 Review methods for controlling efflorescence during construction.
 - .12 Review warranty requirements.
- .3 Scheduling: Schedule with other work in accordance with 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Masonry sizes. Details of reinforcing bars, including wall elevations. Locations of weep holes and vents.
 - .2 Components in fire-rated masonry assemblies, including ULC listings.
- .3 Submit the following information submittals as work progresses:
 - .1 Test and Evaluation Reports:
 - .1 Submit certified test reports.
 - .2 Test reports to certify compliance of masonry units with specified performance characteristics and physical properties.
 - .3 Submit data for masonry units, in addition to requirements set out in referenced CSA and ASTM Standards, indicating initial rates of absorption.
 - .2 Manufacturers' Instructions: Indicate special storage and handling requirements, installation instructions and sequence, and cleaning procedures. Keep a copy onsite during installation.

I.05 QUALITY ASSURANCE

- .1 Mock-ups:
 - .1 Assemble mock-up in accordance with Section 01 43 00 - Quality Assurance.
 - .2 Assemble panel of exterior masonry wall construction 1200 x 1800 mm, demonstrating masonry unit colours, colour blending of masonry units where units are subject to colour variations and textures, use of reinforcement, connectors, ties, through-wall flashing, weep holes, tooling of joints, coursing, pointing, mortar, joint sealant, and installation tolerances.
 - .1 Irregularity in mortar joints: Not visible when viewed from a distance of 6 m or more.
 - .3 HWDSB and JASON FUNG ARCHITECT INC. will require a minimum 48 hours to review the mock-up.
 - .4 After initial review of mock-up, clean half of mock-up with proposed efflorescence cleaning method(s).

I.06 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements, CAN/CSA-A179, and CAN/CSA-A371.
- .2 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors in a clean area, and in accordance with manufacturer's recommendations.
 - .2 Keep materials dry until use, except where wetting of bricks or blocks is specified.
 - .3 Deliver and handle masonry units to avoid chipping and staining.
 - .4 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

I.07 SITE CONDITIONS

- .1 Ambient Conditions: Assemble and install components when temperatures are above 4°C.
 - .1 Cold weather protection and construction requirements: To CAN/CSA-A371 and:
 - .1 Maintain temperature of mortar between 4°C and 50°C until batch is used or becomes stable.
 - .2 Maintain ambient temperature of masonry work and its constituent materials between 4°C and 50°C and protect area of work from windchill.
 - .3 Maintain temperature of masonry above 0°C for a minimum of 28 days after mortar is installed.
 - .4 Preheat unheated wall sections in enclosure to above 10°C for a minimum 72 hours before applying mortar.

1.08 WARRANTY

- .1 For work in this Section, 12 months warranty period is extended to 24 months.

2 PRODUCTS

2.01 MATERIALS

- .1 Masonry materials are specified in the following Sections:
 - .1 Section 04 22 00 – Concrete Unit Masonry
 - .2 Section 04 05 13 - Masonry Mortaring and Grouting
 - .3 Section 07 92 00 – Joint Sealants

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: Perform in accordance with Section 01 71 00 – Examination and Preparation.
 - .1 Site conditions are acceptable, can be maintained, and areas are ready to receive work.
 - .2 Built-in items are in proper location, and ready for roughing into masonry work.
 - .3 Examine openings to receive masonry infill units. Verify opening sizes, locations, and that openings are square, plumb, and ready to receive work.
 - .4 Commencing installation means acceptance of in place substrates.

3.02 PREPARATION

- .1 Surface Preparation: Prepare surface in accordance with Section 01 71 00 - Examination and Preparation and manufacturer's written recommendations.
- .2 Establish and protect lines, levels, and coursing.
- .3 Protect adjacent materials from damage and disfiguration.

3.03 INSTALLATION

- .1 Perform masonry work in accordance with CAN/CSA-A371 except where specified otherwise.

- .2 Build masonry plumb, level, and true to line, with vertical joints in alignment, respecting construction tolerances permitted by CAN/CSA-A371.
- .3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.
- .4 Exposed Masonry:
 - .1 Remove chipped, cracked, and otherwise damaged units in exposed masonry in accordance with CSA A165 series and replace with undamaged units.
- .5 Installation - Joints:
 - .1 Allow joints to set just enough to remove excess water or “thumbprint” hard, then tool with round jointer to provide smooth, compressed, uniformly concave joints true-to-line where concave joints are indicated.
 - .2 Allow joints to set just enough to remove excess water or “thumbprint” hard, then rake joints uniformly to 6-mm depth and compress with square tool to provide smooth, compressed, raked joints of uniform depth where raked joints are indicated.
 - .3 Strike flush joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material, except paint or similar thin finish coating.
- .6 Cutting:
 - .1 Cut-out for electrical switches, outlet boxes, and other recessed or built-in objects.
 - .2 Make cuts straight, clean, and free from uneven edges.
- .7 Building-In:
 - .1 Build-in items required to be built into masonry.
 - .2 Prevent displacement of built-in items during construction. Check plumb, location, and alignment frequently, as work progresses.
 - .3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.
- .8 Wetting of Bricks:
 - .1 Except in cold weather, wet bricks having initial rate of absorption exceeding 1 g/minute/1000 mm²: wet to uniform degree of saturation, 3 to 24 hours before laying, and do not lay until surface dry.
 - .2 Wet tops of brick walls qualifying for wetting when recommencing work on such walls.
- .9 Support of Loads:
 - .2 Install building paper below voids to be filled with concrete grout. Keep paper 25 mm back from faces of units.
- .10 Provision for Movement:
 - .1 Leave 3 mm space below shelf angles.
 - .2 Leave 6-mm space between top of non-loadbearing walls and partitions and structural elements. Do not use wedges.
 - .3 Built masonry to tie in with stabilizers, with provision for vertical movement.
- .11 Installation - Loose Steel Lintels: Install loose steel lintels. Centre over opening width.
- .12 Installation - Control Joints:
 - .1 Construct continuous control joints as indicated on Drawings.

.13 Installation - Movement Joints:

- .1 Build-in continuous movement joints as indicated on Drawings.

.14 Interface with Other Work:

- .1 Cut openings in existing work as indicated on Drawings.
- .2 Openings in walls: Reviewed by JASON FUNG ARCHITECT INC..

3.04 TOLERANCES

.1 Install masonry to tolerances in CAN/CSA-A371 except:

- .1 Vertical alignment at external corners and door jambs should not vary from plumb by more than 3 mm in 3 000.

3.05 PROTECTION

.1 Temporary Bracing:

- .1 Provide temporary bracing and support of masonry work during and after erection until permanent lateral support is in place.
- .2 Brace and support masonry walls as necessary to resist wind pressures, lateral forces, and temporary construction loads during construction.

.2 Moisture Protection:

- .1 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain until completed and protected by flashing or other permanent construction.
- .2 Cover completed and partially completed masonry work not otherwise enclosed or sheltered with waterproof covering at end of each Work Day. Secure coverings in position.

.3 Air Temperature Protection: Protect completed masonry in accordance with CAN/CSA-A371.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 04 05 00 - Common Work Results for Masonry

I.02 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-A179, Mortar and Grout for Unit Masonry.
 - .3 CAN/CSA-A371, Masonry Construction for Buildings.
 - .4 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .2 International Masonry Industry All-Weather Council (IMIAC)
 - .1 Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
- .3 South Coast Air Quality Management District (SCAQMD)
 - .1 SCAQMD Rule 1168, Adhesive and Sealant Applications.

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for masonry mortar and grout and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements. Indicate VOC's mortar, grout, parging, colour additives and admixtures. Expressed as grams per litre (g/L).
- .4 Manufacturers' Instructions: submit manufacturer's installation instructions.

I.04 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control and requirements of Section 04 05 00 - Common Work Results for Masonry.

I.05 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect masonry mortar and grout packages from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

I.06 SITE CONDITIONS

- .1 Ambient Conditions: maintain materials and surrounding air temperature to:
 - .1 Minimum 5 10 degrees C prior to, during, and 48 hours after completion of masonry work.
 - .2 Maximum 32 degrees C prior to, during, and 48 hours after completion of masonry work.
- .2 Weather Requirements: CAN/CSA-A371 International Masonry Industry All-Weather Council (IMIAC) - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

2 PRODUCTS

2.01 MATERIALS

- .1 Use same brands of materials and source of aggregate for entire project.
- .2 Cement:
 - .1 Portland Cement: to CAN/CSA-A3000, Type GU - General use hydraulic cement (Type 10) MS - Moderate sulphate-resistant hydraulic cement (Type 20) HE - High-early-strength hydraulic cement (Type 30) HS - High-sulphate-resistant hydraulic cement (Type 50) MH-Moderate heat of hydration hydraulic cement (Type 40) gray white colour.
 - .1 Use low VOC products in compliance with SCAQMD Rule 1168.
 - .2 Masonry Cement: to CAN/CSA-A3002 and CAN/CSA-A179, Type N S.
 - .3 Mortar Cement: to CAN/CSA-A3002 and CAN/CSA-A179, TypeN S integral water repellents.
 - .1 Use low VOC products in compliance with SCAQMD Rule 1168.
 - .4 Packaged Dry Combined Materials for mortar: to CAN/CSA-A179, Type N S, using gray white colour cement.
- .3 Aggregate: supplied by one supplier.
 - .1 Fine Aggregate: to CAN/CSA-A179, natural sand, manufactured sand, or silica sand.
 - .2 Course Aggregate: to CAN/CSA-A179
- .4 Water: clean and potable.
- .5 Lime:
 - .1 Quick Lime: to CAN/CSA-A179, Type N.
 - .2 Hydrated Lime: to CAN/CSA-A179, Type S.
- .6 Bonding Agent: epoxy type.

- .7 Polymer Latex: organic polymer latex admixture of butadiene-styrene type non-emulsifiable bonding admixture.

2.02 COLOUR ADDITIVES

- .1 Use colouring admixture not exceeding 10% of cement content by mass, or integrally coloured masonry cement, to produce coloured mortar to match approved sample. Admixtures approved prior to use. Use in accordance with specific manufacturer's recommendations.
- .2 White mortar: use white Portland cement, and lime to produce mortar type specified.

2.03 ADMIXTURES

- .1 Water Repellent Agents: powdered, liquid, or polymeric.
 - .1 Use low VOC products in compliance with SCAQMD Rule 1168.
- .2 Air Entrainment Agents: acceptable percent added to mix 15.
 - .1 Use low VOC products in compliance with SCAQMD Rule 1168.
- .3 Plasticizer Agents:
 - .1 Use low VOC products in compliance with SCAQMD Rule 1168.
- .4 Accelerator Agents:
 - .1 Use low VOC products in compliance with SCAQMD Rule 1168.
- .5 Extended life mortar: to CAN/CSA-A179, factory and batch mixed, set controlling admixtures, type RM RS RN or RO.
 - .1 Use low VOC products in compliance with SCAQMD Rule 1168.

2.04 MORTAR MIXES

- .1 Mortar for exterior masonry above grade:
 - .1 Load Bearing: type N based on property specifications.
 - .2 Non-Load Bearing: N based on property specifications.
- .2 Mortar for interior masonry:
 - .1 Load Bearing: type N based on property specifications.
 - .2 Non-Load Bearing: O based on property specifications.
- .3 Mortar for Parapet walls, chimneys, unprotected walls: type N based on property specifications, CAN/CSA-A179.
- .4 Pointing Mortar: CAN/CSA-A179, Type N using property specification with maximum 2 percent ammonium stearate or calcium stearate per cement weight.
- .5 Stain Resistant Pointing Mortar: one part Portland cement, 1/8 part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Add aluminum tristearate, calcium stearate, or ammonium stearate to 2 percent of Portland cement by weight.
- .6 Mortar For Glass Block Masonry: CAN/CSA-A179, Type N, using property specification.
- .7 Pointing Mortar For Glass Block Masonry: CAN/CSA-A179, Type N, using property specification; with maximum 2 percent ammonium stearate or calcium stearate per cement weight.
- .8 Parging Mortar: to CAN/CSA-A179

- .9 Mortar for foundation walls, manholes, sewers, pavements, walks, patios and other exterior masonry at or below grade: type M based on property specifications, CAN/CSA-A179.
- .10 Following applies regardless of mortar types and uses specified above:
 - .1 Mortar for calcium silicate brick and concrete brick: type O based on proportion specifications.
 - .2 Mortar for stonework: type N based on property specifications.
 - .3 Mortar for grouted reinforced masonry: type S based on property specifications.

2.05 MORTAR MIXING

- .1 Use pre-blended, pre-coloured mortar prepackaged under controlled factory conditions. Ingredients batching limitations to within 1% accuracy.
- .2 Mix mortar ingredients in accordance with CAN/CSA-A179 in quantities needed for immediate use
- .3 Maintain sand uniformly damp immediately before mixing process.
- .4 Add mortar colour and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and colouration.
- .5 Using anti-freeze compounds including calcium chloride or chloride based compounds is prohibited.
- .6 Adding air entraining admixture to mortar mix is prohibited.
- .7 Use a batch type mixer in accordance with CAN/CSA-A179
- .8 Pointing mortar: prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than 1 hour no more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.
- .9 Re-temper mortar only within two hours of mixing, when water is lost by evaporation.
- .10 Use mortar within 2 hours after mixing at temperatures of 32 degrees C, or 2-1/2 hours at temperatures under 10 degrees C.

2.06 GROUT MIXES

- .1 Bond Beams: grout mix 10 to 12.5 MPa strength at 28 days; 200-250 mm slump; premixed type in accordance with CSA A23.1/A23.2 mixed in accordance with CAN/CSA-A179 coarse grout.
- .2 Lintels: grout mix 10 to 12.5 MPa strength at 28 days; 200-250 mm slump; premixed type in accordance with CSA A23.1/A23.2 mixed in accordance with CAN/CSA-A179 coarse grout.
- .3 Grout: Minimum compressive strength of 12.5 MPa at 28 days. Maximum aggregate size and grout slump: CAN/CSA-A179

2.07 GROUT MIXING

- .1 Mix batched and delivered grout in accordance with CSA A23.1/A23.2 transit mixed
- .2 Mix grout ingredients in quantities needed for immediate use in accordance with CAN/CSA-A179 coarse grout.
- .3 Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- .4 Using calcium chloride or chloride based admixtures is prohibited.

2.08 MIX TESTS

.1 Testing Mortar Mix:

.1 Test mortar to requirements of Section 01 45 00 - Quality Control, and in accordance with CAN/CSA-A179, for mortar based on property specification. Test prior to construction and during construction for:

- .1 Compressive strength.
- .2 Consistency.
- .3 Mortar aggregate ratio.
- .4 Sand/cement ratio.
- .5 Water content and water/cement ratio.
- .6 Air content.
- .7 Splitting tensile strength.

.2 Testing Grout Mix:

.1 Test grout to requirements of Section 01 45 00 - Quality Control, and in accordance with CAN/CSA-A179, for grout based on property specification. Test prior to construction and during construction for:

- .1 Compressive strength.
- .2 Sand/cement ratio.
- .3 Water content and water/cement ratio.
- .4 Slump.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for masonry installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate.
 - .2 Inform HWDSB and JASON FUNG ARCHITECT INC. of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from JASON FUNG ARCHITECT INC..

3.02 PREPARATION

- .1 Apply bonding agent to existing concrete surfaces.
- .2 Plug clean-out holes with block masonry units. Brace masonry for wet grout pressure.

3.03 CONSTRUCTION

- .1 Do masonry mortar and grout work in accordance with CAN/CSA-A179 except where specified otherwise
- .2 Apply parging in uniform coating not less than total 10 mm thick , where indicated.

3.04 MIXING

- .1 Pointing mortar can be mixed using a regular paddle mixer. Only electric motor mixers are permissible. Mixers run on hydrocarbons are not permitted, due to fumes.
- .2 Clean mixing boards and mechanical mixing machine between batches.
- .3 Mortar: weaker than units it is binding.
- .4 Contractor to appoint one individual to mix mortar, for duration of project. In event that this individual is changed, mortar mixing must cease until new individual is trained, and mortar mix is tested.

3.05 MORTAR PLACEMENT

- .1 Install mortar to manufacturer's instructions.
- .2 Install mortar to requirements of CAN/CSA-A179
- .3 Install mortar and grout to requirements.
- .4 Remove excess mortar from grout spaces.

3.06 GROUT PLACEMENT

- .1 Install grout in accordance with manufacturer's instructions.
- .2 Install grout in accordance with CAN/CSA-A179
- .3 Work grout into masonry cores and cavities to eliminate voids.
- .4 Installing grout in lifts greater than 400 mm, without consolidating grout by rodding is prohibited.
- .5 Displacing reinforcement while placing grout is prohibited.

3.07 FIELD QUALITY CONTROL

- .1 Site Tests, Inspection: in accordance with Section 04 05 00 - Common Work Results for Masonry supplemented as follows:
 - .1 Test and evaluate mortar prior to construction and during construction in accordance with CAN/CSA-A179
 - .2 Test and evaluate grout prior to construction and during construction to CAN/CSA-A179; test in conjunction with masonry unit sections specified
- .2 Manufacturer's Field Services: in accordance with Section 04 05 00 - Common Work Results for Masonry.

3.08 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Remove droppings and splashing using clean sponge and water.
- .3 Clean masonry with low pressure clean water and soft natural bristle brush.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.09 PROTECTION

- .I Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.

3.10 SCHEDULE

- .I Not used.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 04 05 00 - Common Work Results for Masonry
- .2 Section 04 05 13 - Masonry Mortar and Grouting

I.02 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM E336, Standard Test Method for Measurement of Airborne Sound Attenuation Between Rooms in Buildings
- .2 CSA Group (CSA):
 - .1 CAN/CSA-A165 Series-04, CSA Standards on Concrete Masonry Units consists: A165.1, A165.2, A165.3
 - .2 CAN/CSA-A371:14, Masonry Construction for Buildings
 - .3 CSA S304.14, Design of Masonry Structures
- .3 National Research Council Canada (NRC):
 - .1 National Building Code of Canada (NBC)
- .4 South Coast Air Quality Management District (SCAQMD):
 - .1 SCAQMD Rule 1168, Adhesive and Sealant Applications
- .5 ULC Standards (ULC):
 - .1 CAN/ULC-S101, Standard Methods of Fire Endurance Tests of Building Construction and Materials

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for concrete masonry units and include product characteristics, performance criteria, physical size, finish and limitations.

I.04 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 43 00 - Quality Assurance and requirements of Section 04 05 00 - Common Work Results for Masonry supplemented as follows:
 - .1 Construct mock-up panel of exterior concrete unit masonry construction 1200 x 1800

mm.

I.05 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .1 Offload concrete unit masonry packages using equipment that will not damage the surfaces.
 - .2 Do not use brick tongs to move or handle masonry.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Do not double stack cubes of concrete unit masonry.
 - .3 Cover masonry units with non-staining waterproof membrane covering.
 - .4 Allow air circulation around units.
 - .5 Installation of wet or stained masonry units is prohibited.
 - .6 Keep concrete unit masonry in individual cardboard packaging provided by manufacturer until units are ready to be installed.
 - .7 Store and protect concrete unit masonry from chips and cracks.
 - .8 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

- .1 Standard concrete block units: to CAN/CSA-A165 Series (CAN/CSA-A165.1).
 - .1 Dimensions Nominal: 200 mm wide x 200 mm high x 400 mm long.
 - .3 Special shapes: provide Provide additional special shapes as indicated.
 - .4 Profile/Texture for Architectural Concrete Unit Masonry:
 - .1 Split faced: full split units.
 - .2 Scored: 1 scored face units.
 - .4 Surface texture: sandblasted units.
 - .5 Profile: slump block units.
 - .5 Colour:
 - .1 Integrally coloured pre-finished architectural concrete block with one or more faces ground to expose variegated colours of natural aggregates; with factory-applied clear satin gloss acrylic finish.
 - .2 Unit faces filled with cementitious grout, polished with factory applied clear satin gloss acrylic finish.

2.02 REINFORCEMENT

- .1 Reinforcement in accordance to drawings provided by JASON FUNG ARCHITECT INC..

2.03 CONNECTORS

- .1 Connectors in accordance to drawings provided by JASON FUNG ARCHITECT INC..

2.04 FLASHING

- .1 Flashing: in accordance to drawings provided by JASON FUNG ARCHITECT INC..

2.05 MORTAR MIXES

- .1 Mortar and mortar mixes in accordance with Section 04 05 13 - Masonry Mortar and Grouting.

2.06 GROUT MIXES

- .1 Grout and grout mixes in accordance with Section 04 05 13 - Masonry Mortar and Grouting.

2.07 CLEANING COMPOUNDS

- .1 Use low VOC products.
- .2 Compatible with substrate and acceptable to masonry manufacturer for use on products.
- .3 Cleaning compounds compatible with concrete unit masonry and in accordance with manufacturer's written recommendations and instructions.

2.08 TOLERANCES

- .1 Tolerances for standard concrete unit masonry tolerances in accordance with CAN/CSA-A165.1, supplemented as follows:
 - .1 Maximum variation between units within specific job lot not to exceed 2 mm.
 - .2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.
 - .3 Out of square tolerance not to exceed 2 mm.
- .2 Tolerances for architectural concrete masonry units in accordance with CAN/CSA-A165.1, supplemented as follows:
 - .1 Maximum variation in length or height between units within specific job lot for specified dimension not to exceed 2 mm.
 - .2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.
 - .3 Out of square tolerance not to exceed 2 mm.
 - .4 Maximum variation in width between units within specific job lot for specified dimension not to exceed 2 mm.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for concrete unit masonry installation in accordance with manufacturer's written instructions.

- .2 Inform HWDSB and JASON FUNG INC. of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed JASON FUNG ARCHITECT INC..

3.02 PREPARATION

- .1 Protect adjacent finished materials from damage due to masonry work.

3.03 INSTALLATION

- .1 Concrete block units:
 - .1 Bond: running.
 - .2 Coursing height: 200 mm for one block and one joint.
 - .3 Jointing: concave or flush where exposed or where paint or other finish coating is specified.

3.04 REINFORCEMENT

- .1 Install reinforcing in accordance to drawings provided by JASON FUNG ARCHITECT INC..

3.05 CONNECTORS

- .1 Install connectors in accordance to drawings provided by JASON FUNG ARCHITECT INC..

3.06 FLASHING

- .1 Install flashings: in accordance to drawings provided by JASON FUNG ARCHITECT INC..

3.07 MORTAR PLACEMENT

- .1 Place mortar in accordance with Section 04 05 13 - Masonry Mortar and Grouting.

3.08 GROUT PLACEMENT

- .1 Place grout in accordance with Section 04 05 13 - Masonry Mortar and Grouting.

3.09 CONSTRUCTION

- .1 Cull out masonry units, in accordance with CAN/CSA-A165 and reviewed range of colour samples, with chips, cracks, broken corners, excessive colour and texture variation.
- .2 Build in miscellaneous items such as bearing plates, steel angles, bolts, anchors, inserts, sleeves and conduits.
- .3 Construct masonry walls using running bond unless otherwise noted.
- .4 Build around frames previously set and braced. Fill behind hollow frames within masonry walls with mortar or grout and embed anchors.
- .5 Fit masonry closely against electrical and plumbing outlets so collars, plates and covers overlap and conceal cuts.
- .6 Install movement joints and keep free of mortar where indicated.
- .7 Hollow Units: spread mortar setting bed from outside edge of face shells. Gauge amount of mortar on top and end of unit to create full joints, equivalent to shell thickness. Avoid excess mortar.
- .8 Solid Units: apply mortar over entire vertical and horizontal surfaces. Avoid bridging of airspace

between brick veneer and backup wall with mortar.

- .9 Ensure compacted head joints. Use full or face-shell joint as indicated.
- .10 Tamp units firmly into place.
- .11 Do not adjust masonry units after mortar has set. Where resetting of masonry is required, remove, clean and reset units in new mortar.
- .12 Tool exposed joints concave weathered/raked for interior work; strike concealed joints flush.
- .13 After mortar has achieved initial set up, tool joints.
- .14 Do not interrupt bond below or above openings.

3.10 REPAIR/RESTORATION

- .1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.

3.11 SITE QUALITY CONTROL

- .1 Not Used.

3.12 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Standard Concrete Unit Masonry:
 - .1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block. Clean wall surface with suitable brush or burlap.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.13 PROTECTION

- .1 Brace and protect concrete unit masonry in accordance with Section 04 05 00 - Common Work Results for Masonry.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Not used.

I.02 DEFINITIONS.

- .1 Environmental Product Declaration (EPD): Third-party verified documentation with the supporting Product Category Rule (PCR) and Life cycle assessment information. Prepared in accordance with ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope.
 - .1 Industry-wide (generic) EPD with third-party certification (Type III), including external verification in which the manufacturer is explicitly recognized as the participant by the program operator.
 - .2 Product-specific Type III EPD - Products with third-party certification (Type III), including external verification in which the manufacturer is explicitly recognized as the participant by the program operator.

I.03 REFERENCE STANDARDS

- .1 CSA Group (CSA):
 - .1 CAN/CSA-A123.4-04, Asphalt for Construction of Built-Up Roof Coverings and Waterproofing Systems
- .2 National Research Council Canada (NRC)/Institute for Research in Construction (IRC):
 - .1 Canadian Construction Materials Centre (CCMC)
- .3 Health Canada:
 - .1 Workplace Hazardous Materials Information System (WHMIS)
 - .2 Safety Data Sheets (SDS)

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, product literature and data sheets for bituminous dampproofing and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit WHMIS SDS.
- .3 Manufacturer's Instructions: provide to indicate special handling criteria, installation sequence, cleaning procedures.

I.05 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:

- .1 Store materials in original container, indoors in a clean dry well-ventilated area location, and in accordance with manufacturer's recommendations.
- .2 Store and protect dampproofing materials from freezing and solvents.

1.06 SITE CONDITIONS

- .1 Ambient Conditions: temperature, relative humidity, moisture content.
 - .1 Apply dampproofing materials only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
 - .2 Do not proceed with Work when wind chill effect would tend to set bitumen before proper curing takes place.
 - .3 Maintain air temperature and substrate temperature at dampproofing installation area above 5 degrees C for 24 hours before, during and 24 hours after installation.
 - .4 Do not apply dampproofing in wet weather.
- .2 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.

2 PRODUCTS

2.01 MATERIALS

- .1 Asphalt:
 - .1 For application and curing at temperatures above 5 degrees C: to CAN/CGSB-37.2 CGSB 37-GP-6Ma CAN/CGSB-37.16 CAN/CGSB-37.28 CAN/CSA-A123.4 Type 1 2 3.
 - .1 Package label or bill of lading for bulk hot liquid asphalt must indicate type, flash point, equiviscous temperature range and final blowing temperature.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed are acceptable for bituminous dampproofing application installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate.
 - .2 Inform HWDSB and JASON FUNG ARCHITECT INC. of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from JASON FUNG ARCHITECT INC..

3.02 WORKMANSHIP

- .1 Keep hot asphalt:
 - .1 Below its flash point.

- .2 At or below its final blowing temperature.
- .3 Within its equiviscous temperature range at place of application.

3.03 PREPARATION

- .1 Before applying dampproofing:
 - .1 Seal exterior joints between foundation walls and footings, joints between concrete floor slab and foundation and around penetrations through dampproofing with sealing compound.

3.04 APPLICATION

- .1 Dampproofing in accordance with CAN/CGSB-37.3 CGSB 37-GP-12Ma CGSB 37-GP-36M CGSB 37-GP-37M.
- .2 Seal work in accordance with CGSB 37-GP-11M.
- .3 Prime surface in accordance with CGSB 37-GP-15M.
- .4 Apply dampproofing in accordance with applicable CGSB application standard.

Material		Application
CAN/CGSB-37.2	use	CAN/CGSB-37.3
CGSB 37-GP-6Ma	use	CGSB 37-GP-12M
CAN/CGSB-37.1	use	CGSB 6 37-GP-36M
CAN/CGSB-37.2	use	CAN/CGSB-37.3 8
CSA A123.4	use	CGSB 37-GP-37M

3.05 SCHEDULE

- .1 Apply continuous, uniform coating to entire exterior faces of foundation walls from 50 mm below finished grade level to and including tops of foundation wall footings.
- .2 Apply continuous, uniform coating to exterior side of foundation walls enclosing rooms below finished grade. Include exterior portion of interior walls where floors in adjacent rooms are at different elevations.
- .3 Apply two additional coats of dampproofing to vertical corners and construction joints for a minimum width of 230 mm on each side, and all around and for 230 mm along pipes passing through walls.

3.06 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
- .2 Final Cleaning: remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning upon completion.
- .3 Clean adjacent materials of spills, splatter, and accidentally applied dampproofing.
- .4 Waste Management: in accordance with Section 01 74 19 - Waste Management and Disposal.

3.07 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Protect dampproofing from excessive UV exposure. Cover with backfill or other temporary means within 2 days.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 07 92 00 - Joint Sealants

I.02 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB):
 - .1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing
 - .2 CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing
- .2 Canadian Roofing Contractors Association (CRCA):
 - .1 CRCA Roofing Specifications Manual-1997
- .3 CSA Group (CSA):
 - .1 CSA-A123.3-05, Asphalt Saturated Organic Roofing Felt
 - .2 CSA-A123.4-04, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems
 - .3 CSA A231.1/A231.2-06, Precast Concrete Paving Slabs/Precast Concrete Pavers
- .4 Underwriters Laboratories' of Canada (ULC):
 - .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering
 - .2 CAN/ULC-S702.2-03, Standard for Mineral Fibre Thermal Insulation for Buildings
 - .3 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced
 - .4 CAN/ULC-S706-02, Standard for Wood Fibre Thermal Insulation for Buildings

I.03 ADMINISTRATIVE REQUIREMENTS

- .1 Not used.

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide two copies of most recent technical waterproofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Provide two copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and indicate VOC content for:
 - .1 Primers.
 - .2 Asphalt.
 - .3 Sealers.

- .4 Filter fabric.
- .3 Provide shop drawings and indicate:
 - .1 Layout for tapered insulation.
- .4 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
- .5 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.
- .6 Manufacturer's site report: in accordance with Section 01 43 00 – Quality Assurance.

I.05 QUALITY ASSURANCE

- .1 Not used.

I.06 FIRE PROTECTION

- .1 Maintain fire watch for 1 hour after each day's waterproofing operations cease.

I.07 DELIVERY, STORAGE, AND HANDLING

- .1 Provide and maintain dry, off-ground weatherproof storage.
- .2 Store rolls of felt and membrane in upright position.
 - .1 Store membrane rolls with salvage edge up.
- .3 Remove only in quantities required for same day use.
- .4 Place plywood runways over completed Work to enable movement of material and other traffic.
- .5 Store sealants at +5 degrees C minimum.
- .6 Store insulation protected from daylight and weather and deleterious materials.
- .7 Handle waterproofing materials in accordance with manufacturer's written directives, to prevent damage or loss of performance.
- .8 Store and manage hazardous materials in accordance with Section 01 35 29.06 - Health and Safety Requirements.

I.08 SITE CONDITIONS

- .1 Ambient Conditions
 - .1 Do not install waterproofing when temperature remains below -18 degrees C for torch application, or -5 degrees C to manufacturers' recommendations for mop application.
 - .2 Minimum temperature for solvent-based adhesive is -5 degrees C.
- .2 Install waterproofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into waterproofing system.

I.09 WARRANTY

- .1 For Work of this Section 07 13 52 - Modified Bituminous Sheet Waterproofing, 12 months warranty period is extended to 24 months.

2 PRODUCTS

2.01 PERFORMANCE CRITERIA

- .1 Waterproofing System: capable of resisting moisture/water head, and preventing moisture migration to interior.
- .2 Compatibility between components of waterproofing system is essential. Provide written declaration to HWDSB and JASON FUNG ARCHITECT INC. stating that materials and components, as assembled in system, meet this requirement.

2.02 DECK PRIMER

- .1 Asphalt primer: to CGSB 37-GP-9Ma ASTM D41.

2.03 VAPOUR RETARDER

- .1 Two-ply bituminous membrane consisting of:
 - .1 No. 15 asphalt saturated glass roofing felts to CSA A123.3 ASTM D2178.
 - .2 Type 2 asphalt to CSA A123.4 ASTM D312. Provide equiviscous temperature (EVT), finished blowing temperature (FBT) and flash point (FP) temperature.
- .2 Self adhesive air/vapour barrier modified bitumen membrane or vapour retarder waterproofing membrane strip, non-woven polyester reinforcement and elastomeric bitumen.

2.04 MEMBRANE

- .1 Base sheet: to glass fibres to ASTM D6163.
 - .1 Type 2, fully adhered.
 - .2 Class A - granule surfaced C - plain surfaced.
 - .3 Grade I - standard service heavy duty service.
 - .5 Top and bottom surfaces:
 - .1 Sanded/polyethylene.
 - .6 Base sheet membrane properties: to CGSB 37-GP-56M
 - .1 Strain energy (longitudinal/transversal): 9.0/7.0 8.1/8.8 kN/m.
 - .2 Breaking strength (longitudinal/transversal): 17.0/18.0 17.0/12.5 N/5 cm.
 - .3 Ultimate elongation (longitudinal/transversal): 60/70 60/65 %.
 - .4 Tear resistance: 85 60 N.
 - .5 Cold bending at -30 degrees C: no cracking.
 - .6 Softening point: 110 degrees C.
 - .7 Static puncture resistance: 400 300.
 - .8 Dimensional Stability: -0.3 / 0.3 %.
- .7 ULC certification: Class A B.

2.05 ADHESIVE

- .1 Adhesive for securing overlay board and insulation: asphalt extended vulcanized adhesive, two component unit, consisting of two liquids mixed on site to produce pourable adhesive.

2.06 OVERLAY BOARD

- .1 Overlay Board: 12.7 mm thick asphalt based recovery board with non-woven glass facers, as recommended by the membrane manufacturer.

2.07 BITUMEN

- .1 Asphalt: to CSA A123.4 ASTM D312, Type 2 3.

2.08 POLYSTYRENE INSULATION

- .1 Extruded polystyrene (XPS) insulation, Type 2, thickness as indicated,

2.16 SEALERS

- .1 Plastic cement: asphalt.
- .2 Sealing compound: rubber asphalt type.
- .3 Sealants: Caulking - see Section 07 92 00 - Joint Sealants.

2.17 WALKWAYS

- .1 Not used.

2.18 CANT STRIPS

- .1 Cut from pressure-treated wood 38 mm thick prefabricated material, to measure 140 mm on slope.

2.19 FILTER FABRIC

- .1 UV resistant, black woven water pervious polyolefin fabric for installation between insulation and stone ballast in protected membrane system. Fabric to meet approval of insulation manufacturer.
 - .1 Product weight 93.5 77.9 gm/m².

3 EXECUTION

3.01 QUALITY OF WORK

- .1 Do examination, preparation and waterproofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual.
- .2 Do priming for asphalt waterproofing in accordance with manufacturer's written recommendations.
- .3 The interface of the walls and roof assemblies will be fitted with durable rigid material sheet metal plywood providing connection point for continuity of air barrier.
- .4 Assembly, component and material connections will be made in consideration of appropriate design loads, with reversible mechanical attachments.

3.02 EXAMINATION OF ROOF DECKS

- .1 Verification of Conditions:
 - .1 Inspect with HWDSB deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.

- .2 Evaluation and Assessment: before beginning of work ensure:
 - .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
 - .2 Curbs have been built.
 - .3 Roof drains have been installed at proper elevations relative to finished roof surface.
 - .4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.
- .3 Do not install waterproofing materials during rain or snowfall.

3.03 PROTECTION OF IN-PLACE CONDITIONS

- .1 Cover walls, walks , sloped roofs and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of Work.
- .3 Clean off drips and smears of bituminous material immediately.
- .4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.
- .5 Protect roof from traffic and damage. Comply with precautions deemed necessary by HWDSB.
- .6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.
- .7 Metal connectors and decking will be treated with rust proofing or galvanization.

3.04 PRIMING DECK

- .1 Apply deck primer to deck waterproofing substrate at the rate recommended by manufacturer 2.5 L per 10 m².

3.05 CANTS

- .1 Install prefabricated cants over rigid insulation wood insulation stops.
- .2 Apply hot bitumen to receiving surface and embed cant firmly by hand.
 - .1 Fasten wood cants to wood insulation stops.
- .3 Angle cut cants to fit tightly on back and bottom where roof to wall angle varies from 90 degrees.

3.06 PROTECTED MEMBRANE APPLICATION

- .1 Primer:
 - .1 Apply deck primer to concrete deck at rate specified on label.
- .2 Base sheet application:
 - .1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
 - .2 Unroll and embed base sheet in uniform coating of asphalt applied at rate of 1.2 kg/m², EVT at point of contact.
 - .3 Lap sheets 75 mm for side and 150 mm for end laps.
 - .4 Application to be free of blisters, wrinkles and fishmouths.

.3 Cap sheet application:

- .1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.
- .2 Unroll and embed cap sheet in uniform coating of asphalt applied at rate of 1.2 kg/m², EVT at point of contact.
- .3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm from those in base sheet.
- .4 Application to be free of blisters, fishmouths and wrinkles.
- .5 Do membrane application in accordance with manufacturer's recommendations.

.4 Flashings:

- .1 Complete installation of flashing base sheet stripping before installing membrane cap sheet.
- .2 Nail Mop Torch Base and cap sheet onto substrate in 1 metre wide strips.
- .3 Lap flashing base sheet to membrane base sheet minimum 100 mm and seal by mopping or torch welding.
- .4 Lap flashing cap sheet to membrane cap sheet 150 mm and torch weld.
- .5 Provide 75 mm side lap and seal.
- .6 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.
- .7 Do Work in accordance with manufacturer's recommendations Section 07 62 00 - Sheet Metal Flashing and Trim.

.5 Roof penetration:

- .1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with the manufacturer's recommendations and details as indicated.

.6 Insulation application:

- .1 Place insulation, channel cut face down, loose laid in parallel rows with ends staggered.
- .2 Where insulation is in contact with cants bevel insulation edges to fit snug to cant slope.

.7 Filter fabric application:

- .1 Apply fabric unbonded over installed insulation.
- .2 Overlap edges 300 mm minimum.
- .3 Cut fabric around roof drains, vents and other penetrations and extend under metal flashings.

3.07 BALLAST AND PROTECTIVE COVERING

- .1 Not used.

3.08 WALKWAYS

- .1 Not used.

3.09 SITE QUALITY CONTROL

- .1 Not used.

3.10 CLEANING

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by work of this section.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 07 92 00 - Joint Sealants

I.02 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA B111, Wire Nails, Spikes and Staples.
- .2 ULC Standards
 - .1 CAN/ULC-S706, Standard for Wood Fibre Insulating Boards for Buildings.

I.03 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation Meetings:
 - .1 Convene preinstallation meeting 1 week before beginning on-site installation, with HWDSB and Consultant in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Coordination with other construction subtrades.
 - .4 Review manufacturer's written installation instructions and warranty requirements.
- .2 Sequencing: sequence with other work and comply with manufacturer's written recommendations for sequencing construction operations.

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for metal siding and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
 - .2 Indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, metal furring, and related work.
- .4 Samples:
 - .1 Submit duplicate 100mm x 100mm samples of siding material, of colour and profile specified.

I.05 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for installed products for incorporation into manual.

- .3 Warranty Documentation: submit warranty documents specified.

I.06 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Mock-Up:
 - .1 Provide site mock-up for work of this Section indicating methods and materials, and procedures proposed to achieve final results in accordance with Section 01 43 00 - Quality Assurance, and to comply with following requirements, using materials indicated for completed work:
 - .1 Build mock-ups in location and of size as directed by HWDSB and Consultant.
 - .2 Obtain HWDSB and Consultant's acceptance of mock-ups before starting construction; mock-up used throughout construction period as standard of acceptance for subsequent work.
 - .3 Mock-up may form part of permanent structure when accepted by HWDSB and Consultant; repair or replace unacceptable mock-ups at no additional cost to Owner.

I.07 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect metal siding from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

I.08 SITE CONDITIONS

- .1 Execute work of this Section within environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer.

I.09 WARRANTY

- .1 Manufacturer's warranty: Submit, for HWDSB and Consultant acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty in addition to and not limit other rights Owner may have under Contract Documents.

2 PRODUCTS

2.01 MATERIALS

- .1 Aluminum siding:

- .1 Profile: horizontal, preformed interlocking joints, fastener holes pre-punched.
- .2 Pattern: smooth surface.
- .3 Finish: factory precoated with fluorocarbon paint finish, 2 coat system dry paint film thickness of 0.025 mm.
- .4 Colour: colour selected by Consultants.
- .5 Gloss: medium.
- .6 Thickness: 53 gauge base metal thickness.
- .4 Fasteners: nails to CSA B111, screws to ASME B18.6.3 cadmium plated steel purpose made.
- .5 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
 - .1 Test for acceptable VOC emissions in accordance with ASTM D2369 and ASTM D2832.
- .6 Exterior wall sheathing paper: to CAN/ULC-S741.

2.02 ACCESSORIES

- .1 Exposed trim: inside corners, outside corners, cap strip, drip cap, undersill trim, starter strip and window/door trim of same material, colour and gloss as cladding, with fastener holes pre-punched.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts acceptable in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of HWDSB and Consultant.
 - .2 Inform HWDSB and Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions remedied.

3.02 PREPARATION

- .1 Clean surfaces thoroughly before installation.
- .2 Repair substrate flaws or defects before applying siding or soffits.
- .3 Fur surfaces to even plane and free from obstructions.
- .4 Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under project conditions.

3.03 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.04 INSTALLATION

- .1 Install cladding in accordance with manufacturer's written instructions.
- .2 Install one layer exterior wall sheathing paper horizontally by nailing lapping edges 150 mm.
- .3 Install continuous starter strips, inside and outside corners, edgings, soffit, drip, cap, sill and

window/door opening flashings as indicated.

- .4 Install outside corners, fillers and closure strips with carefully formed and profiled work.
- .5 Install soffit and fascia cladding as indicated.
- .6 Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.
- .7 Attach components in manner not restricting thermal movement.
- .8 Caulk junctions with adjoining work with sealant. Do work in accordance with Section 07 92 00 - Joint Sealants.

3.05 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.06 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by preformed metal siding installation.

END OF SECTION

I GENERAL

I.01 SUMMARY

- .1 This Section specifies fire stop and smoke seal systems and materials intended to fill gaps between fire separations, between fire separations and other construction assemblies, or used in or around items which fully or partially penetrate a fire separation, to restrict the spread of fire and smoke thus maintaining the integrity of a fire separation.
- .2 This Section includes requirements for:
 - .1 Through-penetration fire stops:
 - .1 For openings created to allow a penetrating item such as piping, conduits, raceways, ducts, cable trays, cables, tubing or structural components to pass completely through a fire separation or fire-resistance rated assembly.
 - .2 Membrane penetration fire stops:
 - .1 For openings where penetrating items such as piping, conduits, raceways, ducts, cable trays, cables, tubing, recessed components (e.g., panels, electric boxes, devices) or structural components pass through only one membrane of a fire separation or fire-resistance rated assembly.
 - .3 Blank opening fire stops:
 - .1 For openings created in a fire separation where the penetrating item has not yet been installed or has been removed.
 - .4 Construction joint fire stops:
 - .1 For locations where adjacent fire separations or components of fire separations meet. Locations include: ceiling/wall and roof/wall joints, wall/wall joints at corners or in the same plane, wall/floor joints, floor/floor joints and ceiling/ceiling joints.
 - .2 Includes fire stops for seismic joints, vertical control joints, expansion joints, and joints which occur at the tops and bottoms of fire separation walls.
 - .3 Includes fire stops for head-of-wall to non-rated roof or floor assemblies.
 - .5 Building perimeter fire stops:
 - .1 For the space between a fire-resistance rated floor assembly and the curtain wall (e.g.: safing slot gaps).
- .3 This Section includes fire stopping and smoke seal work for the entire Project including selection, installation and inspection of all required fire stops.

I.02 RELATED REQUIREMENTS

I.03 DEFINITIONS

- .1 Fire Blocking: materials, components or system installed in a concealed space in the building to restrict the spread of fire and smoke in that concealed space or from that concealed space to an adjacent space.
- .2 Fire Compartment: spaces within a building that are enclosed by exterior walls or separated from other parts of the building by enclosing Fire Separations having a Fire-Resistance Rating.

- .3 Fire-Resistance Rating: time in minutes or hours that a material or assembly of materials will withstand the passage of flame and transmission of heat when exposed to fire, meeting the requirements of CAN/ULC-S101 or as determined by formal testing of material or assembly of materials, meeting requirements of CAN/ULC-S115, or an interpretation of information derived from formal testing in accordance with requirements of the Building Code.
- .4 Fire Separation: assembly that acts as a barrier against the spread of fire, smoke and noxious gases resulting from combustion as defined by the Building Code and includes the following assemblies having a Fire-Resistance Rating requiring Fire Stopping as follows:
 - .1 Penetration-Type Fire Stop systems located within loadbearing walls and partitions.
 - .2 Penetration-Type Fire Stop systems located within non-loadbearing walls and partitions.
 - .3 Penetration-Type located within floor assemblies.
 - .4 Building Perimeter-Type located between floor assemblies and exterior wall and roof construction.
 - .5 Construction Joint-Type and other assemblies having a Fire-Resistance Rating indicated on Drawings or Schedules.
- .5 Fire Stop: material, component or system, and its means of support, used to protect gaps between fire separations, between fire separations and other construction assemblies, or used in openings where penetrating items wholly or partially penetrate fire separations, to restrict the spread of fire and smoke thus maintaining the fire-resistance continuity of a fire separation.
- .6 Fire Stop System: a specific site erected construction consisting of the assembly, fire stop materials, any penetrating items and their means of support which have met the requirements for an F, FT, FH, FTH and/or L rating when tested in a fire-resistance rated assembly in accordance with CAN/ULC-S115.
 - .1 F-Rating: the amount of time a fire stop system can remain in place without the passage of flame through the opening or the occurrence of flaming on the unexposed face of the fire stop.
 - .2 FT-Rating: a fire stop system with an F-Rating for the required time period which can also resist the transmission of heat through the fire stop during the same period and limit the rise in temperature on the unexposed face and/or penetrating item of the fire stop.
 - .3 FH-Rating: a fire stop system with an F-Rating for the required time period which can also resist the force of a hose stream without developing openings for a prescribed period.
 - .4 FTH-Rating: a fire stop system with an FT-Rating for the required time period which also passes the hose stream test for a prescribed period.
 - .5 L-Rating: largest test sample leakage rate, determined in accordance with the optional air leakage test in CAN/ULC-S115.
- .7 Multi-penetration: two or more service penetrations through an opening in the fire separation.
- .8 Non-rated Fire Separation: fire separation acting as a barrier to the spread of smoke until a response is initiated such as the activation of a fire suppression system.
- .9 Single-penetration: single service penetration through an opening in the fire separation.
- .10 System Design Listing: document providing proof of testing with technical details, specifications and requirements that leads to the application of a specific listed fire stop system.

I.04 REFERENCE STANDARDS

- .1 Firestop Contractors International Association (FCIA):
 - .1 FCIA Firestop Manual of Practice, 6th Edition 2015
- .2 Factory Mutual Approvals (FM):
 - .1 FM 4990- 2009, Approval Standard for Fire stopping
 - .2 FM 4991- 2013, Approval Standard for Firestop Contractors
- .3 International Accreditation Service (IAS):
 - .1 IAS AC291- 19, Accreditation Criteria for Special Inspection Agencies
- .4 International Firestop Council (IFC)
 - .1 IFC Guidelines for Evaluating Engineering Judgments
 - .2 IFC Guidelines for Evaluating Engineering Judgments - Perimeter Fire Barrier Systems
 - .3 IFC Inspection Guidelines for Penetration Firestop Systems and Fire Resistive Joint Systems in Fire Resistance Rated Construction, 5th Edition
- .5 National Fire Protection Agency (NFPA):
 - .1 NFPA 25I, Standard Methods of Tests of Fire Endurance of Building Construction and Materials
- .6 National Research Council Canada (NRC):
 - .1 National Building Code of Canada (NBC)
 - .2 Best Practice Guide on Fire Stops and Fire Blocks and Their Impact on Sound Transmission
- .7 ULC Standards (ULC):
 - .1 CAN/ULC-S101- 14, Standard Method of Fire Endurance Tests of Building Construction and Materials
 - .2 CAN/ULC-S102- 10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
 - .3 CAN/ULC-S114- 05, Standard Method of Test for Determination of Non-Combustibility in Building Materials
 - .4 CAN/ULC-S115- 11, Standard Method of Fire Tests of Firestop Systems
- .8 Underwriters Laboratories Inc. (UL):
 - .1 UL 1479- 2015, Fire Tests of Penetration Firestops
 - .2 UL Qualified Firestop Contractor Program

I.05 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings:
 - .1 Hold pre-installation meeting one week before beginning Work of this Section, with Contractor, Subcontractor and HWDSB in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify Project requirements.
 - .2 Review sustainable requirements.
 - .3 Review installation and substrate conditions.
 - .4 Discuss coordination with other Subcontractors.
 - .5 Review system design listings, manufacturer's installation instructions and warranty requirements.

- .6 Review quantity and location of mock-ups.
- .2 Hold pre-installation meetings with other trades to review:
 - .1 Installation procedures and precautions.
 - .2 Location, scheduling and sequencing of other work around fire stops that can affect the outcome of the installation.
 - .3 Requirements for annular opening sizes.
 - .4 Requirements and preparations for wall/floor single and multi-penetrations.
 - .5 Requirements for construction and perimeter joints.
 - .6 Mock-up requirements.
- .3 Submit copies of applicable listed fire stop system details to each trade for opening preparation. Include installation details required for the listed system.
- .4 Meeting minutes: Contractor to take minutes of pre-installation meetings and distribute to HWDSB and each affected trade.
- .2 Sequencing:
 - .1 Proceed with installation only when submittals have been reviewed by HWDSB.
 - .2 Install fire stops located in floor assemblies before interior partition erections.
 - .3 Metal deck bonding: Unless otherwise noted on system design listing and manufacturer's installation instructions, fire stopping to precede spray-applied fireproofing to ensure required bonding.
 - .4 Pipe and duct insulation: Certified fire stop system component.
 - .1 Ensure pipe and duct insulation installation precedes fire stopping.

I.06 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Qualification Statement:
 - .1 Submit contractor qualification statements and certificates demonstrating compliance with the qualification requirements of this Section, within ten working days after award of contract and before starting Work.
- .3 Product Data:
 - .1 Submit manufacturer's product data for each type of fire stopping and smoke seal. Submit complete product data for each individual component and include:
 - .1 Product name and product number
 - .2 Product characteristics and performance criteria
 - .3 Physical size, finish and limitations
 - .4 Technical data on out-gassing, off-gassing and age testing
 - .5 Curing time
 - .6 Chemical compatibility to other construction materials
 - .7 Shelf life
 - .8 Life expectancy

- .9 Temperature range for installation
- .10 Humidity range for installation
- .11 Sound attenuation STC-Rating
- .2 Manufacture Product Certification:
 - .1 Submit manufacturer certification certifying products supplied comply with local regulations controlling use of Volatile Organic Compounds (VOC's) and are non-toxic to building occupants.
 - .2 Submit test reports showing compliance to ASTM E595.
 - .3 Submit one copy of WHMIS Safety Data Sheets (SDS) for each individual component in accordance with Section 02 81 00 - Hazardous Materials
 - .4 Submit a comprehensive list of all products and components included in submittal.
- .4 Shop Drawings:
 - .1 Submit shop drawings showing system design listings for Project including proposed materials, reinforcement, anchorage, fastenings and method of installation.
 - .2 Construction details to accurately reflect actual job conditions for each product and assembly.
 - .3 Submit details for materials and prefabricated devices.
 - .4 Submit electronic copy of shop drawings and include:
 - .1 Title page, labelled "Fire and Smoke Stop System Listings". Include project name, date and the names of the installation company and the manufacturer of proposed products.
 - .2 Table of Contents.
 - .3 List of each proposed listed fire stop system and corresponding service penetration type or joint type in a matrix spreadsheet schedule, indicating floor and wall system, including rating for each.
 - .4 Location of penetrations:
 - .1 Drawings showing the location of each penetration with a unique penetration identification number and associated listing number.
 - .2 Schedules listing each penetration with a unique identification number, their associated listing number, organized by floor, wall and ceiling area and indicating each room number.
 - .5 System Design Listings:
 - .1 Submit design listings for each listed fire stop system and each application identified in accordance with CAN/ULC-SI 15
 - .2 When more than one product is specified for the listed fire stop system or more than one packing/damming material is indicated, identify the item that will be used on this Project.
 - .6 Certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Manufacturer's Instructions: Submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.
- .6 Samples: Submit to HWDSB and JASON FUNG ARCHITECT INC. a minimum one week before

beginning site work:

- .1 Submit two 300 x 300-mm samples of each system showing actual fire stop materials proposed for Project including anchors/fasteners and damming materials.
 - .2 Submit two samples of each type of label proposed for the identification of fire stops.
- .7 Quality Assurance Submittals: Submit the following in accordance with Section 01 43 00 - Quality Assurance:
- .1 Test reports in accordance with CAN/ULC-S101, CAN/ULC-S102, and CAN/ULC-S115.
 - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
 - .2 Document from Engineer of Record showing compliance of alternative fire stopping solution with CAN/ULC-S115 provided by the National Research Council, Best Practice Guide on Fire Stops and Fire Blocks and Their Impact on Sound Transmission.
 - .3 Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .4 Manufacturer's Instructions: Submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.
 - .5 Manufacturer's Site Reports: Submit manufacturer's reports within three days of review, verifying compliance of Work, as described in SITE QUALITY CONTROL in Part 3 of this Section.
- .8 Closeout Submittals:
- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .9 Operation and Maintenance Data: Submit maintenance data for incorporation into manual, including:
- .1 WHMIS Safety Data Sheets (SDS),
 - .2 product data and manufacturer's installation and maintenance instructions for each product/system used on this project,
 - .3 approved system design listings, and
 - .4 matrix schedule listing all system design listings with a description of their penetration or joint type.
 - .5 Certifications:
 - .1 Provide proof of training for each worker that performed installation on the Project.
 - .2 Provide proof of company installing fire stopping and smoke seals is a Member in Good Standing with FCIA.
 - .3 Certification of company as a ULC Qualified or FM 4991 Approved Firestop Contractor, including the Designated Responsible Individual (DRI) certificate.
 - .4 Accreditation of third-party inspection firm.
 - .6 Manufacturer's field reports.
 - .7 Warranty information on fire stop installations.
 - .8 Life expectancy of each product installed as part of Project. For each system, list the installation date of products and the expected expiration date (month/year).

.10 Record Documentation:

- .1 Maintain a daily log of all activities on site during the course of construction. Submit a copy of all daily logs after completion of fire stopping work.
- .2 As-built Drawings:
 - .1 Submit a marked-up set of Drawings to provide referencing system identifying the location of each fire stop.
 - .2 Identify each penetration type fire stop with their penetration identification number.
- .3 Provide detailed Drawings of system design listings for each type of fire stop (i.e., through-penetration, membrane penetration, blank opening, construction joint, building perimeter).
- .4 Fire Stop Schedules:
 - .1 Submit complete fire stop schedules for floors, walls and ceilings.
 - .2 Indicate all penetration fire stops and joint fire stops through each reference wall, floor and ceiling in the schedules.
 - .3 Cross-reference firestop schedules with as-built drawings and indicate design listing numbers associated to each penetration fire stop and joint fire stop.

I.07 QUALITY ASSURANCE

- .1 Regulatory Requirements: Use materials and methods of determining required thickness of application that are tested in accordance with CAN/ULC-S115, and form a part of a ULC or cUL listed system or Equivalent Fire Resistance Rated Assembly.
- .2 Provide systems selection and analysis, installation and inspection of fire stop systems in accordance with the recommended practices detailed in the following guides:
 - .1 FCIA Firestop Manual of Practice (MOP).
- .3 Qualifications:
 - .1 Contractor specializing in selection and installation of fire stops with five years documented experience. Submit a list of five successfully completed projects of similar scale and type.
 - .2 The installers are recognized as a Member in Good Standing with the Firestop Contractors International Association (FCIA). Submit proof of current membership.
 - .3 Training: Workers, including site supervisor, to complete:
 - .1 Manufacturer training on the products/systems installed as part of this Section.
 - .2 Training under the FCIA Firestop Containment Worker Education Program.
 - .4 Certified Firestop Contractor: company certified with one of the following programs:
 - .1 ULC Qualified Firestop Contractor Program. Submit signed copy of certificate.
 - .2 FM 4991 Approved Firestop Contractor. Submit signed copy of FM Approval certificate.
 - .5 Third-Party Inspection Firm: IAS AC291 Accredited inspection agency with inspectors who have passed the ULC Firestop Exam or FM Firestop Exam.
- .4 Mock-ups:
 - .1 Construct mock-up of fire stop systems in accordance with Section 01 43 00 - Quality Assurance.
 - .2 Before beginning construction, provide mock-up of each proposed listed fire stop system for

review by HWDSB. Mock-up shall include work by other trades to demonstrate the required finish work, such as steel stud/gypsum board trade framing out multi-penetration openings.

- .3 Install proposed identification labels for each penetration.
 - .4 Locations for mock-ups as directed by the HWDSB.
 - .5 After mock-up completion and adequate curing time for materials, provide a minimum of 48 hours notification to HWDSB to conduct review.
 - .6 Manufacturer's representative and inspection firm shall be present during review of mock-ups.
 - .7 Correct mock-up deficiencies as directed by HWDSB. Mock-up may not remain as part of finished work.
 - .8 HWDSB may perform destructive tests to each mock-up to ensure the system meets or exceeds the approved system design listing.
- .5 Manufacturer Site Visits:
- .1 Conducted after delivery and storage of products, and when preparatory Work is complete, but before installation begins.
 - .2 During progress of work at 75% completion.
 - .3 Conducted again upon completion of Work and after final cleaning is complete.

I.08 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings, manufacturing date, shelf life expiry date.
- .2 Storage and Protection:
 - .1 Store materials in a well-ventilated, dry indoor location and in accordance with manufacturer's instructions.
 - .2 Coordinate delivery of materials with scheduled installation dates to allow minimum storage time on site.
 - .3 Comply with recommended procedures, precautions and measures described in WHMIS Safety Data Sheets (SDS).
- .3 Waste Management and Disposal:
 - .1 Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

I.09 AMBIENT CONDITIONS

- .1 Ambient Conditions:
 - .1 Install fire stops and smoke seals when ambient and substrate temperatures are within the limits prescribed by the manufacturer and when the substrate is dry and without risk of condensation.
 - .2 Maintain manufacturer's recommended ambient and substrate temperatures for 48 hours before and 72 hours after installation.
- .2 Ventilate fire stops and smoke seals in accordance with manufacturers' instructions by natural means or, where this is inadequate or not available, use forced air circulation.

1.10 WARRANTY

- .1 Extend 12 month warranty period to 24 months for Work of this Section.
- .2 Manufacturers shall warrant work of this Section against defects and deficiencies in the product material for a period of 24 months. Promptly correct any defects or deficiencies which become apparent within warranty period at no expense.
- .3 Contractor warrants workmanship on materials and installation for a period of 24 months. Promptly correct any defects or deficiencies which become apparent within warranty period at no expense.

2 PRODUCTS

2.01 MANUFACTURERS

- .1 Provide products from a single manufacturer, to the greatest extent possible, to perform all fire stopping work. Materials of different manufacturers will not be permitted without authorization from HWDSB.
- .2 Provide a listed system from an alternative where there is no specific tested listed fire stop system available from the manufacturer for a particular fire stopping application to avoid providing an Engineering Judgment.

2.02 SUSTAINABILITY CHARACTERISTICS

- .1 Not Used.

2.03 PERFORMANCE/DESIGN CRITERIA

- .1 Fire stop and smoke seal systems consisting of a material or combination of materials installed to maintain the integrity of the fire-resistance rating of a fire separation in accordance with the requirements of the NBC.
- .2 Performance Requirements: Manufacturer shall design proprietary assemblies to withstand the listed ratings in accordance with the NBC, ULC Standards, and as follows:
 - .1 Non-rated fire separations: Provide L-Rated smoke protection fire stop system for application on both sides of separation.
 - .2 Provide through-penetration fire stop and joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of penetrated assembly, such as:
 - .1 Fire-resistance rated loadbearing walls, including partitions, with fire protection rated openings.
 - .2 Fire-resistance rated non-loadbearing walls, including partitions with fire protection rated openings.
 - .3 Fire-resistance rated floor assemblies.
 - .3 "F" Rated Systems: Provide through-penetration fire stop systems with F-ratings indicated, as determined by CAN/ULC-S115 or ASTM E814, and equal to or exceeding the fire-resistance rating of the penetrations created during construction.
 - .4 "T" Rated Systems: Where fire stop systems protect penetrating items from potential contact with adjacent materials, provide through-penetration fire stop systems with T-ratings and F-ratings indicated, as determined by CAN/ULC-S115 or ASTM E814, for the following

conditions:

- .1 Penetrations located outside wall cavities.
- .2 Penetrations located outside fire resistive shaft enclosures.
- .3 Penetrations located in a construction containing fire protection rated openings.
- .4 Penetrating items larger than a 100-mm-diameter nominal pipe or 100 cm² in overall cross-sectional area.
- .5 Fire stopping and Smoke Seal Systems Exposed to View: Provide products that after curing do not deteriorate when exposed to view, traffic, moisture, and physical damage both during and after construction, and as follows:
 - .1 Provide moisture resistant through-penetration fire stop systems for piping penetrations for plumbing and wet pipe sprinkler systems.
 - .2 Provide fire stopping and smoke seal systems capable of supporting anticipated floor loads either by installing floor plates or by other means for floor penetrations with annular spaces exceeding 100 mm in width and exposed to possible loading and traffic.
 - .3 Provide fire stopping and smoke seal systems not requiring removal of insulation for penetrations involving insulated piping.
 - .4 Provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 50 for fire stopping, smoke seal, and joint systems exposed to view.
 - .5 Architectural considerations: When fire stop system is exposed to view, consider architectural finish, potential traffic, and exposure to moisture and heat.
- .6 Fire Resistance of Joint Systems: Assembly ratings and movement capabilities shall be as indicated with assembly ratings equal to or exceeding the fire-resistance rating of constructions in which joints are located.
- .3 Dynamic Joints: Where required, design fire stop and smoke seal systems to accommodate a defined amount of movement in structural elements, construction joints and mechanical piping caused by expansion or contraction. Systems should also accommodate movement and sound and vibration control in mechanical installations.
- .4 Insulated Pipes and Ducts: Design and test listed fire stop system with the actual insulation materials penetrating the fire separation, as indicated on the system design listing.
- .5 Use in Wet Areas: water-based products are unacceptable in wet areas or areas that may be subject to occasional water exposure or flooding during and after construction.
- .7 Environment Considerations: Select materials taking into consideration the environment in which they will be used during and after curing, as well as the intended use of the space. Confirm compatibility of the proposed materials/products with fire stop manufacturer for the following situations:
 - .1 Spaces requiring resistance to infection and biological spread through assemblies.
 - .2 Spaces containing sensitive electronic equipment.
 - .3 Preventing contamination of laboratory and manufacturing environments.

2.04 MATERIALS

- .1 Compatibility: Under conditions of service and application, provide fire stopping and smoke seal systems that are compatible with one another, with the substrates forming openings, and with the

items, if any, penetrating the systems, as demonstrated by fire stopping and smoke seal system manufacturer based on testing and site experience, and as follows:

- .1 Asbestos-free materials and systems capable of maintaining an effective barrier against the passage of flame, smoke and water and the transmission of heat in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended, as indicated on System Design Listing.
- .2 Fire Stop System Rating: To match fire-resistance rating of fire separation as indicated on Drawings.
- .3 Service penetration assemblies and fire stop components: Certified by testing laboratory to CAN/ULC-S115.
- .4 Provide elastomeric seal or non-shrink foam cement mortar for fire and smoke stop systems at openings intended for re-entry, such as cables. Do not use cementitious or rigid seal at such locations.
- .5 Provide elastomeric protection for fire and smoke stop systems at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control. Do not use a cementitious or rigid seal at such locations. Exemption for fire dampers.
- .6 Provide elastomeric seal for fire and smoke seals behind and around mechanical and electrical boxes within wall, floor, and ceiling assemblies.

2.05 FILL MATERIALS

- .1 General:
 - .1 Provide fire stopping and smoke seal systems containing the types of fill materials indicated in SCHEDULE in Part 3 of this Section by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
 - .2 Fire stopping and smoke seal systems shall be tested in accordance with CAN/ULC-S115 and be comprised of asbestos free materials and systems capable of maintaining an effective barrier against flame, smoke and gases. Fire stopping and smoke seal systems not to exceed opening sizes for which they are intended for the ratings as indicated on Drawings.
- .2 Cast-in-Place Fire Stopping and Smoke Seal Devices: Factory assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- .3 Latex Sealants: Single component latex formulations that after curing do not re-emulsify during exposure to moisture.
- .4 Fire Stopping and Smoke Seal Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrating item.
- .5 Cable Penetration Devices:
 - .1 Pre-manufactured intumescent blocks
 - .2 Pre-manufactured sleeves, consisting of an adjustable core
 - .3 Pre-manufactured cable management system, consisting of a system of intumescent inserts and

adjustable cores

- .6 Intumescent Composite Sheets: Rigid panels consisting of aluminum foil faced elastomeric sheet bonded to galvanized steel sheet.
- .7 Intumescent Putties: Non-hardening dielectric, water resistant putties containing no solvents, inorganic fibres, or silicone compounds.
- .8 Intumescent Spray Foam: Expanding spray-in-place intumescent foam sealant.
- .9 Intumescent Wrap Strips: Single component intumescent elastomeric sheets with aluminum foil on one side.
- .10 Intumescent, Latex Sealant: Single-component, intumescent, latex formulation.
- .11 Job-Mixed Vinyl Compound: Prepackaged vinyl-based powder product for mixing with water at Project site to produce a paintable compound, passing ASTM E136, with flame-spread and smoke-developed ratings of zero per ASTM E84.
- .12 Solvent-Release-Curing Intumescent Sealant: Solvent-release-curing, single-component, synthetic-polymer-based sealant of grade indicated below:
 - .1 Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces. Non-sag formulation for openings in vertical and other surfaces requiring a non-slumping/gunnable sealant, unless indicated fire stop system limits use non-sag grade.
- .13 Mortars: Pre-packaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- .14 Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass fibre cloth cases filled with a combination of mineral fibre, water insoluble expansion agents and fire-retardant additives.
- .15 Silicone Foams: Multi-component, silicone based liquid elastomers that, when mixed, expand and cure in-place to produce a flexible, non-shrinking foam.
- .16 Silicone Sealants: Moisture curing, single component, silicone based, neutral curing elastomeric sealants of grade indicated below:
 - .1 Grade for Horizontal Surfaces: Pourable (self-levelling) formulation for openings in floors and other horizontal surfaces.
 - .2 Grade for Vertical Surfaces: Non-sag formulation for openings in vertical and other surfaces.
- .17 Ceramic-Fibre and Mastic Coating: Ceramic fibres in bulk form formulated for use with mastic coating, and ceramic fibre manufacturer's mastic coating.
- .18 Ceramic-Fibre Sealant: Single-component formulation of ceramic fibres and inorganic binders.

2.06 MIXING

- .1 For those products requiring mixing before application, comply with fire stopping and smoke seal system manufacturer's instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

2.07 FIRE-RESISTIVE ELASTOMERIC JOINT SEALANTS

- .1 Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer that comply with ASTM C920 requirements, including those referenced

for Type, Grade, Class, and Uses, and requirements specified in this Section applicable to fire-resistive joint sealants.

- .2 Single-Component, Neutral-Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, G, A, and (as applicable to joint substrates indicated) O.
 - .1 Additional Movement Capability: When tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, provide sealant with the capability to withstand the changes in joint width existing at the time of installation, and remain in compliance with other requirements of ASTM C920.
- .3 Multicomponent, Non-sag, Urethane Sealant: Type M; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, A, and (as applicable to joint substrates indicated) O.
 - .1 Additional Movement Capability: When tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, provide sealant with the capability to withstand the change in joint width existing at the time of installation, and remain in compliance with other requirements of ASTM C920.
- .4 Single-Component, Non-sag, Urethane Sealant: Type S; Grade NS; Class 25; and Uses NT, M, A, and (as applicable to joint substrates indicated) O.

2.08 FIRE STOP IDENTIFICATION

- .1 Identification Labels and Markings: Permanent for the expected service life of the installation.
- .2 Fire Stopped Penetrations:
 - .1 Provide identification labels at each penetration.
 - .2 Identification labels: adhesive plastic stickers, tamper-evident frangible stickers, embossed, metal tags, ceramic fiber tags with metal fastening device with the following information:
 - .1 penetration number
 - .2 floor number
 - .3 room number
 - .4 product name and number
 - .5 system design number
 - .6 fire rating required in hours.
 - .7 fire stop contractor's name and phone number
 - .8 installer's name
 - .9 date of installation
 - .10 re-penetrated by: company, installer and date
 - .3 Indicate on label that fill material around the penetration is a fire stop system and shall not be disturbed except by authorized personnel.
- .3 Fire Separation (Barrier) Markings:
 - .1 Provide identification for all vertical fire separations.
 - .2 Identification markings: adhesive, tamper evident, stickers, stencil painted with lettering at least 75 mm in height with a minimum 10mm stroke in contrasting colour.
 - .3 Incorporate assembly's fire-resistance rating and the following suggested wording, "FIRE

AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS", or other accepted wording.

- .4 Include horizontal red painted line, 75 mm in width, between identification markings.
- .5 For occupied areas with exposed ceilings: Use 50mm red dot adhesive stickers or stencil painted red dots without horizontal painted lines.

2.09 ACCESSORIES

- .1 Provide components for each fire stopping and smoke seal system needed to install fill materials. Use only components specified by fire stopping and smoke seal system manufacturer and approved by the qualified testing and inspecting agency for fire stopping and smoke seal systems indicated on Drawings.
- .2 Primers: To manufacturer's recommendation for specific material, substrate, and end use.
- .3 Water (if applicable): Potable, clean and free from harmful amounts of deleterious substances.
- .4 Metal Fire Stop: Commercial galvanized steel, to ASTM A1008/A1008M, zinc coating 260 g/m², minimum metal core thickness 0.912 mm.
- .5 Steel Deck Moulded Flute Inserts: One-piece moulded mineral fibre flute inserts, sized for steel deck profiles, for placement at top of fire-rated wall assemblies
- .6 Packing/Damming Materials, Supports and Anchoring Devices: To manufacturer's recommendations, and in accordance with tested assembly.
- .7 Fire Stop Insulation: Pre-formed, semi-rigid, non-combustible mineral wool, pre-cut in 1220-mm lengths to required depth and width.
- .8 Junction Box/Outlet Sealing Putty: Intumescent putty, pre-formed in pads.
- .9 Sealants: Good adhesion without use of primer, high visibility safety colours.
 - .1 Flame-spread rating: Maximum 25
 - .2 Smoke development classification: Maximum 50
 - .3 For vertical joints: Non-sagging
 - .4 For horizontal joints: Single component, self-levelling

3 EXECUTION

3.01 EXAMINATION

- .1 Verify that conditions of substrates previously installed are acceptable for product installation in accordance with manufacturer's instructions and approved system design listings for each condition.
- .2 Verify each opening/annular space to ensure it does not exceed the maximum and minimum dimensions indicated on the approved system design listing.
- .3 Verify that all joints, service penetrating elements and supporting devices/hangers have been properly installed as indicated on approved system design listings. Remove all temporary lines and markings to meet the approved system design listings.
- .4 Verify that proposed fire stop system consists of components that are compatible with each other, with substrates forming the openings, and with items, if any, penetrating the fire stop under conditions of application and service, as demonstrated by the fire stop manufacturer based on testing and site experience.

- .5 Pipe and Duct Insulation: Confirm that proposed fire stop system has been tested with the actual insulation penetrating the fire separation on site, as indicated in the approved system design listing. Maintain insulation around pipes and ducts penetrating the fire separation.
- .6 Ensure no additional items have been installed through opening that does not appear on the approved system design listing.
- .7 Ensure fire stopped areas are accessible for proper application and that conditions are suitable for installation of the fire stop system. Areas to remain accessible for inspection.
- .8 Report in writing to HWDSB any defective surfaces or conditions affecting the fire stop system installation immediately and before commencing any installations.
- .9 Proceed only once defected surfaces or conditions have been corrected.
- .10 Proceed with installation only after unacceptable conditions have been remedied.

3.02 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
 - .1 Ensure that substrates and surfaces are clean, dry and frost free.
 - .2 Ensure substrates and surfaces are free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
- .2 Prepare surfaces in contact with fire stop and smoke stop materials to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.
- .5 Protect adjacent work areas and finish surfaces from damage during product installation.
- .6 Prime surfaces as required.
- .7 Ensure multi-penetration openings have been framed and boarded out around annular openings, as indicated in the system design listing before prepping the opening.

3.03 INSTALLATION

- .1 Install fire stop and smoke seal materials and components in accordance with manufacturer's certified tested system listing.
- .2 Coordinate with other sub-trades to ensure that all pipes, conduits, cables, and other items, which penetrate fire separations, have been permanently installed before installation of fire stop systems.
- .3 Schedule work to ensure that fire separations and all other construction that conceals penetrations are not erected before installation of fire and smoke seal systems
- .4 Seal holes or voids made by through-penetrations, poke-through termination devices, and un-penetrated openings or joints to ensure that both continuity and integrity of fire separation are maintained.
- .5 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing per manufacturer's instructions.
- .6 Tool or trowel exposed surfaces to neat finish.

- .7 Remove excess compound promptly as work progresses and upon completion.
- .8 Protect gaps around recessed components (e.g., panels, electrical boxes, outlets) with sealing putty in accordance with manufacturer's instructions.
- .9 Do not use damaged or expired material.

3.04 INSTALLATION - JOINT FIRE STOPS

- .1 For sealant applications, install joint fillers to support fire stop materials during application. Position joint fillers to ensure fire stop material cross-sectional shape and thickness relative to the joint width allows for optimum sealant movement, while developing the required fire-resistance rating.
- .2 Install fire stops using techniques recommended by the manufacturer:
 - .1 Fully wetting joint substrates to optimize adhesion.
 - .2 Completely filling recesses provided for each joint configuration.
 - .3 Tool non-sag fire stop materials immediately after their application and before the time skinning begins. Form smooth, uniform beads of configuration indicated or required to
 - .1 provide required fire-resistance rating,
 - .2 eliminate air pockets, and
 - .3 ensure contact and adhesion with sides of joint.
 - .4 Joint Systems and Perimeter Fire Containment Systems:
 - .1 For systems with dynamic joints, ensure movement capabilities of the installation meet or exceed the movement expectations of the system design listing and manufacturer's installation instructions.

3.05 INSTALLATION – THROUGH PENETRATION JOINT SEALANTS

- .1 Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position required to achieve fire ratings of designated through-penetration fire stop systems.
- .2 Install fill materials for through-penetration fire stop systems by techniques recommended by the manufacturer to produce the following results:
 - .1 Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
 - .2 Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - .3 For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- .3 Remove combustible forming materials and other accessories not indicated as permanent components of fire stop systems.

3.06 IDENTIFICATION

- .1 General:
 - .1 Clean substrate before applying identification.
 - .2 Determine final location of identification on site.

- .3 Identification is not required on both sides of the fire separation.
- .4 Refer to Drawings for locations of fire separations and rating required.
- .2 Fire Stopped Penetrations:
 - .1 Install identification label adjacent to each fire stopped wall/floor service penetration. Provide one identification label per single opening or per grouping cluster.
 - .2 Securely apply identification to substrate by providing adequate adhesive
 - .3 Secure tags with metal fasteners or hang with metal chain or wire.
 - .4 Identification shall be completely filled out and installed before requesting substantial performance.
- .3 Fire Separations (Barriers):
 - .1 Position identification at least 4500 mm from end of each wall and at intervals not exceeding 9000 mm along wall/floor joint fire stops.
 - .2 Install markings within ceiling spaces, 600 mm below horizontal fire separation or roof structure unless otherwise indicated on Drawings.
 - .3 Review location of identification with HWDSB for occupied areas with exposed ceilings before proceeding.

3.07 REPAIRS AND MODIFICATIONS

- .1 Identify damaged or re-entered seals requiring repair or modification.
- .2 Remove loose or damaged materials. If adding penetrating items, remove sufficient material to insert new elements and to avoid damaging the balance of the seal.
- .3 Ensure sealed surfaces are clean and dry.
- .4 Use only materials that are suitable for repair of original seal, as approved by manufacturer. Do not mix products from different manufacturers.

3.08 SITE QUALITY CONTROL

- .1 Inspections: Notify HWDSB when ready for inspection and before concealing or enclosing fire stop materials and service penetration assemblies.
- .2 Manufacturer's Field Services:
 - .1 Mock-ups: Manufacturer to provide confirmation that the fire stop system installed meets or exceeds the system design listing requirements for each mock-up application.
 - .2 Obtain report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Site Reports as described in SUBMITTALS in Part I of this Section.
 - .3 Provide manufacturer's site services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.09 INSPECTIONS

- .1 Third-Party Inspection Firm: Provide the services of a third-party inspection firm to conduct random inspections and direct exploratory review (i.e., destructive testing) during the course of construction and before closing off any concealed areas. Perform inspections and destructive

testing in compliance with ASTM E2174 and ASTM E2393.

- .2 HWDSB to conduct random inspections and direct exploratory review (i.e., destructive testing) during the course of construction and before closing off any concealed areas. Perform inspections and destructive testing in compliance with ASTM E2174 and ASTM E2393.
 - .1 Include a minimum of 2% of each 900-m² area for exploratory reviews for each approved system design listing and each trade involved. Perform cut tests at perimeter joints every 15 meters. Perform cut test at bottom and top of wall joints and wall-to-wall joints and building expansion joints every 15 meters.
 - .2 Perform exploratory review as directed by HWDSB and Third-Party Inspection Firm. Cut out fire stop and remove to ensure fire stop system installation meets or exceeds the system design listing as identified.
- .3 Upon completion of construction and before requesting substantial performance review, fire stop contractor and manufacturer's representative shall inspect all fire stopping work and prepare a deficiency list. Submit deficiency list to HWDSB for review. Repair any deficiencies and re-inspect work to ensure that all deficiencies have been completed.
- .4 Submit formal request for substantial performance review of work once all work is completed, quality control has been performed and all fire stop installations have been inspected and identified with the approved fire stop identification labels.
- .5 HWDSB and Third-Party Inspection Firm will conduct the substantial performance review in the presence of the fire stop Contractor and the manufacturer's representative.

3.10 CLEANING

- .1 Perform cleaning in accordance with Section 01 74 00 - Cleaning.
- .2 Remove equipment, excess materials and debris and clean adjacent surfaces immediately after application. Use methods and cleaning materials approved by manufacturer.
- .3 Protect fire stops during and after curing period from contact with contaminating substances
- .4 Remove temporary dams after initial set of fire stop and smoke seal materials.

3.11 SCHEDULE

- .1 Provide fire stop and L-Rated smoke-resistant fire stop systems at locations shown on Drawings and details.
- .2 Design and provide through-penetration fire stopping and smoke seals as follows:
 - .1 Systems with no penetrating items, select one or more of the following fill materials:
 - .1 latex sealant
 - .2 silicone sealant
 - .3 intumescent putty
 - .4 intumescent foam blocks or boards
 - .5 intumescent spray foam
 - .2 Systems for metallic pipes, conduit, or tubing, select one or more of the following fill materials:
 - .1 latex sealant
 - .2 silicone sealant

- .3 intumescent putty
- .4 intumescent foam blocks or boards
- .5 intumescent spray foam
- .3 Systems for non-metallic pipe, conduit, or tubing, select one or more of the following fill materials:
 - .1 latex sealant
 - .2 silicone sealant
 - .3 intumescent putty
 - .4 intumescent foam blocks or boards
 - .5 intumescent spray foam
- .4 Re-enterable and cable managed systems for electrical, and data and communications cables:
 - .1 prefabricated fire stop sleeve cp653 (hilti)
 - .2 preformed intumescent blocks cfs-bl (hilti)
 - .3 preformed intumescent blocks (roxtec)
 - .4 prefabricated cable pathways (ez-path)
- .5 Systems for electrical, and data and communications cables, select one or more of the following fill materials:
 - .1 latex sealant
 - .2 silicone sealant
 - .3 intumescent putty
 - .4 silicone foam
 - .5 prefabricated fire stop sleeve cp 653 (hilti)
 - .6 preformed intumescent blocks cfs-bl (hilti)
 - .7 preformed intumescent blocks (roxtec)
 - .8 prefabricated cable pathways (ez-path)
 - .9 intumescent foam blocks or boards
 - .10 intumescent spray foam
- .6 Systems for cable trays, select one or more of the following fill materials:
 - .1 latex sealant
 - .2 intumescent putty
 - .3 silicone foam
 - .4 pillows/bags
 - .5 intumescent foam blocks or boards
- .7 Systems for insulated pipes, select one or more of the following fill materials:
 - .1 latex sealant
 - .2 intumescent putty
 - .3 silicone foam

- .4 intumescent wrap strips
- .5 intumescent foam blocks or boards
- .6 intumescent spray foam
- .8 Systems for miscellaneous electrical penetrations, select one or more of the following fill materials:
 - .1 latex sealant
 - .2 intumescent putty
 - .3 intumescent foam blocks or boards
 - .4 intumescent spray foam
- .9 Systems for miscellaneous mechanical penetrations, select one or more of the following fill materials:
 - .1 latex sealant
 - .2 intumescent foam blocks or boards
 - .3 intumescent spray foam
- .10 Systems for groupings of penetrations, select one or more of the following fill materials:
 - .1 latex sealant
 - .2 intumescent wrap strips
 - .3 fire stopping and smoke seal device
 - .4 intumescent composite sheet
 - .5 intumescent foam blocks or boards
 - .6 intumescent spray foam
- .3 Design and provide joint fire stopping and smoke seals as follows for:
 - .1 Floor-to-Floor, Fire-Resistive Joint System: Provide materials to meet the following criteria:
 - .1 assembly rating: as indicated
 - .2 nominal joint width: as indicated
 - .3 movement capabilities: compression and extension
 - .2 Floor-to-Wall, Fire-Resistive Joint System: Provide materials to meet the following criteria:
 - .1 assembly rating: as indicated
 - .2 nominal joint width: as indicated
 - .3 movement capabilities: to be confirmed, compression, extension, or horizontal shear
 - .3 Head-of-Wall, Fire-Resistive Joint System: Provide materials to meet the following criteria:
 - .1 assembly rating: as indicated
 - .2 nominal joint width: as indicated
 - .3 movement capabilities: compression and extension
 - .4 Wall-to-Wall, Fire-Resistive Joint System: Provide materials to meet the following criteria:
 - .1 assembly rating: as indicated
 - .2 nominal joint width: as indicated

- .3 movement capabilities: compression and extension
- .4 Design and provide perimeter fire containment fire stopping and smoke seals as follows for:
 - .1 Perimeter Fire Containment System: Provide materials to meet the following criteria:
 - .1 integrity rating: as indicated
 - .2 insulation rating: as indicated
 - .3 linear opening width: as indicated

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 09 21 16 – Gypsum Board Assemblies.

I.02 DEFINITIONS

- .1 Environmental Product Declaration (EPD): Submit an Industry-wide EPD for each metal product outlined in the specification. Provide EPD with at least a cradle to gate scope, identifying the following impact categories (minimum):
 - .1 Global Warming Potential (GWP): Submit GWP information in the form of kgCO₂ eq.
 - .2 Ozone Depletion Potential (ODP): Submit ODP information in the form of kgCFC-11 eq.
 - .3 Acidification Potential (AP): Submit AP information in the form of kgSO₂ eq.
 - .4 Eutrophication Potential (EP): Submit EP information in the form of kgN eq.
 - .5 Smog Formation Potential (SFP): Submit SFP information in the form of kgO₃ eq. Also referred to as Photochemical ozone creation potential (POCP).

I.03 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB) 1330:
 - .1 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound
- .2 Department of Justice Canada (Jus):
 - .1 Canadian Environmental Protection Act, 1999 (2018) (CEPA)
- .3 General Services Administration (GSA) - Federal Specifications (FS):
 - .1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
 - .1 Safety Data Sheets (SDS)
 - .2 Sealant, Waterproofing, and Restoration Institute (SWRI): Sealants: The Professionals' Guide 2013
- .5 Transport Canada (TC):
 - .1 Transportation of Dangerous Goods Act, 1992 (2019 amended.) (TDGA)
- .6 ULC Standards/ UL Canada (ULC):
 - .1 CAN/ULC 115-2018, Standard Method of Fire Tests of Firestop Systems

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's product data for each type of primer, backer rod, and sealants and include product characteristics, performance criteria, available colours, compatibility warnings, compliance standards and limitations.
 - .2 Manufacturer's product to describe:

- .3 Submit one electronic copy of WHMIS SDS.
- .3 Samples:
 - .1 Submit two samples of each type of joint sealant material and colour.
 - .2 Submit two cured samples of exposed sealants of each colour to match adjacent material.
- .4 Certificates: When requested by HWDSB, submit manufacturer's product certificates indicating proposed sealant is appropriate for each application on this Project.
- .5 Manufacturer's Instructions:
 - .1 Submit instructions for each type of product.

I.05 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: Submit maintenance data for incorporation into manual.

I.06 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Manufacturer: Obtain each type of joint sealant from a single manufacturer.
 - .2 Minimum three years successful experience in Work of similar size and complexity.
- .2 Compatibility: Ensure sealants are compatible with adjacent materials and are approved by manufacture for use with adjacent materials.
- .3 Mock-Ups:
 - .1 Construct mock up in accordance with Section 01 43 00 - Quality Assurance.
 - .2 Before performing sealant work do sample applications of each type of sealant for review.
 - .3 Site locations for sample applications shall be designated by HWDSB.
 - .4 Construct joint sealant mock-ups in assemblies of other Sections with joint sealants, which are referenced in this Section.
- .4 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Safety Data Sheets (SDS) acceptable to Health Canada.

I.07 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements: Deliver materials to site in original factory packaging, with manufacturer's label.
- .2 Storage and Handling Requirements:
 - .1 Store materials in a ventilated dry indoor location and in accordance with manufacturer's recommendations.
 - .2 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
 - .3 Do not dispose of unused sealant material into sewer system, streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
 - .4 Divert unused joint sealing material from landfill to official hazardous material collections site approved by HWDSB.

1.08 AMBIENT CONDITIONS

- .1 Proceed with installation of joint sealants only when:
 - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
 - .2 Joint substrates are dry.
 - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 HWDSB will arrange for ventilation system to be operated on maximum outdoor air and exhaust during installation of sealants. Ventilate area of work as directed by HWDSB by use of approved portable supply and exhaust fans.

1.09 WARRANTY

- .1 Manufacturer's warranty: Provide manufacturer's standard warranty documentation.
- .2 Warrant that sealant work will not leak, crack, crumble, melt, shrink, run, lose adhesion or stain adjacent surfaces in accordance with General Conditions, except for five years.
- .3 Installer's Warranty: Provide an installation warranty, installer agrees to repair or replace joint sealants that do not comply with requirements of this Section for two years from Substantial Performance.

2 PRODUCTS

2.01 SUSTAINABILITY CHARACTERISTICS

- .1 When low toxicity sealants are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.
- .2 VOC emissions limits shall be as follows:
 - .1 Sealant Primers:
 - .1 for non-porous surfaces: 250 g/L
 - .2 for porous surfaces: 775 g/L
 - .3 for modified bituminous membranes: 500 g/L
 - .4 for marine deck: 760 g/L
 - .5 for other conditions: 420 g/L
 - .2 Sealants:
 - .1 architectural: 250 g/L
 - .2 marine deck: 760 g/L
 - .3 non-membrane roof: 300 g/L
 - .4 roadway: 250 g/L
 - .5 single-ply roof membrane: 450 g/L
 - .6 other conditions: 420 g/L

2.02 PERFORMANCE REQUIREMENTS

- .1 Each sealant system shall meet the following requirements for warranty period:
 - .1 Waterproof, flexible, and compatible with substrate under applicable service conditions.
 - .2 Provide a weather-tight seal that does not allow moisture penetration.
 - .3 Shall not de-bond, crack, or craze.
 - .4 Shall not leak.

2.03 SEALANT MATERIALS

- .1 In air handling units and supply air system, use sealants without strong odours, without toxic chemicals, and are mould-resistant. When low toxicity sealants are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.
- .2 Provide primers in accordance with manufacturer recommendation.

2.04 SEALANT MATERIAL DESIGNATIONS

- .1 Type S-1: Acrylic Latex One Part, Shore A Hardness 20,
- .2 Type S-2: Silicone Sealant; mould and mildew resistant.
 - .1 To ASTM C920 CAN/CGSB-19.13; type S; grade NS; class 50; use NT, G, and A.
 - .2 To ASTM C920 CAN/CGSB-19.13; type S; grade NS; class 25; use NT, G, and A.
- .3 Type S-3: Silicone Sealant; general construction and air-seal sealant.
 - .1 To ASTM C920: type S; grade NS; class 25; use NT, M, G, A, O.
- .4 Type S-4: Silicone Sealant; structural glazing.
 - .1 To ASTM C920 CAN/CGSB-19.13: type S; grade NS; class 25; use NT, A, G, O.
- .5 Type S-5: Acoustical Sealant; interior, non-skimming, non-hardening, simple component synthetic rubber sealant, to ASTM C919.
- .6 Type S-6: Multi-component polyurethane sealant; chemical curing, exterior wall sealant.
 - .1 To ASTM C920 CAN/CGSB-19.24: type M; grade NS; class 50; use T, NT, M, A, O.
- .7 Type S-7: One-component polyurethane sealant; non-sag, for general construction.
 - .1 To ASTM C920 CAN/CGSB-19.24: type S; grade NS; class 25; use NT, M, A, O.
- .8 Type S-8: Horizontal joint sealant; two component, self-levelling.
 - .1 To ASTM C920 CAN/CGSB-19.13: type M; grade P; class 25; use T, M, O.
- .9 Type S-9: One part moisture curing, low modulus polyurethane sealant for sealing joints in level and slightly slope surfaces conforming to ASTM C920 CAN/CGSB-19.24, type S, grade P, class 50, use T, M, A, O, MC-I-25-B-N.
- .10 Type S-10: Control joint sealant: two-component, epoxy-urethane, self-levelling, load bearing saw cut or preformed control joints.
- .11 Type S-11 Control Joint Sealant: Two component, polyurea based, load bearing, self levelling sealant.
- .12 Type S-12 Control Joint Sealant: Two component, semi-rigid epoxy, load bearing, self levelling sealant.

- .13 Type S-13: One-component polyurethane sealant; medium-modulus, non-sag, low-VOC, UV stable, to CAN/CGSB-19.24.
- .14 Type S-14: Polysulfide two part:
 - .1 Self-levelling to CAN/CGSB-19.24, Type 1, Class B.
 - .2 Non-sag: to CAN/CGSB-19.24, Type 2, Class B.
- .15 Type S-15: Polysulfide one part:
 - .1 Self-levelling: to GRADE P, Class 35 25. Use MC-1-40-B-N MC-1-25-B-N.
 - .2 Non-sag: Grade NS, Class 35 25 use M, A.
- .16 Type S-16: To ASTM C920, Two-component, Type M, Grade P, Class 25 FS-SS-S-200E, Type 2, aviation fuel-resistant; polyurethane elastomeric, chemical cured.

2.05 SEALANT SELECTION

- .1 Where no specific type of sealant is scheduled, provide one of the sealants indicated in this Section appropriate for its application and consistent with manufacturer's recommendations and the recommendations of SWRI, Sealants: The Professionals' Guide.
- .2 Make sealant selections consistent with manufacturer's recommendations.
- .3 Use acrylic sealant Type S-1 only on the interior and only in situations where little or no movement can occur.
- .4 Use mould & mildew resistant silicone sealant Type S-2 for nonmoving joints in washrooms and kitchens. Do not use on floors.
- .5 Use silicone general construction sealant Type S-3 or Type S-6 and S-7 for all joints, interior and exterior, where no other specific sealant type specified.
- .6 Use structural glazing silicone Type S-4 for sealing glass, interior and exterior.
- .7 Use acoustical sealant Type S-5 and air seal sealant Type S-3 only where they will be fully concealed and only where no constant or consistent air pressure difference will exist across the joint.
- .8 Use multi component sealant type S-6, primed penetration element surfaces other than concrete, for mechanical and electrical service penetrations in concrete foundation walls.
- .9 Use multi component sealant Type S-8 for horizontal joint sealant of plaza, floors and decks, exterior areas only, subject to pedestrian and vehicular traffic.
- .10 Use polyurethane, semi-self levelling sealant Type S-9 for in expansion joints in sidewalks, plazas, floors and other pedestrian and vehicular horizontal surfaces with slopes up to 6%.
- .11 Use control joint sealant S-10 as filler for interior, horizontal saw cut or preformed control joints where joints are subject to load bearing conditions.
- .12 Use control joint sealant S-10 as filler for interior only, horizontal saw cut or preformed control joints where joints are subject to load bearing conditions.
- .13 Use control joint sealant S-11 as filler for interior, horizontal saw cut or preformed control joints, where joints are subject to low temperatures (freezer floors) and where joints require nosing support.
- .14 Use control joint sealant S-12 as filler for interior, horizontal saw cut or preformed control joints where joints are subject to thermal shock conditions, traffic loops, and where a high bond strength is required.
- .15 Use sealant S-13 for sealing exterior holes and penetrations around pipes and other services passing

through concrete foundations and requiring greater movement capability.

2.06 ACCESSORIES

- .1 Preformed compressible and non-compressible back-up materials that are non-staining, compatible with joint substrate, sealants, primers, and other joint fillers, and are approved for applications indicated by sealant manufacturer based on site experience and laboratory testing:
 - .1 Rod Type Sealant Backings:
 - .1 ASTM C1330, Type C (closed cell material with a surface skin), Type O (open cell material) or Type B (bi cellular material with a surface skin).
 - .2 Provide any of the preceding types, as approved in writing by joint sealant manufacturer for joint application indicated.
 - .3 Size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 - .4 Non adhering to sealant, to maintain two sided adhesion across joint.
 - .2 High Density Foam:
 - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m³ density, or neoprene foam backer, size as recommended by manufacturer.
 - .3 Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, non absorbent to water and gas, capable of remaining resilient at temperatures down to 15 deg C. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth and otherwise contribute to optimum sealant performance.
 - .4 Bond Breaker Tape:
 - .1 Polyethylene bond breaker tape or other tape recommended by sealant manufacturer which will not bond to sealant.
- .2 Preformed Sealants:
 - .1 Preformed Silicone Sealant System: Manufacturer's standard system consisting of pre-cured low modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral curing silicone sealant for bonding extrusions to substrates.
 - .2 Preformed Hollow Neoprene Gasket: Manufacturer's standard preformed polychloroprene elastomeric joint seal of the open cell compression type complying with ASTM D2628 and with requirements for size, profile and cross sectional design.
- .3 Bond Breaker: Pressure-sensitive plastic tape that will not bond to sealants.
- .4 Joint Cleaner: Provide a non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's recommendations
- .5 Primer: Provide in accordance with sealant manufacturer's recommendations.
- .6 Masking Tape: Non-absorbent type, non-staining, compatible with joint sealant and joint substrates.

2.07 COLOURS

- .1 Sealant Colours: Match colour of adjacent materials where visible, as selected by HWDSB and JASON FUNG ARCHITECT INC., from manufacturer's complete colour range.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed are acceptable for joint sealants installation in accordance with manufacturer's instructions.
 - .1 Visually inspect substrate.
 - .2 Verify joint surfaces are dry and frost free.
 - .3 Verify substrates are without contaminants capable of interfering with sealant adhesion. Remove contaminants where occurring.
 - .4 Examine joint sizes and conditions to establish acceptable depth to width ratio for installation of backup materials and application of sealants.
 - .5 Verify joint widths are within the limits recommended by joint sealant manufacturer for applications indicated.
 - .6 Inform HWDSB of unacceptable conditions immediately upon discovery.
 - .7 Proceed with installation only after unacceptable conditions have been remedied.

3.02 SURFACE PREPARATION

- .1 Clean bonding joint surfaces of harmful contaminants including dust, rust, oil grease, and other matter which may impair adhesion.
- .2 Do not apply sealants to joint substrates treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- .3 Prepare surfaces in accordance with manufacturer's directions.

3.03 PRIMING

- .1 Mask adjacent surfaces prior to priming and sealing where necessary to prevent staining.
- .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately applying sealant, except when manufacturer's instructions explicitly state priming is not required.
- .3 Prime all porous material (e.g. wood, masonry, concrete, ceramic or paver tile, etc).

3.04 BACKUP MATERIAL

- .1 Provide backer rod as specified, to limit depth of sealant and to act as bond breaker at back of joint.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.
- .3 Apply paper masking tape to back of joint to act as bond break where depth of joint does not permit the use of backer rod.
- .4 Ensure that no joints are formed which are bonded on adjacent sides where there is any possibility of movement.

3.05 MIXING

- .1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.06 APPLICATION

- .1 Sealant: Application: Apply sealants to recommendations of ASTM C1193, and of ASTM C1481 for EIFS systems, and in accordance with manufacturer's instructions, and as follows:
 - .1 Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature range.
 - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
 - .3 For joints where movement is possible, apply backer rod to achieve a joint depth of one half the joint width but not less than 9 mm; for joints larger than 25 mm use a depth of 13 mm
 - .4 Apply sealant in a continuous beads.
 - .5 Apply sealant using gun with proper size nozzle.
 - .6 Fill voids and joints solid.
 - .7 Form sealant surface with a smooth full bead, without from ridges, wrinkles, sags, air pockets, embedded impurities.
 - .8 Tool exposed surfaces before skinning begins to give slightly concave shape.
 - .9 Ensure bead is solid, filling entire space between sides and bedding material, exerting sufficient pressure to obtain maximum bond, by allowing sealant to bulge out in advance of nozzle.
 - .10 Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature range.
 - .11 Seal at all locations where dissimilar material meet.
- .2 Sealant Curing:
 - .1 Cure sealants in accordance with sealant manufacturer's instructions.
 - .2 Do not cover up sealants until after curing has completed.

3.07 CLEANING

- .1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Clean adjacent surfaces immediately of excess primers and sealants.
 - .2 Remove excess and droppings, using recommended cleaners as work progresses.
 - .3 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: Perform in accordance with Section 01 74 00 - Cleaning upon completion.
- .3 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Do not dispose of unused sealant materials into sewer system, streams, lakes, onto ground, or other location where it might pose a health or environmental hazard.
 - .2 Divert unused sealants from landfill to a hazardous material collection site.
 - .3 Place materials defined as hazardous or toxic in designated containers.
 - .4 Dispose of hazardous materials in accordance with the CEPA, TDGA, regional and municipal regulations.

3.08 PROTECTION

- .1 Protect installed products and components from damage during construction.

- .2 Repair damage to adjacent materials caused by joint sealants installation.

3.09 SCHEDULE

- .1 Use acrylic sealant Type S-1 only on the interior and only where little or no movement can occur.
- .2 Use silicone general construction sealant Type S-3 or Type S-6 and S-7 for all joints, interior and exterior, where no other specific sealant type is specified.
- .3 Use acoustical sealant Type S-5 only where they will be fully concealed and only where no constant or consistent air pressure difference will exist across the joint.
- .4 Use multicomponent sealant type S-6, primed penetration element surfaces other than concrete, for mechanical and electrical service penetrations in concrete foundation walls.
- .5 Use control joint sealant S-10 as filler for interior, horizontal saw cut or preformed control joints where joints are subject to load bearing conditions.
- .6 Use control joint sealant S-11 as filler for interior, horizontal saw cut or preformed control joints, where joints are subject to low temperatures (freezer room floors) and where joints require nosing support.
- .7 Use control joint sealant S-12 as filler for interior, horizontal saw cut, or preformed control joints where joints are subject to thermal shock conditions, traffic loops, and where a high bond strength is required.
- .8 Seal control joints in gypsum board, except where prefabricated control joints are specified.
- .9 Seal junctures between interior partitions with exterior walls.
- .10 Seal joints in floors and walls and around service and mechanical and electrical fixture penetrations.
- .11 Expansion and control joints in exterior surfaces of poured-in-place concrete walls.
- .12 Expansion and control joints in exterior surfaces of precast architectural wall panels.
- .13 Cornice and wash (or horizontal surface joints).
- .14 Control and expansion joints on the interior of exterior cast-in place concrete walls.
- .15 Joints of underside of precast beams or planks.
- .16 Interior control and expansion joints in floor surfaces.
- .17 Perimeters of interior frames and exterior frames.
- .18 Joints at tops of non-load bearing masonry walls at the underside of poured concrete.
- .19 Exposed interior control joints in gypsum board.
- .20 Seal joint edges of washroom fixtures with silicone at walls and floors.

END OF SECTION

I GENERAL

I.01 SECTION INCLUDES

- .1 Curb-mounted plastic unit skylights.
- .2 Standard double dome configuration.
- .3 Pyramid over dome configuration.

I.02 RELATED SECTIONS

I.03 PERFORMANCE REQUIREMENTS

- .1 General: Provide unit skylights capable of withstanding loads as prescribed by the prevailing code for the project location.
- .2 Unit skylights must be tested in accordance with AAMA\WDMA\CSA\101\I.S.2\A440
- .3 Unit skylights must be tested and certified by NFRC for thermal performance. Products must be listed on the NFRC Certified Products directory.
- .4 System Performance Requirements:
 - .1 U-factor shall be .61 BTU/HR-ft²-F maximum per NFRC 100
 - .2 SHGC shall be .45 maximum
 - .3 Visible Light Transmission shall be 60% per ASTM E972

I.04 SUBMITTALS

- .1 Product Data Sheet: For each type of skylight specified, include details of construction and installation, relative to applicable roofing materials.
- .2 Samples for Selection: Manufacturer's color charts showing a full range of colors available for each type of skylight glazing and aluminum finish.

I.05 QUALITY ASSURANCE

- .1 Fire-Test-Response Characteristics: Provide Thermoformed domes fabricated from sheets identical to those tested for the following fire-test-response characteristics, per ASTM test method indicated below, by UL or other testing and inspecting agencies acceptable to authorities having jurisdiction. Identify plastic sheets with appropriate markings of applicable testing and inspecting organization.

- .1 Self-Ignition Temperature: 343 deg C or greater when tested per ASTM D 1929 on plastic sheets in the thickness intended for use.
- .2 Smoke density of 75 or less when tested per ASTM D 2843 on plastic sheets in the thickness intended for use.
- .3 Relative- Burning Characteristics: As follows, when tested per ASTM D 635:
 - .1 Class CC2 Burning rate of 2.5 inches (64 mm) per minute or less when tested on plastic glazing indicated above with a nominal thickness of 0.060 inch (1.5 mm) or the thickness intended for use.

1.06 WARRANTY

- .1 General: Warranties specified in this section shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.
- .2 Skylight Warranty: Provide written warranty signed by manufacturer, agreeing to repair or replace work that exhibits defects in materials or workmanship and guaranteeing weather-tight and leak-free performance. "Defects" is defined as uncontrolled leakage of water and abnormal aging or deterioration.
 - 1. Warranty Period: 5 years from date of Substantial Completion.
- .3 Plastic Warranty: Provide written warranty signed by manufacturer agreeing to repair or replace work that has or develops defects in the plastic. "Defects" is defined as abnormal aging or deterioration.
 - 1. Warranty Period: years from date of Substantial Completion against yellowing or breakage.
- .4 Finish Warranty: Provide written warranty signed by manufacturer agreeing to repair or replace work with finish defects. "Defects" is defined as peeling, chipping, chalking, fading, abnormal aging or deterioration, and failure to perform as required.
 - 1. Warranty Period for Anodized Finish: 5 year from date of shipment from the manufacturer.
 - 2. Warranty Period for 2604 Powder Finish: 10 years from date of shipment from the manufacturer.
 - 3. Warranty Period for 2605 Liquid Finish: 10 years from date of shipment from the manufacturer. (20 years available if specified).
 - 4. Warranty Period for 2605 Powder Finish: 20 years from the date of shipment from the manufacturer.

2 PRODUCTS

2.01 MANUFACTURERS

- .1 Manufacturers: Subject to compliance with requirements, provide products by Velux Group.
- .2 Substitutions: Alternative manufactures shall be considered with approval from HWDSB and Consultant. Substitute manufacturers must have been in the skylight business for not less than a period of 10 years and must submit to the Architect the following:
 - 1. List of similar projects successfully completed within the last five years.
 - 2. Complete details of proposed skylight.
 - 3. Complete specifications for Architect's review.
 - 4. Test reports showing units have been tested with NFRC
 - 5. NFRC Certified Products Directory (CPD#) number.

2.02 MATERIALS

- .1 Curb Frame: High performance PVC with minimum effective thickness of 0.060 inch (1.5mm). Provide integral condensation gutter system with corners fully welded for waterproof quality.
- .2 Retainer Frame: Extruded aluminum alloy 6063-T5 (min). ASTM B 221 (ASTM B 221 M) with minimum effective thickness of 0.60 inch (1.5 mm).
- .3 Plastic Sheets: Monolithic, formable, transparent (colorless) or translucent (white) sheets with good weather resistant.
- .4 Thermal Break: Fabricate skylight units with thermal chambered PVC.
- .5 Gaskets: Structural glazing tape to form adhesive bond between PVC curb and inner dome and between inner and outer dome. Butyl tape between outer dome and extruded aluminum retainer. Gaskets form an air and water impenetrable barrier between adjacent surfaces.
- .6 Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other non-corrosive metal as recommended by manufacturer.

2.03 PLASTIC SKYLIGHT UNITS

- .1 General: Factory-assembled, curb-mounted unit consisting of plastic glazing, gasketing, inner frame designed to mount on separate curb, and self-contained flashing.
 - .1 Products: Provide model meeting the requirements of this section.
- .2 Curb: Field built Curbs or Pre-Fabricated Curbs (By Others)
 - .1 Height: Minimum 4" above finished roofing.

- .3 Condensation Control: Fabricate skylight units with integral internal gutters and weeps to collect and dispose of condensation.
- .4 Thermal Break: Fabricate skylight units with thermal chambered PVC.
- .5 Shape and Size: As indicated by model number.
- .6 Outer Glazing: Dome or Pyramid thermoformed:
 - .1 Acrylic: Clear, translucent.
- .7 Inner Glazing: Thermoformed Dome:
 - .1 Acrylic Clear

2.04 FABRICATION

- .1 Framing Components:
 - .1 Factory fit and assemble components.
- .2 Fabricate components to drain condensation and moisture occurring or migrating within skylight system to the exterior.
- .3 Fabricate components to accommodate expansion, contraction, and field adjustment, and to provide for minimum clearance and shimming at skylight perimeter.
- .4 Fabricate components to ensure that glazing is thermally and physically isolated from framing members.
- .5 Fit and secure joints in aluminum by heliarc welding.

3 EXECUTION

3.01 EXAMINATION

- .1 Examine substrates and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting skylight performance.
- .2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- .1 General: Comply with manufacturer's written instructions for protecting, handling, and installing skylight components.
- .2 Coordinate with installation of roof deck and other substrates to receive skylight units.
- .3 Coordinate with installation of vapor barriers, roof insulation, roofing, and flashing as required to assure that each element of the work performs properly and that combined elements are

waterproof and weather tight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.

.4 Counter Flashing: Where counter flashing is required as a component of the skylight, install to provide an adequate waterproof overlap with roofing or roof flashing (as counter flashing). Seal with thick bead of mastic sealant, except where overlap is indicated to be left open for ventilation.

3.03 CLEANING AND PROTECTION

.1 Clean exposed metal and plastic surfaces according to manufacturer's instructions. Touch up damaged metal coatings.

.2 Clean plastic skylight units, inside and out, not more than 5 days prior to date of substantial completion.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 08 11 13 - Hollow Metal Doors and Frames
- .2 Section 03 30 00 – Cast-in-Place Concrete
- .3 Section 08 42 29 - Automatic Entrances

I.02 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA):
 - .1 ANSI/BHMA A156.1, Butts and Hinges
 - .2 ANSI/BHMA A156.2, Bored and Preassembled Locks and Latches
 - .3 ANSI/BHMA A156.3 Exit Devices
 - .4 ANSI/BHMA A156.4 Door Controls - Closers
 - .5 ANSI/BHMA A156.5, Cylinders and Input Devices for Locks
 - .6 ANSI/BHMA A156.6, Architectural Door Trim
 - .7 ANSI/BHMA A156.8, Door Controls - Overhead Stops and Holders
 - .8 ANSI/BHMA A156.10, Power Operated Pedestrian Doors
 - .9 ANSI/BHMA A156.12, Interconnected Locks
 - .10 ANSI/BHMA A156.13, Mortise Locks and Latches
 - .11 ANSI/BHMA A156.14, Sliding and Folding Door Hardware
 - .12 ANSI/BHMA A156.15, Release Devices - Closer Holder, Electromagnetic and Electromechanical
 - .13 ANSI/BHMA A156.16, Auxiliary Hardware
 - .14 ANSI/BHMA A156.17, Self Closing Hinges and Pivots
 - .15 ANSI/BHMA A156.18, Materials and Finishes
 - .16 ANSI/BHMA A156.19, Power Assist and Low Energy Power Operated Doors
 - .17 ANSI/BHMA A156.20, Strap and Tee Hinges and Hasps
 - .18 ANSI/BHMA A156.21, Thresholds
 - .19 ANSI/BHMA A156.22, Gasketing
 - .20 ANSI/BHMA A156.26, Continuous Hinges
 - .21 ANSI/BHMA A156.28, Recommended Practices for Mechanical Keying Systems
 - .22 ANSI/BHMA A156.29, Exit Locks, Exit Alarms, Alarms for Exit Devices
 - .23 ANSI/BHMA A156.30, High Security Cylinders
 - .24 ANSI/BHMA A156.34, Bored Locks and Mortise Locks with Ligature Resistant Trim
 - .25 ANSI/BHMA A156.36, Auxiliary Locks
- .2 Canadian Steel Door Manufacturers' Association (CSDMA):
 - .1 Recommended Dimensional Standards for Commercial Steel Doors and Frames,
- .3 CSA Group (CSA):

- .1 CSA B651, Accessible Design for the Built Environment
- .4 Door and Hardware Institute (DHI):
 - .1 Sequence and Format for the Hardware Schedule,
- .5 National Fire Protection Association (NFPA):
 - .1 NFPA 80, Standard for Fire Doors and Other Opening Protectives

I.03 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Obtain and distribute templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Coordinate with shop drawings or other Sections. Confirm that adequate provisions are made for locating and installing door hardware in accordance with indicated requirements, and as follows:
 - .1 Coordinate for type of wire required for electrified hardware, schedule for installation, and connection to electrified door hardware.
 - .2 Coordinate layout and installation of recessed pivots and closers, and cast-in anchoring inserts into floor construction with Section 03 30 00 – Cast-in-Place Concrete.
 - .3 Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, security system, and, building management system..
 - .4 Coordinate with electrical Subcontractor for provision of service to each electrical door operator.
 - .5 Coordinate with electrical Subcontractor for electrical conduit and wiring from specified electrical door controls to door operators.
 - .6 Coordinate door hardware and electrified operators with Section 08 11 13 - Hollow Metal Doors and Frames.

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's product data for each type of door hardware. Include product characteristics, performance criteria, profiles, dimensions, finishes, and limitations.
- .3 Shop Drawings: Submit shop drawings indicating details of electrified door hardware including the following:
 - .1 Detailed interface between electrified door hardware and fire alarm, access control, security, building management system.
 - .2 Theory of operation for electrified door hardware groups.
 - .3 Wiring diagrams for power, signal, and control systems. Identify manufacturer-installed wiring and site-installed wiring.
 - .1 System schematic
 - .2 Point-to-point wiring diagram
 - .3 Riser diagram
 - .4 Elevation of each electrified door.

- .4 Samples:
 - .1 Submit samples of the following hardware items for verification:
 - .1 cylinders, keys, door gasket, door sweeps, locks and latches, operating trim.
 - .2 Identify each sample with a label indicating applicable specification paragraph number, brand name, model number, finish, and hardware schedule group/number.
 - .3 After approval, samples will not be returned for inclusion into Work.
- .5 Source Quality Control Submittals: When requested, submit proof of door hardware schedule consultant's participation in Door and Hardware Institute® (DHI) Continuing Education Program.
- .6 Contract Door Hardware Schedule: Submit schedule prepared by or under the supervision of a qualified hardware consultant detailing fabrication and assembly of door hardware.
 - .1 Comply with DHI Sequence and Format for the Hardware Schedule.
 - .2 Organize the door hardware schedule into door hardware groups indicating a complete description of every item required for each door (or opening).
 - .3 Indicate hardware make, model, material, function, handing, size, fastening, and finish using codes in BHMA A156.18, and other pertinent information.
 - .4 Include keying schedule describing how each locking device is keyed in accordance with ANSI/BHMA A156.28. Index each key type to a specific door number.
 - .5 Indicate location of each door hardware set, cross-referencing door numbers indicated in the Contract Documents.
 - .6 Include an explanation of abbreviations, symbols, and alphanumeric codes in contract hardware schedule, where applicable.
 - .7 Include description of each electrified door hardware function, sequence of operation, and coordinating interface with other systems (e.g., fire alarm).
 - .8 Include DHI certification stamp on contract door hardware schedule.
- .7 Test Reports: When requested, submit certified test reports showing a product's compliance to a specified referenced standard.
- .8 Manufacturer's Instructions: Submit manufacturer's installation instructions.

I.05 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: Submit operation and maintenance data for door hardware and incorporate into manual.
- .3 Warranty Documentation: Submit manufacturer's material and fabrication warranty.

I.06 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Stock Materials: Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .1 Tools: Supply two sets of wrenches for door closers, locksets and fire exit hardware.

I.07 QUALITY ASSURANCE

- .1 Qualifications:

- .1 Door Hardware Consultant: DHI-certified, including any of the following: Door + Hardware Consultant (DHC), Door + Hardware Specification Consultant (DHSC), or Access Control System Consultant (ACSC), or an Architectural Hardware Consultant.
- .2 Installer: Completed door hardware projects similar in scope to this Project with a record of successful in-service performance in the past five years.
- .2 Regulatory Requirements:
 - .1 Hardware for doors in fire separations and exit doors: To ANSI/BHMA A156.29, certified by a Canadian Certification Organization accredited by the Standards Council of Canada.
 - .2 Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labelled by a qualified testing agency for fire-protection ratings indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: Deliver materials to site in original factory packaging and with manufacturer's labels.
- .3 Package hardware items, including fasteners, separately or in groups of related hardware. Protect prefinished surfaces with wrapping, strippable coating, or other protective packaging. Label each package with their contents and location in building.
- .4 Storage and Handling Requirements:
 - .1 Store materials off ground in a dry, well-ventilated indoor location, and in accordance with manufacturer's recommendations.
 - .2 Store and protect door hardware from scratches and other damages.

2 PRODUCTS

2.01 DOOR HARDWARE

- .1 Use products from only one manufacturer for similar items.
- .2 Locks and Latches:
 - .1 Bored and preassembled locks and latches: To ANSI/BHMA A156.2, series 2000 preassembled lock, grade 1 series 4000 bored lock, grade 1 2 3, designed for function and keyed as stated in hardware schedule.
 - .2 Interconnected locks and latches: To ANSI/BHMA A156.12, series 5000 interconnected lock, grade 1 2 3, designed for function and keyed as stated in hardware schedule.
 - .3 Mortise Locks and Latches: To ANSI/BHMA A156.13 ANSI/BHMA A156.34, series 1000 mortise lock, grade 1 2 3 4, designed for function and keyed as stated in Hardware Schedule.
 - .4 Lever Handles: Plain designed with antimicrobial coating.
 - .5 Cylinder Collar (rose, escutcheon): Round.
 - .6 Normal strikes: Box type, lip projection not beyond jamb.
 - .7 Cylinders: To ANSI/BHMA A156.5 ANSI/BHMA A156.30, key into keying system as directed.
 - .8 Finishes: To ANSI/BHMA A156.18

- .3 Butts and hinges:
 - .1 Butts and Hinges: To ANSI/BHMA A156.1, designated by letter A and numeral identifiers, followed by size and finish, listed in hardware schedule.
 - .2 Self-closing hinges and pivots: To ANSI/BHMA A156.17, designated by letter K and numeral identifiers listed in hardware schedule, with suffix letter F indicating listed for use on fire doors.
 - .3 Strap and tee hinges and hasps: To ANSI/BHMA A156.20, designated by letter A and numeral identifiers listed in hardware schedule, size listed in hardware schedule
 - .4 Continuous Hinges: To ANSI/BHMA A156.26.
- .4 Exit Devices: To ANSI/BHMA A156.3, Provide ULC-labelled devices at fire-protection rated closures.
 - .1 Auxiliary items: door coordinator, type 21, for pairs of doors with overlapping astragals.
- .5 Door Closers and Accessories:
 - .1 Door controls (closers): To ANSI/BHMA A156.4, designated by letter C and numeral identifiers listed in hardware schedule.
 - .2 Door controls - overhead holders: To ANSI/BHMA A156.8, designated by letter C and numeral identifiers listed in hardware schedule.
 - .3 Closer/holder release devices: To ANSI/BHMA A156.15, designated by letter C and numeral identifiers listed in hardware schedule.
 - .4 Door coordinator: Surface for pairs of doors with overlapping astragal.
- .6 Door Operators:
 - .1 Power-operated pedestrian doors: To ANSI/BHMA A156.10
 - .2 Power assist and low energy power-operated doors: To ANSI/BHMA A156.19
- .7 Auxiliary locks and associated products: To ANSI/BHMA A156.36 and ANSI/BHMA A156.31, designated by letter E and numeral identifiers listed in hardware schedule
 - .1 Latch bolt and Dead bolt, Key into keying system as directed.
 - .2 Cylinders: for installation in deadlocks provided with special doors as listed in hardware schedule. Key into keying system as directed.
- .8 Door bottom seal: Heavy duty, door seal of extruded aluminum frame and solid closed cell neoprene weather seal, surface mounted with drip cap recessed in door face, closed ends, adjustable, clear anodized finish.
- .9 Thresholds: To ANSI/BHMA A156.21 extruded aluminum, bronze, stainless steel mill finish, plain serrated surface, with thermal break of rigid PVC, with lip and vinyl door seal insert.
- .13 Weatherstripping: To ANSI/BHMA A156.22, and as follows:
 - .1 Head and jamb seal:
 - .1 Extruded aluminum frame and solid closed-cell neoprene insert, clear anodized finish.
 - .2 Adhesive backed neoprene material.
 - .2 Door bottom seal:
 - .1 Extruded aluminum frame and closed-cell neoprene sweep, clear anodized finish.
- .14 Astragal: Adjustable, extruded aluminum frame with vinyl insert, finish to match door.

.15 Barrier-Free Pneumatic Door Operator:

- .1 Heavy duty pneumatically-assisted door closer, capable of multi-door operation, complete with actuators, control boxes, pneumatic tubing and compressed air source.
- .2 Self-contained control box/compressor combination for independent operation of two door leaves.
- .3 Control boxes: Complete with electric strike relay.
- .4 Mount operators on either push or pull sides of doors as required to place them inside rooms.
- .5 Actuation of operators by card readers.
- .6 Electrical box and actuator: Hardwired low voltage actuator with stainless steel 114-mm round plate, engraved blue and filled with International Symbol of Access (ISA). 51-mm-wide x 102-mm-high x 50-mm-deep single gang electrical box, flush-mounted in wall at indicated locations.
- .7 Supply switched line voltage to control box. Locate switch adjacent to box.
- .8 Supply low voltage wiring to each actuator and a 6mm diameter air tubing to each operator.
- .9 Mount control box in location as directed by HWDSB.

2.02 MISCELLANEOUS HARDWARE

- .1 Indexed Key Control System: To ANSI/BHMA A156.5, designated by letter E and numeral identifiers, wall mounted, colour enamel paint finish.

2.03 FASTENINGS

- .1 Use only fasteners provided by the manufacturer. Failure to comply may void warranties and applicable licensed labels.
- .2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .3 Match exposed fastening devices to finish of hardware.
- .4 Where pull is positioned on one side of the door and push plate on the other side, supply fastening devices, and install to secure pull through the door from the reverse side. Install push plate to cover fasteners.
- .5 Use fasteners compatible with the material they are used in.

2.04 KEYING

- .1 Doors, padlocks and cabinet locks to be keyed alike in groups, master keyed as noted in hardware schedule. Prepare detailed keying schedule in conjunction with HWDSB.
- .2 Provide keys in duplicates for every lock of the Work.
- .3 Provide 3 master keys for each master key.
- .4 Stamp keying code numbers on keys and cylinders.

3 EXECUTION

3.01 INSTALLATION

- .1 Manufacturer's Instructions: Comply with manufacturer's recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Provide metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .3 Provide manufacturers' instructions for proper installation of each hardware component.
- .4 Install hardware to standard hardware location dimensions in accordance with CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames and CSA B651.
- .5 Where door stop comes into contact with door pull, mount stop to strike bottom of pull.
- .6 Install key control cabinet.
- .7 Use only manufacturer's supplied fasteners.
 - .1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
- .8 Remove construction cores, locks when directed by HWDSB.
 - .1 Install permanent cores and confirm locks operate correctly.

3.02 ADJUSTING

- .1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
- .2 Lubricate hardware, operating equipment and other moving parts.
- .3 Adjust door hardware to ensure tight fit at contact points with frames.

3.03 CLEANING

- .1 Progress Cleaning: Perform in accordance with Section 01 74 00 - Cleaning and as follows:
 - .1 Remove protective coatings and wrappings from hardware items.
 - .2 Final Cleaning: Perform in accordance with Section 01 74 00 - Cleaning.

3.04 DEMONSTRATION

- .1 Keying System Setup and Cabinet:
 - .1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index, key change index, label shields, control book and key receipt cards.
 - .2 Place file keys and duplicate keys in key cabinet on their respective hooks.
 - .3 Lock key cabinet and provide key to HWDSB.
- .2 Maintenance Staff Briefing: Brief maintenance staff regarding the following:
 - .1 Proper care, cleaning, disinfecting, and general maintenance of hardware.
 - .2 Description, use, handling, and storage of keys.
 - .3 Use, application and storage of wrenches for door closers, locksets, and fire exit hardware.
- .3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.05 PROTECTION

- .1 Protect installed products and components from damage during construction.

3.06 DOOR HARDWARE SCHEDULE

.1 Refer to drawings.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 07 92 00 - Joint Sealants.

I.02 REFERENCE STANDARDS

- .1 Association of the Wall and Ceilings Industries International (AWCI)
 - .1 AWCI Levels of Gypsum Board Finish-GA-214.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - .2 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.
- .3 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-10, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit gypsum board assembly drawings stamped and signed by professional engineer registered or licensed in ONTARIO, Canada.
 - .2 Indicate components such as fastener type, dimensions, spacing and locations at gypsum board edges, ends and in field of board as well as installation methods. Components and work to confirm to ASTM C 840 standard specification for application and finishing of gypsum board.
 - .3 Indicate type of joint compound, and number of joint compound layers.
 - .4 Indicate number and location of electrical boxes for wall and ceiling.
- .4 Samples:
 - .1 Submit for review and acceptance of each component specified or necessary for complete installation. Include technical descriptive data.
 - .2 Submit samples of gypsum board and 300 mm long samples of corner and casing beads.
 - .3 Samples will be returned for inclusion into work.
- .5 Certifications:
 - .1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .6 Construction Waste Management:

- .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
- .7 Low-Emitting Materials:
 - .1 Submit listing of adhesives and sealants and paints and coatings used in building, showing compliance with VOC and chemical component limits.

I.04 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address and applicable standard designation.
- .3 Exercise care in unloading gypsum board materials shipment to prevent damage.
- .4 Storage and Handling Requirements in accordance with ASTM C 840-16:
 - .1 Store gypsum board assemblies materials level flat off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
 - .3 Protect gypsum board from direct exposure to rain, snow, sunlight, or other excessive weather conditions.
 - .4 Protect ready mix joint compounds from freezing, exposure to extreme heat and direct sunlight.
 - .5 Protect from weather, elements and damage from construction operations.
 - .6 Handle gypsum boards to prevent damage to edges, ends or surfaces.
 - .7 Protect prefinished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
 - .8 Replace defective or damaged materials with new.
- .5 Develop Construction Waste Management Plan related to Work of this Section.

I.05 AMBIENT CONDITIONS

- .1 Maintain temperature 10 °C minimum, 21 °C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.
- .2 Apply board and joint treatment to dry, clean, frost free surfaces.
- .3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

2 PRODUCTS

2.01 MATERIALS

- .1 Standard board: to ASTM C1396/C1396M-14 regular 12.7 mm thick and Type X, 15.9mm thick, 1200 mm wide x maximum practical length, ends square cut, edges squared.
- .2 Gypsum sheathing board: to ASTM C1396/C1396M-14, regular, 12.7 mm thick and Type X, 15.9 mm thick, 1200 mm wide x maximum practical length.
- .4 Backing board and coreboard: to ASTM C1396/C1396M-14 regular, 12.7 mm thick squared edges.

- .5 Water-resistant board: to ASTM C1396/C1396M-14 regular, 12.7 mm thick and Type X, 15.9 mm thick, 1200 mm wide x maximum practical length.
- .12 Nails: to ASTM C514-14
- .13 Steel drill screws: to ASTM C1002-14
- .14 Stud adhesive: to CAN/CGSB-71.25 ASTM C557.
- .15 Laminating compound: as recommended by manufacturer, asbestos-free.
- .16 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, PVC, 0.5 mm base thickness, perforated flanges, one piece length per location.
- .17 Shadow mould: 35 mm high, snap-on trim, of 0.6 mm base steel thickness galvanized sheet pre-finished in satin enamel, white colour.
- .19 Vinyl mouldings: mouldings for joint treatment of vinyl-faced gypsum board, as supplied by gypsum board manufacturer.
- .20 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
 - .1 VOC limit 250 g/L maximum.
 - .2 Acoustic sealant: in accordance with Section 07 92 00 - Joint Sealants.
- .21 Polyethylene: to CAN/CGSB-51.34, Type 2
- .23 Joint compound: to ASTM C475, asbestos-free

2.02 FINISHES

- .1 Texture finish: asbestos-free standard white texture coating and primer-sealer, recommended by gypsum board manufacturer.
 - .1 Primer: VOC limit 200 g/L maximum to GS-11.

3.01 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assemblies installation in accordance with manufacturer's written instructions.
 - .1 Inform HWDSB and JASON FUNG ARCHITECT INC. of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from JASON FUNG ARCHITECT INC..

3.02 ERECTION

- .1 Do application and finishing of gypsum board to ASTM C840-16 except where specified otherwise
- .2 Do application of gypsum sheathing to ASTM C1280-13a
- .3 Erect hangers and runner channels for suspended gypsum board ceilings to ASTM C840-16 except where specified otherwise
- .4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .5 Install work level to tolerance of 1:1200.
- .6 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.

- .7 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.
- .8 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.
- .9 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.
- .10 Install wall furring for gypsum board wall finishes to ASTM C840-16, except where specified otherwise
- .11 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
- .12 Furr duct shafts, beams, columns, pipes and exposed services where indicated.
- .13 Erect drywall resilient furring transversely between layers of gypsum board, spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 25 mm drywall screw.
- .14 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

3.03 APPLICATION

- .1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.
- .2 Apply single layer gypsum board metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.
 - .1 Single-Layer Application:
 - .1 Apply gypsum board on ceilings prior to application of walls to ASTM C840-16
 - .2 Apply gypsum board on walls vertically or horizontally, providing sheet lengths that will minimize number of board edges or end joints.
- .3 Apply single layer gypsum board to concrete surfaces, where indicated, using laminating adhesive.
 - .1 Comply with gypsum board manufacturer's recommendations.
 - .2 Brace or fasten gypsum board until fastening adhesive has set.
 - .3 Mechanically fasten gypsum board at top and bottom of each sheet.
- .6 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, in partitions where perimeter sealed with acoustic sealant.
- .7 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.
- .8 Install gypsum board with face side out.
- .9 Do not install damaged or damp boards.
- .10 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.04 INSTALLATION

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where

practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre using contact adhesive for full length.

- .2 Install casing beads around perimeter of suspended ceilings.
- .3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.
- .4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.
- .5 Install shadow mould at gypsum board/ceiling juncture. Minimize joints; use corner pieces and splicers.
- .6 Construct control joints of two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.
- .7 Provide continuous polyethylene dust barrier behind and across control joints.
- .9 Install control joints straight and true.
- .10 Ensure that screws or nails are properly applied in process of attaching gypsum board to framing without damaging of gypsum board edges and ends.
- .11 Construct expansion joints, at building expansion and construction joints. Provide continuous dust barrier.
- .12 Install expansion joint straight and true.
- .13 Splice corners and intersections together and secure to each member with 3 screws.
- .14 Install access doors to electrical and mechanical fixtures specified in respective sections.
 - .1 Rigidly secure frames to furring or framing systems.
- .15 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.
- .16 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI Levels of Gypsum Board Finish:
 - .1 Levels of finish:
 - .1 Level 5: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.
 - .2 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
 - .3 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board, invisible after surface finish is completed.
 - .4 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
 - .5 Completed installation smooth, level or plumb, free from waves and other defects and ready for surface finish.
 - .6 Apply one coat of white primer sealer over surface to be textured. When dry apply textured finish in accordance with manufacturer's instructions.

- .24 Mix joint compound slightly thinner than for joint taping.
- .25 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.
- .26 Allow skim coat to dry completely.
- .27 Remove ridges by light sanding or wiping with damp cloth.

3.05 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.06 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by gypsum board assemblies installation.

3.07 SCHEDULES

- .1 Not used.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 09 21 16 – Gypsum Board Assemblies

I.02 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - .2 CAN/CGSB-7.1-98, Lightweight Steel Wall Framing Components.

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for furring and lathing and include product characteristics, performance criteria, physical size, finish and limitations.

I.04 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect furring and lathing application from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan an Waste Reduction Workplan in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 MATERIALS

- .1 Metal furring members: channels, inserts, and fasteners: ASTM C841
- .2 Metal lath: ASTM C847 of type and weight to suit plaster system and support spacing, galvanized treated with rust inhibitive coating.
- .3 Gypsum lath: ASTM C847 Type X. Thickness to suit plaster system and support spacing.

- .4 Polyethylene film: CAN/CGSB-51.34, Type 2, 0.15 mm thick.
- .5 Metal accessories (corner beads, base screeds, cornerite, casing beads): ASTM C1047
- .6 Expansion joint assemblies: back-to-back casing beads to ASTM C1047 plus polyethylene film looped to form continuous air seal.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for furring and lathing application in accordance with manufacturer's written instructions.
- .2 Inform HWDSB and JASON FUNG ARCHITECT INC. of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from JASON FUNG ARCHITECT INC..

3.02 PREPARATION

- .1 Do not lath over bucks, anchors, blocking, electrical and mechanical work until they are inspected and approved by JASON FUNG ARCHITECT INC..
- .2 Leave finished work rigid, secure, square, level, plumb, and erected to maintain finish plaster line dimensions and contours.
 - .1 Make allowance for thermal movement.
- .3 Provide clearance under beams and structural slabs to prevent transmission of structural loads to vertical furring.

3.03 INSTALLATION

- .1 Furring and lathing work: in accordance with ASTM C841 ASTM C1063 except as specified otherwise.
- .2 Ceiling Furring:
 - .1 Install runners level to tolerance of 3 mm over 3.5 m. Provide runners at interruptions of continuity and change in direction.
 - .2 Frame with furring channels, perimeter of openings to accommodate access panels, light fixtures, diffusers, grilles.
 - .3 Furr for vertical bulkheads within or at termination of ceilings.
 - .4 Furr above suspended ceilings for fire and sound stops and to form plenum areas indicated.
 - .5 In concrete, place anchors hangers by attachment to reinforcing steel by loops embedded at least 50 mm or by approved inserts.
- .3 Gypsum Lathing:
 - .1 Install gypsum lath only on straight flat surfaces of partitions and walls using drywall screws or lathing clips to metal framing.
 - .2 Apply gypsum lath to ceilings first, then walls.

- .3 Butt lath together to moderate contact. Neatly cut around outlets, pipes and openings.
- .4 Erect gypsum lath proprietary ceiling system in accordance with manufacturer's instructions.
- .5 Metal Lathing:
 - .1 Install ribbed lath over chases and openings.
 - .1 Extend 450 mm each side of opening.
 - .2 Secure lath to furring channels with 18 gauge tie wire at intervals not exceeding 150 mm.
- .6 Expansion/Control Joints:
 - .1 Back to back plaster stops 6 mm apart, over 0.150 mm sheet polyethylene looped continuous air seal, continuously supported along both sides of joint.
 - .2 Install 150 x 450 mm metal lath strips diagonally at each corner of openings exceeding 0.1 m², in masonry, gypsum lath and rigid insulation substrates.
 - .3 Apply cornerite to internal angles to be plastered except at suspended ceilings.
 - .1 Fasten to retain position during plastering.
 - .2 Do not secure to framing members.
 - .4 Lath across junctures of dissimilar materials to be plastered with strip of metal lath at least 200 mm wide.
 - .5 Erect accessories straight, plumb or level, rigid and at proper plane.
 - .1 Use full length pieces where practical.
 - .2 Make joints tight, accurately aligned and rigidly secured.
 - .3 Mitre and fit corners accurately, free from rough edges.
 - .4 Secure at 220 mm on centre.
 - .6 Install corner beads on external angles with fasteners at 300 mm on centre.
 - .7 Install casing beads at perimeter of suspended plaster ceilings; wherever plaster abuts or joins a dissimilar exposed surface such as masonry, concrete, wood, metal; where edges of plaster are exposed; where plaster on a non-structural member butts plaster on a structural member; and elsewhere as indicated.
 - .8 Install metal screeds at top of bases and dados.
 - .9 Construct expansion joints of two back-to-back casing beads set in plaster supported independently on both sides of joint.
 - .13 Provide continuous polyethylene air seal behind and across expansion/contraction joints.
 - .14 Locate expansion joints at dissimilar walls and ceilings, at changes in substrate construction, at line of door jambs from top of door frame to ceiling, at approximate 9 m spacing on long corridor runs, at maximum 7.5 m spacing in each direction on ceilings, at building expansion and construction joints.
 - .15 Install expansion joints straight and true.
 - .16 Install rings and frames for electrical and mechanical fixtures.
 - .17 Rigidly secure rings and frames to furring and lathing systems.

3.04 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.05 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by furring and lathing application.

3.06 SCHEDULES

- .1 Not used.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 07 92 00 - Joint Sealants

I.02 REFERENCE STANDARDS

- .1 Underwriter's Laboratories (UL)
 - .1 UL-2768, Architectural Surface Coatings.
- .2 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
 - .1 MPI #26, Primer, Galvanized Metal, Cementitious.

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for metal framing and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS SDS
- .3 Samples:
 - .1 Submit duplicate 300 mm long samples of non-structural metal framing.

I.04 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

I.05 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements: deliver materials to Site in original factory packaging, labelled with manufacturer's name and address.
- .2 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect metal framing from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .3 Develop Construction Waste Management Plan related to Work of this Section.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 MATERIALS

- .1 Non-load bearing channel stud framing: to ASTM C645, roll formed from 0.53 mm thickness hot dipped zinc-coated (galvanized) steel sheet in accordance with ASTM A653, Z180, for screw attachment of gypsum board or lath.
 - .1 Knock-out service holes at 460mm centres.
- .2 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, and as follows:
 - .1 Slotted Deflection Track for Fire Separations: Premanufactured slotted top runner with 63 mm down standing legs and having 6 mm wide x 38 mm high slots spaced at 25 mm on centre along length of runner; tested and certified for use in fire rated wall construction.
 - .2 Double Runner Deflection Track: Outside runner using 50 mm flanges; inner runner 33 mm; maintaining 25 mm minimum deflection space.
 - .3 Deep Leg Deflection Track: Top runner having 50 mm down standing legs; maintaining 13 mm minimum deflection space.
 - .4 Base Runner: Bottom track with 33 mm upstanding legs.
- .3 Furring Channels: Commercial steel sheet in accordance with ASTM A653, Z180, hot dipped zinc-coated (galvanized), as follows:
 - .1 Hat Shaped, Rigid Furring Channels: ASTM C645, 0.75 mm thickness x 22 mm deep
 - .2 Resilient Furring Channels: 0.46 mm thickness x 13 mm deep members designed to reduce sound transmission having asymmetrical face attached to single flange by a slotted leg (web).
- .6 Metal channel stiffener: 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.
- .7 Acoustical sealant: in accordance with Section 07 92 00 - Joint Sealants.
- .8 Sealants: VOC limit 30g/L maximum.
- .9 Insulating strip: rubberized, moisture resistant 3 mm thick cork strip, 12 mm wide, with self sticking adhesive on one face, lengths as required.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for non-structural metal framing application in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of HWDSB.
 - .2 Inform HWDSB of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation after unacceptable conditions have been remedied and after receipt of written approval to proceed from HWDSB.

3.02 ERECTION

- .1 Erect partitions in accordance with framing requirements of ASTM C754
- .2 Align partition tracks at floor and ceiling and secure at 610mm on centre maximum.

- .3 Install damp proof course under stud shoe tracks of partitions on slabs on grade.
- .4 Place studs vertically not more than 50 mm from abutting walls, and at each side of openings and corners.
 - .1 Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
- .5 Erect metal studding to tolerance of 1:1000.
- .6 Attach studs to bottom or ceiling track using screws or pop rivets.
- .7 Co-ordinate simultaneous erection of studs with installation of service lines. Align web openings when erecting studs.
- .8 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.
- .9 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified.
 - .1 Secure studs together, 50mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.
- .10 Install heavy gauge single jamb studs at openings.
- .11 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs.
 - .1 Secure track to studs at each end, in accordance with manufacturer's instructions.
 - .2 Install intermediate studs above and below openings in same manner and spacing as wall studs.
- .12 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.
- .13 Provide 40mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.
- .14 Install steel studs or furring channel between studs for attaching electrical and other boxes.
- .15 Extend partitions to ceiling height except where noted otherwise on drawings.
- .16 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.
 - .1 Use 50mm leg ceiling tracks. Use double track slip joint as indicated.
- .17 Install continuous insulating strips to isolate studs from uninsulated surfaces.

3.03 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.04 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 03 30 00 – Cast-in-Place Concrete
- .2 Section 04 22 00 – Concrete Unit Masonry
- .3 Section 09 21 16 – Gypsum Board Assemblies
- .4 Section 09 22 00 – Supports for Plaster and Gypsum Board

I.02 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction
 - .2 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction
- .2 CSA Group (CSA):
 - .1 CSA A82.30-M1980, Interior Furring, Lathing and Gypsum Plastering
- .3 ULC Standards (ULC):
 - .1 ULC Online Directory for fire-resistance rated listings (UL Product iQ)
 - .2 CAN/ULC-S101-14, Standard Method of Fire Endurance Tests of Building Construction and Materials

I.03 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate installation tolerances of concrete base for veneer plaster substrate with Section 03 30 00 – Cast-in-Place Concrete.
 - .2 Coordinate installation tolerances of concrete unit masonry base for veneer plaster substrate with Section 04 22 00 – Concrete Unit Masonry.
 - .3 Coordinate installation tolerances of gypsum base for veneer plaster substrate with Section 09 21 16 – Gypsum Board Assemblies.
- .2 Sequencing:
 - .1 Begin plaster work after building envelope is weathertight and before installation of finish flooring or acoustic ceilings.

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's mixing instructions, product literature, and data sheets for gypsum plaster materials. Include product characteristics, performance criteria, recommended thicknesses, and limitations.
 - .2 Submit WHMIS SDS.
- .3 Samples:

- .1 Submit a small sample of each type of corner trim for initial selection and verification. These samples will not be returned.
- .2 Samples for initial selection: Submit small samples of gypsum plaster illustrating standard range of surface textures for initial selection by HWDSB.
- .3 Samples for verification: Submit 300 x 300-mm sample of textured plaster finishes. These samples will not be returned.
- .4 Samples will not be returned for inclusion into work.
- .4 Test and Evaluation Reports: Submit ULC design listings indicating compliance with specified fire-resistance ratings.

I.05 QUALITY ASSURANCE

- .1 Mock-Ups: Assemble a mock-up in accordance with Section 01 43 00 – Quality Assurance, and as follows:
 - .1 Construct a mock-up a minimum 3m² from floor to ceiling and include one expansion joint, control joint, corner trim, and an interior wall corner.

I.06 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: Deliver materials to site in original factory packaging, labelled with manufacturer's name and date it was manufactured.
 - .1 Deliver lath and plaster products to site 24 hours before application.
 - .2 Deliver fresh plaster as needed to Project site.
- .3 Storage and Handling Requirements:
 - .1 Store gypsum plastering materials indoors, in dry location, away from heavy traffic areas and off-gassing materials, and in accordance with manufacturer's recommendations.
 - .2 Store and protect bagged goods from direct contact with rain, snow, splashing water, wet or damp surfaces, and condensation and moisture absorption.
 - .3 Stack plaster bags on planks or platforms away from damp floors and walls.
 - .4 Do not expose gypsum plaster base to an excessive amount of sunlight.
 - .5 Replace materials if defective, damaged, or if plaster is exposed to moisture.

I.07 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Ventilation:
 - .1 Have free circulation of air to carry off excess moisture.
 - .2 Mechanically remove moisture laden air in areas lacking normal ventilation.
 - .3 Protect plaster from vent drafts, heaters or windows to avoid uneven drying.
 - .4 Prevent excessive ventilation or air movement to allow plaster to properly set.
 - .5 Provide temporary screening a minimum 24 hours before, during, and until plaster is dry at unfinished openings in the building envelope that impact work of this Section.
 - .6 If ambient humidity levels are sufficiently low to impact the proper curing of plaster,

then wet unfinished concrete floor before plaster application. Maintain minimal ventilation.

- .2 Temperature:
 - .1 Do not apply plaster to surfaces containing frost.
 - .2 Maintain a uniform temperature above 13°C and below 28°C for 7 days before erection of gypsum plaster base, before and during application of plaster, and for 2 days following installation of plaster or until plaster is dry.
 - .3 Distribute heat evenly to areas.
 - .4 Prevent irregular heat on plaster near source by providing deflection or protective screens.

2 PRODUCTS

2.01 DESCRIPTION

- .1 Regulatory Requirements:
 - .1 Fire-resistance rated gypsum plastering assemblies: To CAN/ULC-S101.

2.02 MATERIALS

- .1 Basecoat plasters:
 - .1 Gypsum neat plaster (hardwall): To ASTM C28/C28M
 - .2 Gypsum mill aggregated plaster: To ASTM C35
 - .3 Gypsum bonding plaster: To ASTM C28/C28M
- .2 Finishing plaster:
 - .1 Hydrated finishing lime:
 - .1 Type N: To ASTM C206
 - .2 Type S: To ASTM C206
 - .3 Soaked overnight in water above 10°C.
 - .2 Gypsum gauging plaster:
 - .1 To ASTM C28/C28M
 - .2 Add to lime putty in proportion of 1 part dry gauging plaster by weight to 2 parts dry lime by weight.
 - .3 Grounds:
 - .1 Wooden strips, corner beads, metal casing beads applied at perimeter of all openings.
 - .2 Set over gypsum lath to obtain minimum 12.7-mm plaster thickness.
 - .3 Set over brick, clay tile or other masonry to obtain minimum 15.9-mm plaster thickness.
 - .4 Set over metal lath to obtain minimum 15.9-mm plaster thickness from face of lath.
- .4 White Gauging Plasters:
 - .1 Quick set.
 - .2 Aggregated with mill-mixed fine aggregate.

- .5 Acoustic Plaster: Factory mixed, non-combustible plaster mix for textured, acoustical finish, white colour to match HWDSB's sample.
- .3 Vermiculite aggregate in basecoat plasters: To ASTM C35.
- .4 Texturing Plaster: Factory mixed finishing plaster prepared for texture application, to match sample reviewed by HWDSB.
- .5 Water:
 - .1 Clean, fresh, potable.
 - .2 Free from mineral and organic substances which impact plaster set.
 - .3 Use the minimum amount required to achieve a plaster of workable consistency.
 - .4 Mixing Water Temperature: Approximately 20°C.
- .6 Plastic Vapour Barrier Sheet: To CAN/CGSB-51.33, Type 2 or CAN/CGSB-51.34, maximum 60 ng/Pa s m² water vapour permeance.
- .7 Bonding agent: To ASTM C631, surface applied type.
- .8 Reinforcing Hair: Free of knots, dust and clumps and washed clean of pesticides.
- .9 Retarder: Not permitted
- .10 Accelerator: Ground gypsum
- .11 Accessories: To ASTM C841, galvanized steel, to suit total plaster thickness.

2.03 MIXES

- .1 Mix plasters to ASTM C841 in mechanical mixers, except finish coats containing lime that may be hand mixed. Use mechanical mixers that accurately control water quantity.
- .2 Avoid excessive mixing. Discard plaster if it has started to set before being applied.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: Perform in accordance with Section 01 71 00 – Examination and Preparation. Verify conditions of substrates are acceptable for gypsum plastering installation in accordance with ASTM C842 and ASTM C844, and as follows.
 - .1 Verify concrete unit masonry joints are flush and verify concrete and concrete masonry are free of bituminous compounds and waterproofing agents and other in-place conditions to avoid latent defects in quality of work in presence of HWDSB.

3.02 PREPARATION

- .1 Prepare surfaces to receive plaster to CSA A82.30 and ASTM C841 ASTM C1396/C1396M.
- .2 Remove dust, loose materials, grease, paint, and materials that may impair bond.
- .3 Install grounds, screeds, beads, control joints, and accessories.
- .4 Properly plug, cap or cover conduits, pipes, cables, and outlets before applying base coat.
- .5 Install screeds plumb and level to allow for thickness of finish coat.
- .6 Install vertical joint screeds in continuous lengths. Install horizontal joint screeds butted to vertical

- screeds. Install with a maximum joint bounding area of 14 m².
- .7 Where plaster butts exposed masonry walls, insert a 1-m-wide strip of plastic vapour barrier sheet before applying plaster to protect masonry. Cut plastic vapour barrier sheet neatly at junction with plaster when plastering is completed.
 - .8 Mask off or temporarily protect adjacent aluminum and finished work.
 - .1 Do not apply plaster until such work is protected.
 - .2 Remove temporary protection as work progresses, before plastering is dry.
 - .9 Apply bonding agent to concrete and bonding plaster to masonry surfaces in accordance with manufacturer's instructions.

3.03 APPLICATION

- .1 Perform plastering work to CSA A82.30 and ASTM C842 ASTM C844 ASTM C587.
- .2 Apply plaster finish with flatness variation of maximum 3 mm in 2.5 m in any plane.
- .3 Apply 3 coats plaster.
- .4 Form small V-groove where plaster finish is flush with bases, window frames, wall tiles, and other similar construction.
- .5 Application - Basecoat Plaster:
 - .1 Thickness: 25.4mm
 - .2 Mix with mechanical mixer, following manufacturer's directions.
 - .3 Wet unit masonry surfaces. Treat monolithic concrete with application of plaster bonder before plastering.
 - .4 Fur and lath interior surface of exterior masonry or monolithic concrete walls before applying plaster.
 - .5 Apply initial basecoat application (scratch coat) to gypsum lath and masonry by machine with sufficient material and pressure to form a good bond to base and to cover well.
 - .6 Double back to bring plaster out to grounds.
 - .7 Straighten to a true surface with rod and darby without use of additional water.
 - .8 Leave surface rough, ready to receive a plaster finish.
 - .9 Apply scratch (first) coat with sufficient materials and pressure to form good full keys on metal lath, and good bond on other bases.
 - .10 Cross rake.
 - .11 Apply brown (second) coat after first coat has set firm and hard.
 - .12 Bring out to grounds and straighten to a true surface with rod and darby without use of additional water.
 - .13 Leave surface rough, ready to receive finish (third) coat.
 - .14 Cut base coats free of bucks, frames, and grounds to allow for movement. Cut plaster free of electrical outlet boxes and other openings.
 - .15 Mix fireproofing plaster basecoats using vermiculite aggregate.
- .6 Application - Finishing Plaster:
 - .1 Mix, in proportion by dry weight, parts of gauging to parts of lime, in accordance with

applicable bag mixing instructions. Mix factory premixed finishing plaster in accordance with manufacturer's instructions.

- .2 Add 0.014 m³ of perlite fines, 22.7 kg of No.1 silica sand per 45.4kg of gauging plaster. Use mill-aggregated "quality" gauging plaster.
- .3 Application - Trowel Finish Coats:
 - .1 Scratch plaster in thoroughly and immediately double back to fill out to smooth, dense surface for decoration, free of surface blemishes and irregularities.
 - .2 Apply 2.4 (maximum)mm finish coat.
 - .3 Trowel plaster after set to achieve dense, hard, smooth surface.
- .4 Application - Float Finish Coats:
 - .1 Scratch plaster in thoroughly and immediately double back to a true, even surface.
 - .2 Float using a shingle float to bring aggregate to surface to produce finish of uniform texture free of slick spots, cat faces, and other blemishes.
 - .3 Use water sparingly on natural colour and no water on coloured finishes.
- .5 Application - Machine-Applied Spray Finishes:
 - .1 Apply initial coat of finish by hand.
 - .2 Float to uniform texture surface to provide background.
 - .3 Apply plaster in uniform spray pattern to produce texture approved by HWDSB.
- .6 Finish Coat: Leave brown coat properly roughened and open as well as partially dry (green state) to receive finish coat.
- .7 Machine mix acoustical plaster in accordance with manufacturer's instructions.
 - .1 Apply acoustical plaster finish coat by machine and finish to match sample reviewed by HWDSB.
- .8 Mix Retarder:
 - .1 Mix retarder with water before adding to plaster.
 - .2 Slowly add retarder to water and stir until retarder is completely dispersed.
 - .3 Screen out any retarder lumps which have formed.
 - .4 Stir retarder mixture before using.
- .9 Mix Accelerator:
 - .1 Sprinkle, in dry form, into mixer after plaster has been added. (Check for product specific instructions).
 - .2 Add dry accelerator to dry mix for hand mixing.

3.04 ADJUSTING

- .1 Cut out and patch cracked, loose, or defective plaster. Patch plaster flush with surrounding plaster and matching in colour, finish, and texture.
 - .1 Patch work with same materials as installed plaster, except:
 - .1 Patch holes 13 mm or less in diameter with patching plaster.
 - .2 Sanding plaster for patching is not acceptable.

- .2 Repair damage to materials adjacent to plaster caused by gypsum plastering installation.

3.05 CLEANING

- .1 Cleaning: Perform in accordance with Section 01 74 00 - Cleaning, and as follows:
 - .1 Remove droppings and splatters from surfaces.
 - .2 Remove temporary protective coverings from floors.

3.06 PROTECTION

- .1 Protect gypsum plastering from damage of other construction activities.

3.07 SCHEDULES

END OF SECTION

I GENERAL

I.01 SUMMARY

.1 This section describes interior ceramic tiling and associated materials, including installation methods for floor, wall, ceiling, and base tiles.

I.01 RELATED REQUIREMENTS

- .1 Section 03 30 00 - Cast-in-Place Concrete
- .2 Section 06 08 99 – Rough Carpentry for Minor Works
- .3 Section 06 10 53 – Miscellaneous Rough Carpentry
- .4 Section 07 92 00 - Joint Sealants
- .5 Section 08 71 00 – Door Hardware
- .6 Section 09 21 16 – Gypsum Board Assemblies
- .7 Section 09 23 00 - Gypsum Plastering

I.02 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-25.20-95, Surface Sealer for Floors
 - .2 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction
 - .3 CGSB 71-GP-22M-78, Adhesive, Organic, for Installation of Ceramic Wall Tile
 - .4 CAN/CGSB-75.1-M88, Tile, Ceramic
- .2 CSA Group (CSA):
 - .1 CAN/CSA-A3000-18, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005)
 - .2 CSA O121-08, Douglas Fir Plywood
- .3 International Standards Organization (ISO):
 - .1 ISO 10545, Ceramic Tiles
 - .2 ISO 13006, Ceramic Tiles - Definitions, Classification, Characteristics and Marking
 - .3 ISO 13007-1, Ceramic Tiles - Grouts and Adhesives - Part 1: Terms, Definitions and Specifications for Adhesives
 - .4 ISO 13007-2, Ceramic Tiles — Grouts and Adhesives – Part 2: Test Methods for Adhesives
 - .5 ISO 13007-3, Ceramic Tiles - Grouts and Adhesives - Part 3: Terms, Definitions and Specifications for Grouts
 - .6 ISO 13007-4, Ceramic Tiles — Grouts and Adhesives – Part 4: Test Methods for Grouts
 - .7 ISO 13007-5, Ceramic Tiles - Grouts and Adhesives - Part 5: Requirements, Test Methods, Evaluation of Conformity, Classification and Designation of Liquid-Applied Waterproofing Membranes for Use Beneath Ceramic Tiling Bonded with Adhesives
 - .8 ISO 13007-6, Ceramic Tiles - Grouts and Adhesives - Part 6: Requirements, Test Methods, Evaluation of Conformity, Classification and Designation for Waterproof Membranes Used With the

Installation of Ceramic Tiles

- .4 Terrazzo Tile and Marble Association of Canada (TTMAC):
 - .1 Tile Specification Guide 09 30 00, Tile Installation Manual
 - .2 Hard Surface Maintenance Guide
 - .3 Tile Installer Technical Manual,
- .5 Tile Council of North America (TCNA):
 - .1 TCNA Handbook for Ceramic, Glass, and Stone Tile Installation

I.03 ADMINISTRATIVE REQUIREMENTS

- .1 Preconstruction Meetings: Arrange a preconstruction meeting in accordance with Section 01 31 19 – Project Meetings attended by Contractor, HWDSB and JASON FUNG ARCHITECT INC., tile installer to discuss the following:
 - .1 Substrate and backing surfaces flatness requirements.
 - .2 Installation techniques associated with specified materials.
 - .3 Compatibility between specified materials and between adjacent materials.
 - .4 Other concerns associated with site conditions.
 - .5 Installer's or manufacturer's representative's concerns associated with as-constructed conditions.
 - .6 Substrate joints and cracks that require adjusting tile joint locations or additional tile joint locations.
- .2 Coordination: Where finished tile surfaces are installed flush with adjacent floor finishes coordinate the following:
 - .1 Coordinate requirements for recessed concrete floor slabs. Coordinate the depth of required slab depressions with Section 03 30 00 – Cast-in-Place Concrete before placement of concrete taking into account mortar bed, bond coat, and tile thickness.

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit product data for each type of product and accessory specified. Indicate compliance with this Section.
- .3 Samples for Initial Selection: Submit samples of the following:
 - .1 Actual tiles or sections of tiles showing the full range of colours, textures, and patterns available for each type of tile indicated.
 - .2 Edging and trim accessories showing the full range of colours available.
 - .3 Actual sections of grout showing the full range of colours available for each type of grout indicated.
- .4 Samples for Verification: Submit samples of the following:
 - .1 Submit porcelain wall tile for each colour, pattern, texture, and size.
 - .2 Submit tile trim shapes for each type, colour, pattern, texture, and size.
 - .3 Submit sample panel of porcelain tile adhered to 19-mm-thick plywood illustrating grout colour and joint width. Panel to include three horizontal and three vertical tiles.

- .5 Certificates: Where products from more than one manufacturer are used for part of a single tile assembly, submit a statement from setting material manufacturer indicating compatibility of other manufacturer's materials.
- .6 Site Quality Control Submittals: Submit manufacturer's site inspection report(s).
 - .1 Low Emitting Materials:
 - .1 Submit manufacturer's information indicating VOC emission limit in grams per litre (g/L).
 - .2 Provide low VOC emitting Products (within the building waterproofing membrane), in compliance with VOC emission limits referenced in LEED sustainability program standards, for the following categories:
 - .1 Interior adhesives and sealants applied on site.

I.05 CLOSEOUT SUBMITTALS

- .1 Operations and Maintenance Data: Submit TTMAC Hard Surface Maintenance Guide, in digital format, including the following:
 - .1 Indicate specific warnings for maintenance materials or practices that might damage tile work
- .2 Warranty Documentation: Submit manufacturers' warranties.

I.06 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Stock Materials: Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .1 Submit extra tile amounting to 3% of gross area covered, allowing proportionately for each pattern and type specified and which are part of the same Production run as installed products. Store maintenance products as directed by HWDSB.
 - .2 Supply maintenance materials from the same production run as installed materials.

I.07 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installers: Skilled in ceramic tile installation with five years of experience completing tile installations similar in material and scope as this Project, and member in good standing with TTMAC.
- .2 Mock-Ups: Assemble mock-up in accordance with Section 01 43 00 - Quality Assurance, and as follows:
 - .1 Assemble one typical washroom indicating wall tile pattern(s), grout, one floor movement joint, transition strips, and reducer strips.
 - .2 Acceptable mock-up may not remain as part of the completed work.

I.08 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements, and as follows:
 - .1 Deliver materials in adequate crates or containers with manufacturer's name and product description clearly marked.
 - .2 Examine materials upon delivery. Open boxes and confirm that materials match accepted samples, are free from defects and damage detrimental to final appearance and installation.

Tile materials that are factory marked as seconds or that are not consistent with materials submitted for review are not acceptable.

- .3 Verify that tiles with colour/pattern variations have been blended at the factory, so that tile units taken from one package show the same range of colours/patterns as those taken from other packages. If tiles are packaged without factory blending, blend tiles on site before installation.
- .4 Store cementitious materials indoors, in dry location, protected from foreign materials.
- .5 Protect adhesives, fillers, and sealants from freezing.
- .6 Handle and store tiles in a manner to avoid chipping, breakage or the instruction of foreign matter. Take precautions to protect the mortar and grout admixtures from freezing or from excessive heat.

1.09 AMBIENT CONDITIONS

- .1 Maintain air temperature and substrate temperature at tile installation area above 12C for 48 hours before, during, and 48 hours after installation.
- .2 Do not install tiles at temperatures less than 12C or above 38C.
- .3 Do not install epoxy mortar and grouts at temperatures below 15C or above 25C.
- .4 Provide additional heat when there is a risk that surface temperatures may drop below manufacturer's recommended temperatures.

2 PRODUCTS

2.01 MANUFACTURERS

- .1 Acceptable Manufacturer: Olympia Tile, which is located at: 1000 Lawrence Ave W, North York, ON M6A 1C6
- .2 Substitutions: Permitted, subject to review by HWDSB and JASON FUNG ARCHITECT INC.
- .3 Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.02 MATERIAL

- .1 General: All materials under work of this Section, including but not limited to, sealants, adhesives, and sealers are to have low VOC content limits.

2.03 PERFORMANCE CRITERIA

- .1 Perform work of this Section in accordance with TTMAC Tile Installer Technical Handbook as a minimum requirement.
- .2 Provide tile products manufactured and tested in accordance with ANSI A108 or ANSI A137.1 or ISO 10545.
- .3 Tile Slip Resistance:
 - .2 Minimum wet in accordance with DIN 51130 with R10 Class Slip Resistance.
- .4 Tile Frost Resistance: Maximum water absorption rating of 0.5% to ISO 10545-3 or ASTM C373 for

ceramic tile.

2.04 WALL TILE

- .1 Ceramic Tile: To ISO 10545, ANSI A108/A118/A136.1, CAN/CGSB-75.1, and as follows:
 - .1 Size: 10mm x 40mm x 6mm thick (nominal)
 - .2 Appearance: Solid
 - .3 Pattern: Non-textured
 - .4 Glaze: Bright
 - .5 Tile Composition: Porcelain
 - .6 Water Absorption Class: Less than 0.5 in accordance with ASTM C373
 - .7 Chemical Resistance: Pass Rating for specified application in accordance with ISO 10545-13.
 - .8 Stain Resistance: To ISO 10545-14, Class 5-Stain Removed with Hot Water
 - .9 Colour: As selected by HWDSB and JASON FUNG ARCHITECT INC. from manufacturer's standard colour range.

2.05 TILE TRIMS

- .1 Wall edge protection and tile cap: Aluminum edge protection with trapezoid perforated anchoring leg and an anodized finish, continuous at all exposed tile edges, depth as required to suit tile thickness. 'Jolly' by Schluter Systems or approved alternative by HWDSB and JASON FUNG ARCHITECT INC.

2.06 ACCESSORIES

- .1 Cement: CAN/CSA A3000, Type GU.
- .2 Sand: ASTM C144.
- .3 Water: Potable and free of minerals and other contaminants which are detrimental to mortar and grout mixes.
- .4 Polymer additive: Keralastic by Mapei Inc or approved alternative by Ardex, Flextile Ltd. or Laticrete International.
- .5 Thin-set mortar: 2 component to ANSI A108/A118/A136.1:
 - .1 'Kerabond with Keralastic Latex Additive' by Mapei Inc., 'Ardex X77 Microtec' by Ardex, '56SR/51 w/44' by Flextile Ltd., or '254/255' by Laticrete International.
- .6 Primer: To meet specified requirements of adhesive manufacturer.
- .7 Cleaner: In accordance with TTMAC's requirements and as recommended by tile manufacturer.
- .8 Crack-isolation system: Flexible, thin, fabric-reinforced, peel and stick membrane meeting ANSI A118.12 cut into strips to suit joints. 'Mapeguard 2' by Mapei Inc., or approved alternative by Ardex or Laticrete International Inc. Provide manufacturer approved primer.
- .9 Waterproof Membrane: Waterproof Membrane System made from black, coldapplied, self-curing, liquid rubber polymer and an integral reinforcing fabric. '9235Waterproofing' by Laticrete International Inc. or approved alternative by Mapei Inc.
- .10 Organic adhesive (walls): CGSB 71-GP-22M, Type I.
- .11 Grout:

- .1 Walls (1.5 mm to 3 mm joint width): 'Keracolor U' by Mapei Inc. or approved alternative by Ardex, Flextile Ltd. or Laticrete International.
- .2 Walls (over 3 mm joint width): 'Ultracolor Plus' by Mapei Inc. or approved alternative by Ardex, Flextile Ltd. or Laticrete International.
- .3 Grout colour: To be selected by JASON FUNG ARCHITECT INC. from the manufacturer's full colour range.
- .12 Sealer: CAN/CGSB-25.20, penetrating, type as recommended by tile manufacturer.
- .13 Tile sealant: In accordance with Section 07 92 00.

2.07 MIXES

- .1 Levelling bed mix:
 - .1 1 part Portland cement.
 - .2 4 parts sand.
 - .3 1 part water (including polymer additive), adjusted for water content of sand.
 - .4 1/10 part polymer additive.
- .2 Where allowed in material manufacturer's instructions, adjust water volume depending on moisture content of sand to obtain consistency and workability.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions:
 - .1 Wall Tiles: Provide wall levelling
- .2 Examine substrates and conditions where tile will be installed for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - .1 Verify that substrates for bonding tile are firm, dry, clean, and free from oil, waxy films, and curing compounds.
 - .2 Verify substrates are within starting flatness tolerances as specified in Section 03 30 00 – Cast-in-Place Concrete, and are ready for application of levelling materials specified in this Section.
 - .3 Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar products located in, behind, or through tiling is complete.
 - .4 Verify that joints and cracks in substrates align with tile movement joint locations indicated on Drawings. Adjust joints in consultation with HWDSB and JASON FUNG ARCHITECT INC. to align.

3.02 PREPARATION

- .1 Thoroughly clean substrate surfaces. Remove oil, wax, grease, dust, dirt, paint, tar, primers, form release agents, curing compound, and other foreign material from substrate surfaces which may prevent or reduce adhesion, and as follows:
 - .1 Clean the back of each tile before installation to remove surface contaminants and cutting

residue, firing release dust, and other debris detrimental to bond and final surface appearance.

- .2 Surface Levelling: Apply Levelling Bed Mortar to make backing surfaces flat and true to tolerances in plane listed for performance requirements, with additional requirements as follows:
 - .1 Install levelling materials at slight substrate irregularities.
 - .2 Provide self-levelling materials for thicknesses less than 8 mm where thin-set tile methods are used.
 - .3 Provide mortar bed levelling materials for thicknesses 8 mm and greater.

3.03 INSTALLATION - GENERAL

- .1 Perform tile work in accordance with TTMAC Tile Installer Technical Manual, parts of ANSI A108 Series of tile installation standards that apply to types of bonding and grouting materials, and to methods required for complete tile installation as minimum requirements.
- .2 Extend tile work into recesses and under equipment and fixtures, to create a complete uninterrupted wall covering.
 - .1 Terminate Work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
 - .2 Do not split tile.
 - .3 Make cut edges smooth, even, and free from chips.
- .3 Fit tile around corners, fitments, fixtures, drains, and other built-in objects.
- .4 Accurately form intersections and returns. Cut and drill tile without marring visible surfaces:
 - .1 Cut, drill, and fit tile to accommodate work of other Subcontractors penetrating and abutting work of this Section.
 - .2 Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints.
- .5 Lay tile in pattern indicated on Drawings and as follows:
 - .1 Align joints when adjoining tiles on floor, base, walls, and trim are the same size.
 - .2 Lay out tile Work and centre tile sites in both directions in each space or on each wall area.
 - .3 Centre tile patterns between control and movement joints; notify HWDSB and JASON FUNG ARCHITECT INC. for further instructions where tile patterns do not align with control or movement joints.
- .6 Cut tile accurately and without damage.
- .7 Smooth exposed cut edges with abrasive stone, where visible.
- .8 Minimum tile width is half unit size unless specifically indicated otherwise on Drawings.
- .9 Adjust tile layout to minimize tile cutting.
- .10 Provide uniform joint widths.
- .11 Make joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished Work. Align tile sheet patterns.
- .12 Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, and covers overlap tile.
- .13 Make joints between tile uniform, plumb, straight, true, and flush with adjacent tile.

- .14 Maximum Surface Tolerance: 1:800.
- .15 Lay out tiles so perimeter tiles are at least 1/2 of a full size.
- .16 Sound tiles after setting and replace hollow-sounding units to obtain full bond.
- .17 At termination of wall tile, provide aluminum edge protection, Jolly' by Schluter Systems or approved alternative by HWDSB and JASON FUNG ARCHITECT INC.
- .18 Wait a minimum of 24 hours after installation of tiles, before grouting.

3.04 INSTALLATION - CONTROL AND MOVEMENT JOINTS

- .1 Provide control, expansion and isolation joints in accordance with TTMAC specification 301MJ and as indicated on drawings. Install in locations indicated on drawings and specified herein.
- .2 Continue control, construction, and cold joints in the structural substrate up through the tile finish, and align with mortar joints where possible. Review joint locations on site with JASON FUNG ARCHITECT INC.
- .3 Install joint widths to match grout joint widths, except where a minimum width is indicated.
- .4 Install control joints in the following typical locations:
 - .1 Aligned over changes in type of substrate.
 - .2 At the restraining perimeters such as walls and columns.
 - .3 Interior areas (not subject to sunlight): 6 mm minimum width, at 7320 mm o.c. maximum.
 - .4 Interior areas (subject to sunlight): 6 mm minimum width, at 3660 mm o.c maximum.
 - .5 As indicated on the Contract Drawings.
- .5 Seal control joints in accordance with Section 07 92 00.

3.05 INSTALLATION – GROUT

- .1 Grouting: Install grout in accordance with manufacturer's written instructions, the requirements of TTMAC Tile Installer Technical Manual, and as follows:
 - .1 Allow proper setting time before application of grout.
 - .2 Pre-seal or wax tiles that require protection from grout staining.
 - .3 Force grout into the joints with a rubber grout float. Make sure all joints are well-compacted and free of voids and gaps.
 - .4 Remove excess grout in accordance with manufacturer's instructions and polish tile with clean cloths.

3.06 INSTALLATION – LEVELLING BED

- .1 Install a levelling bed on uneven substrate surfaces, level and plumb substrates in accordance with the following tolerances:
 - .1 Vertical surfaces: 3 mm in 2.4 m maximum
 - .2 Horizontal surfaces: 6 mm in 3 m from finished levels of the surface, or better.
- .2 Clean structural substrate control joints and blow-clean with compressed air. Grout fill control joints flush to slab with levelling bed.

3.07 SITE QUALITY CONTROL

- .1 Manufacturer Services:
 - .1 Provide manufacturer's site services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .2 Site Tests and Inspections: HWDSB will pay cost of inspection of installed Work from the Cash Allowance in accordance with Section 01 21 00 – Allowances. Subcontractor to cooperate with HWDSB inspector and correct deficiencies identified. Inspection will consist of the following as a minimum:
 - .1 Arrange for mortar and grout manufacturer's representative to review delivered materials and confirm in writing that materials and mixes specified for the Project are in accordance with manufacturer's requirements.
 - .2 Confirm that tile is set flush and level with adjacent tiles.
 - .3 Identify broken, cracked, hollow sounding, and damaged tiles.
 - .4 Confirm that accessories are installed correctly.
 - .5 Confirm that flexible grouting and joint sealants have been installed correctly.
 - .6 Confirm that installation is complete and in accordance with the requirements of this Section.

3.08 CLEANING

- .1 Perform cleaning in accordance with Section 01 74 00 - Cleaning. Clean tile surfaces so they are free of foreign matter using manufacturer recommended cleaning products and methods after completing grouting, and as follows:
 - .1 Clean off excess grout with soft burlap or sponge moistened with clean water as soon as possible.
 - .2 Polish wall tile after grout has cured in accordance with TTMAC recommendations in the Maintenance Guide; do not use acid for cleaning.
 - .3 Re-point joints after cleaning as required to eliminate imperfections, then re-clean as necessary. Avoid scratching tile surfaces.
- .2 Waste Management and Disposal: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

3.09 JOINT BACKING AND TILE SEALANT

- .1 Install joint backing under sealant as necessary.
- .2 Install tile sealant around piping and fittings extending through tiled surfaces.
- .3 Seal tile control joints.
- .4 Seal internal tile to tile junctions. Tool to a smooth, flush surface, free from air bubbles and contamination.

3.10 PROTECTION

- .1 Prevent traffic over tiled areas, and protect tiled assemblies from weather, freezing, and water immersion, for 72 hours minimum, after final installation.
- .2 Prevent direct impact, vibration and heavy hammering on adjacent and opposite walls for 24 hours

minimum, after final installation.

- .3 Cover work temporarily with building paper properly lapped and taped at joints until work has been approved by JASON FUNG ARCHITECT INC.

END OF SECTION

I GENERAL

I.1 RELATED DOCUMENTS

- .1 Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-I Specification sections apply to work of this section.

I.2 SUMMARY

- .1 Section Includes
 - .2 Acoustical ceiling panels
 - .2 Exposed grid suspension system
 - .3 Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
 - .4 Perimeter Trim
- .2 Related Sections
 - .1 Section 09 51 23 – Acoustical Tile Ceilings
 - .2 Section 09 20 00 - Plaster and Gypsum Board
- .3 Alternates
 - .1 Prior Approval: Refer to the RFT document for substitutions. Acceptability of a proposed substitution is contingent upon HWDSB and JASON FUNG ARCHITECT INC.'s review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been pre-approved by the architect and included in the Addenda, the originally specified products shall be provided without additional compensation.
 - .2 Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers; Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

I.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM A1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
 - .2 ASTM A641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
 - .3 ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
 - .4 ASTM C423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - .5 ASTM C635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
 - .6 ASTM C636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
 - .7 ASTM E1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
 - .8 ASTM E1264 Classification for Acoustical Ceiling Products

I.4 SYSTEM DESCRIPTION

- .1 Continuous/Wall-to-wall

I.5 SUBMITTALS

- .1 Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
- .2 Samples: Minimum 6-inch x 6-inch samples of specified acoustical panel; 8-inch-long samples of exposed wall molding and suspension system, including main runner and 4-foot cross tees.
- .3 Shop Drawings: Layout and details of acoustical ceilings show locations of items that are to be coordinated with or supported by the ceilings.
- .4 Acoustical Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification, such as Underwriter's Laboratory (UL), of NRC, CAC, and AC.
 - .1 If the material supplied by the acoustical subcontractor does not have an independent laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of, and replaced with complying product at the expense of the Contractor performing the work.

I.6 SUSTAINABLE MATERIALS

- .1 Not used

I.7 QUALITY ASSURANCE

- .1 Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer to ensure fit and function.

I.8 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- .2 Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- .3 Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

I.9 PROJECT CONDITIONS

- .1 Space Enclosure:
 - .1 HumiGuard Plus Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Products with HumiGuard Plus performance and hot dipped galvanized steel, aluminum or stainless-steel suspension systems can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the ceiling.

I.10 WARRANTY

- .1 Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
 1. Acoustical Panels with HumiGuard® Max and HumiGuard® Plus performance: sagging and warping
 2. Acoustical panels with BioBlock® performance: growth of mold and mildew
 3. Grid System: rusting and manufacturer's defects

- .2 Warranty Period:
 1. Ceiling System: Thirty (30) years from date of substantial completion
- .3 The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.11 MAINTENANCE

- .1 Extra Materials: Deliver extra materials to HWDSB. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
 - .1 Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
 - .2 Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Ceiling Panels:
 - .1 Armstrong World Industries, Inc. or approved equivalent by HWDB and JASON FUNG ARCHITECT INC.
 - .2 Substitutions: Refer to RFT document.
- .2 Suspension Systems:
 - .1 Existing to be reused and repainted.
 - .2 Inform JASON FUNG ARCHITECT INC. and HWDSB if existing suspension system is in poor condition.

2.2 ACOUSTICAL CEILING UNITS

- .1 Acoustical Panel Ceilings
 - .1 Surface Texture: Medium Texture
 - .2 Composition: Mineral Fiber
 - .3 Color: White
 - .4 Size: 24 in x 48 in
 - .5 Edge Profile: Square Lay-in
 - .6 Noise Reduction Coefficient (NRC) ASTM C 423 Classified w/ UL label on product carton: 0.70
 - .7 Ceiling Attenuation Class (CAC): ASTM E1414/E1414M; Classified with UL label on product carton: 40
 - .8 Flame Spread: ASTM E 1264; Class A
 - .9 Light Reflectance (LR) White Panel: ASTM E 1477; 0.82
 - .10 Dimensional Stability: HumiGuard Plus
 - .11 Recycle Content: Up to 56% total recycled content. (Total recycled content: pre-consumer, post-consumer and post-industrial)
 - .12 Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label
 - .13 Basis of Design: SCHOOL ZONE FINE FISSURED, item number #1714, as manufactured by Armstrong World Industries, Inc. or approved equivalent by HWDB and JASON FUNG ARCHITECT INC.
 - .14 Substitutions: Refer to RFT document.

2.3 METAL SUSPENSION SYSTEMS

- .1 Components: Existing to remain.
 - .1 Color: White
 - .2 Basis of Design if replacement is required:
 - i. Prelude XL 15/16" Exposed Tee as manufactured by Armstrong World Industries, Inc. or approved equivalent by HWDB and JASON FUNG ARCHITECT INC.
 - ii. Substitutions: Refer RFT document.

3 EXECUTION

3.1 EXAMINATION

- .1 Do not proceed with installation until all wet work such as concrete, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

3.2 PREPARATION

- .1 Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.
- .2 Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
- .3 Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

- .1 Follow manufacturer installation instructions.
- .2 Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.
- .3 Suspend main beam from overhead construction with hanger wires spaced 4 feet on center along the length of the main runner. Install hanger wires plumb and straight.
- .4 Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
- .5 For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.
- .6 Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 ADJUSTING AND CLEANING

- .1 Replace damaged and broken panels.
- .2 Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Not Used.

I.02 REFERENCE STANDARDS

- .1 Environmental Protection Agency (EPA)
 - .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, EPA Method 24 - Surface Coatings.
 - .2 SW-846, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).
- .3 Master Painters Institute (MPI)
 - .1 The Master Painters Institute (MPI)/Architectural Painting Specification Manual (ASM) - current edition.
 - .2 Standard GPS-1- 12, MPI Green Performance Standard.
 - .3 Standard GPS-2- 12, MPI Green Performance Standard.
- .4 National Research Council Canada (NRC)
 - .1 National Fire Code of Canada (NFC).
- .5 Society for Protective Coatings (SSPC)
 - .1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

I.03 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling:
 - .1 Submit work schedule for various stages of painting to HWDSB for review. Provide schedule minimum of 48 hours in advance of proposed operations.
 - .2 Obtain written authorization from HWDSB for changes in work schedule.
 - .3 Schedule new additions to existing building coordinate painting operations with other trades.

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's instructions, printed product literature and data sheets for paint and paint products and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
 - .3 Confirm products to be used are in MPI's approved product list.
- .3 Upon completion, provide records of products used. List products in relation to finish system and

include the following:

- .1 Product name, type and use.
 - .2 Manufacturer's product number.
 - .3 Colour numbers.
 - .4 MPI Environmentally Friendly classification system rating.
 - .5 Manufacturer's Safety Data Sheets (SDS).
- .4 Samples:
- .1 Submit full range colour sample chips to indicate where colour availability is restricted.
 - .2 Submit duplicate 200 x 300mm sample panels of each paint, stain, clear coating, special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
 - .1 3 mm plate steel for finishes over metal surfaces.
 - .2 13 mm plywood for finishes over wood surfaces.
 - .3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
 - .4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
 - .5 10 mm plywood for finishes over wood surfaces.
 - .3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
 - .5 Certificates: Provide certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties. MPI Gateway #.
 - .6 Manufacturer's Instructions:
 - .1 Provide manufacturer's installation and application instructions.

I.05 CLOSEOUT SUBMITTALS

- .1 Provide in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: Provide operation and maintenance data for painting materials for incorporation into manual.
- .3 Include:
 - .1 Product name, type and use.
 - .2 Manufacturer's product number.
 - .3 Colour numbers.
 - .4 MPI Environmentally Friendly classification system rating.

I.06 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Stock Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Submit one four litre can of each type and colour of primer, stain, finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

I.07 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Materials: in accordance with MPI Painting Specification Manual “Approved Product” listing and from a single manufacturer for each system used.
 - .2 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by HWDSB.
 - .3 Standard of Acceptance:
 - .1 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
 - .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.
- .2 Mock-Ups:
 - .1 When requested by HWDSB or Paint Inspection Agency, prepare and paint designated surface, area, room or item to requirements specified herein, with specified paint or coating showing selected colours, number of coats, gloss/sheen, textures and quality of work to MPI Painting Specification Manual standards for review and approval.
 - .2 Construct mock-ups in accordance with Section 01 43 00 - Quality Assurance.
 - .1 Provide 300mm x 300mm mock-up. Prepare and paint designated surface, area, room or item (in each colour scheme) to specified requirements, with specified paint or coating showing selected colours, gloss/sheen, textures.
 - .2 Mock-up will be used:
 - .1 To judge quality of work, substrate preparation, operation of equipment and material application and skill to MPI Architectural Painting Specification Manual standards.
 - .3 Locate where directed.
 - .4 Allow 24hours for inspection of mock-up before proceeding with Work.
 - .5 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may not remain as part of finished work. Remove mock-up and dispose of materials when no longer required and when directed by HWDSB.

I.08 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer’s written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer’s name and address.
 - .1 Labels: to indicate:
 - .1 Type of paint or coating.
 - .2 Compliance with applicable standard.
 - .3 Colour number in accordance with established colour schedule.
- .3 Storage and Handling Requirements:

- .1 Store materials indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Observe manufacturer's recommendations for storage and handling.
- .3 Store materials and supplies away from heat generating devices.
- .4 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
- .5 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of HWDSB. After completion of operations, return areas to clean condition to approval of HWDSB.
- .6 Remove paint materials from storage only in quantities required for same day use.
- .7 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- .8 Fire Safety Requirements:
 - .1 Provide one Type ABC fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada (NFC).
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

I.09 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Heating, Ventilation and Lighting:
 - .1 Ventilate enclosed spaces.
 - .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
 - .3 Provide continuous ventilation for 7 days after completion of application of paint.
 - .4 Coordinate use of existing ventilation system with HWDSB and ensure its operation during and after application of paint as required.
 - .5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
 - .6 Provide minimum lighting level of 323 Lux on surfaces to be painted.
 - .7 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Unless pre-approved written approval by Specifying body and product manufacturer, perform no painting when:
 - .1 Ambient air and substrate temperatures are below 10 degrees C.

- .2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
- .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
- .4 The relative humidity is under 85 % or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
- .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
- .6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.
- .2 Perform painting work when maximum moisture content of the substrate is below:
 - .1 12 % for concrete and masonry (clay and concrete brick/block). Allow new concrete and masonry to cure minimum of 28 days.
 - .2 15 % for hard wood.
 - .3 17 % for soft wood.
 - .4 12 % for plaster and gypsum board.
- .3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".
- .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .8 Surface and Environmental Conditions:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
 - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
 - .3 Apply paint when previous coat of paint is dry or adequately cured.
- .9 Additional interior application requirements:
 - .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
 - .2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of HWDSB such that painted surfaces will have dried and cured sufficiently before occupants are affected.

2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- .1 Environmental Performance Requirements:
 - .1 Provide paint products meeting MPI "Environmentally Friendly" E1 E2 E3 ratings based on

VOC (EPA Method 24) content levels

- .2 Green Performance in accordance with MPI Standard GPS-1 GPS-2.

2.02 MATERIALS

- .1 Only Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project
- .2 Provide paint materials for paint systems from single manufacturer. Acceptable Products:
 - .1 Benjamin Moore.
 - .2 Sherwin Williams.
 - .3 Dulux-Giddien.
 - .4 Para Paints and Coatings.
- .3 Only qualified products with E2 "Environmentally Friendly" rating are acceptable for use on this project.
- .4 Conform to latest MPI requirements for interior painting work including preparation and priming
- .5 Provide paint products meeting MPI "Environmentally Friendly" E1 ratings based on VOC (EPA Method 24) content levels
- .6 Use MPI listed materials having minimum E2 rating where indoor air quality (odour) requirements exist.
- .7 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids to be:
 - .1 Be Water-based.
 - .2 Be non-flammable.
 - .3 Be manufactured without compounds which contribute to ozone depletion in the upper atmosphere.
 - .4 Be manufactured without compounds which contribute to smog in the lower atmosphere.
 - .5 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.
- .8 Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings does not release:
 - .1 Matter in undiluted production plant effluent generating 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to natural watercourse or sewage treatment facility lacking secondary treatment.
 - .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to natural watercourse or a sewage treatment facility lacking secondary treatment.
- .9 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes to meet minimum "Environmentally Friendly" E2 rating.
- .10 Recycled water-borne surface coatings to contain 50% post-consumer material by volume.
- .11 Recycled water-borne surface coatings must not contain:
 - .1 Lead in excess of 600.0 ppm weight/weight total solids.
 - .2 Mercury in excess of 50.0 ppm weight/weight total product.
 - .3 Cadmium in excess of 1.0 ppm weight/weight total product.
 - .4 Hexavalent chromium in excess of 3.0 ppm weight/weight total product.

.5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

2.03 COLOURS

- .1 HWDSB and JASON FUNG ARCHITECT INC. will provide Colour Schedule after Contract award. Submit proposed Colour Schedule to HWDSB for review.
- .2 Colour schedule will be based upon selection of 3 colours. No more than 2 colours will be selected for entire project.
- .4 Where specific products are available in restricted range of colours, selection based on limited range.
- .5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats, if requested by HWDSB.
- .6 For deep and ultra deep colours; 4 coats may be required.

2.04 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from HWDSB for tinting of painting materials.
- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.
- .4 Thin paint for spraying in accordance with paint manufacturer's instructions.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity. Strain as necessary.

2.05 GLOSS/SHEEN RATINGS

- .1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - Velvet-Like Finish	Max. 10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	min. 35
Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

- .2 Gloss level ratings of painted surfaces as indicated.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.02 GENERAL

- .1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.03 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable to be painted in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of HWDSB.
 - .2 Inform HWDSB of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from HWDSB.
- .2 Interior repainting work: inspected by MPI Accredited Paint Inspection Agency (inspector) acceptable to specifying authority and local Painting Contractor's Association. Painting contractor to notify Paint Inspection Agency minimum of one week prior to commencement of work and provide copy of project repainting specification and Finish Schedule.
- .3 Interior surfaces requiring repainting: inspected by both painting contractor and Paint Inspection Agency who will notify HWDSB in writing of defects or problems, prior to commencing repainting work, or after surface preparation if unseen substrate damage is discovered.
- .4 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
- .5 Maximum moisture content as follows:
 - .1 Stucco, plaster and gypsum board: 12 %.
 - .2 Concrete: 12 %.
 - .3 Clay and Concrete Block/Brick: 12 %.
 - .4 Hard Wood: 15 %.
 - .5 Soft Wood: 17%.

3.04 PREPARATION

- .1 Protection (not applicable to new painting work):
 - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by HWDSB.
 - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
 - .3 Protect factory finished products and equipment.
 - .4 Protect passing pedestrians, building occupants and general public in and about the building.
- .2 Surface Preparation (not applicable to new painting work):
 - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is

- completed.
- .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
 - .3 Place “WET PAINT” signs in occupied areas as painting operations progress. Signs to approval of HWDSB.
- .3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
- .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
 - .2 Wash 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.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and allow to dry thoroughly.
 - .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
 - .6 Use trigger operated spray nozzles for water hoses.
 - .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.
- .4 Clean following surfaces with high pressure water washing.
- .5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .6 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
- .1 Apply sealer to MPI #36 over knots, pitch, sap and resinous areas
 - .2 Apply wood filler to nail holes and cracks.
 - .3 Tint filler to match stains for stained woodwork.
- .7 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .8 Carried out during shop priming: clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, blowing with clean dry compressed air or vacuum cleaning.
- .9 Touch up of shop primers with primer as specified.
- .10 Do not apply paint until prepared surfaces have been accepted by HWDSB

3.05 EXISTING CONDITIONS

- .1 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple “cover patch test” and report findings to HWDSB. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
- .2 Maximum moisture content as follows:

- .1 Stucco: 12 %.
- .2 Concrete: 12 %.
- .3 Clay and Concrete Block/Brick: 12 %.
- .4 Hard Wood: 15 %.
- .5 Soft Wood: 17%.

3.06 APPLICATION

- .1 Method of application to be as approved by JASON FUNG ARCHITECT INC.. Apply paint by brush and roller. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:
 - .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
 - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.
- .4 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .5 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .6 Sand and dust between coats to remove visible defects.
- .7 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .8 Finish inside of cupboards and cabinets as specified for outside surfaces.
- .9 Finish closets and alcoves as specified for adjoining rooms.
- .10 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.
- .11 Metal grid, drywall, plaster, concrete, and concrete masonry units; if sprayed, must be back rolled.

3.07 MECHANICAL/ELECTRICAL EQUIPMENT

- .1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.
- .2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.
- .3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .4 Do not paint over nameplates.
- .5 Keep sprinkler heads free of paint.

- .6 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.
- .7 Paint fire protection piping red.
- .8 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
- .9 Paint natural gas piping yellow.
- .10 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .11 Do not paint interior transformers and substation equipment.

3.08 SITE TOLERANCES

- .1 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
- .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.09 SITE QUALITY CONTROL

- .1 Interior painting and decorating work to be inspected by a MPI Accredited Paint Inspection Agency (inspector) acceptable to specifying authority and local Painting Contractor's Association. Painting contractor will notify Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of project painting specification, plans and elevation drawings (including pertinent details) as well as a Finish Schedule.
- .2 Interior surfaces requiring painting to be inspected by Paint Inspection Agency who will notify HWDSB and General Contractor in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.
- .3 Where "special" painting, coating or decorating system applications (i.e. elastomeric coatings) or non- MPI listed products or systems are to be used, paint or coating manufacturer will provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to HWDSB.
- .4 Standard of Acceptance:
 - .1 Ceilings: no defects visible from floor at 45 degrees degrees to surface when viewed using final lighting source.
 - .2 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.
- .5 Advise HWDSB when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
- .6 Cooperate with inspection firm and provide access to areas of work.
- .7 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by HWDSB.

3.10 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.11 RESTORATION

- .1 Clean and re-install hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .4 Protect freshly completed surfaces from paint droppings and dust to approval of HWDSB. Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by HWDSB.

END OF SECTION

I GENERAL

- .1 Required signage will be indicated by HWDSB during the project.

I.01 RELATED REQUIREMENTS

I.02 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM A123/A123M-24, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A653/A653M-23, Standard Specification for Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
 - .3 ASTM B32-20, Standard Specification for Solder Metal.
 - .4 ASTM B456-17, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- .2 CSA Group (CSA)
 - .1 CSA W47.2-11, Certification of Companies for Fusion Welding of Aluminum.
 - .2 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
 - .3 CSA W59.2-M1991, Welded Aluminum Construction.
- .3 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI SSF 6, Sheet Steel Facts #6, Metallic Coated Sheet Steel for Structural Building Products.
- .4 Green Seal (GS)
 - .1 GS-11, Standard for Paints and Coatings.
 - .2 GS-36, Adhesives for Commercial Use.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).
- .6 Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
 - .1 MPI #76, Quick Dry Alkyd Metal Primer.
 - .2 MPI #96, Quick Dry Enamel Gloss.

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for signage and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
 - .2 Submit catalogue sheets and full size templates.

- .3 Indicate materials, thicknesses, sizes, finishes, colours, construction details, removable and interchangeable components, electrical components specifications and power loads, wiring terminal box locations, lamp centres and overlaps, access panels, mounting methods, schedule of signs.
- .4 Submit full size templates drawn-to-scale details for individually fabricated or incised lettering indicating word and letter spacing.
- .4 Samples:
 - .1 Submit duplicate representative sample of each type sign, sign image and mounting method including, but not limited to: graphics, cast letters, sign box installation method, channel letters, and wall plates fixed mounting installation method.
 - .2 Low-Emitting Materials:
 - .1 Submit listing of adhesives and sealants and paints and coatings used in building, showing compliance with VOC and chemical component limits or restriction requirements.

I.04 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for illuminated signs for incorporation into manual.

I.05 QUALITY ASSURANCE

- .1 Welding Certification in accordance with CSA W47.2.

I.06 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect specified materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan.

2 PRODUCTS

2.01 MATERIALS

- .1 Aluminum extrusions: to designation AA 6063-T5 and AA 6006-T5.
- .2 Sheet aluminum: anodizing quality.
- .3 Prefinished sheet aluminum: plain or embossed utility sheet with manufacturer applied baked enamel finish to 0.25 mm thick on face and 0.0076 mm thick on back.

- .4 Prefinished sheet steel: conforming to CSSBI SSF 6: for normal environment: in colours selected from manufacturer's standard range as indicated.
- .5 Galvanized steel sheet to ASTM A653/A653M: Commercial Quality with mill phosphatized Z001 or ZF001 coating, where coating is required.
- .6 Acrylic sheet: polymethylmethacrylate (PMMA) cast sheet suitable for intended use in sign fabrication, translucent white, transparent clear or colours as indicated.
- .7 Fibreglass sheet: to CGSB 41-GP-6M, flat sheet, smooth finish, colours as indicated.
- .8 Engraving sheet: lamicoid 3.2mm thick plastic sheet, black core.
- .9 Electrical components: CSA approved as indicated.
- .10 Welding materials: to CSA W59
- .11 Solder: to ASTM B32, TypeSn50.
- .12 Self-stick foam tape: 3.2mm thick, 352.4kg/m³ density polyurethane open-cell foam tape for sign purposes, with synthetic self-stick adhesive on both sides.
 - .1 Width: to suit sign sizes.
- .13 Adhesives, paints, sealants and solvents for acrylic sheet: type recommended by sheet manufacturer for applicable condition.
- .14 Acrylic top-coat: clear, non-yellowing, exterior grade, satin finish, acrylic polyester resin protective coating, compatible with acrylic or metal surface of type recommended by sheet manufacturer.

2.02 SIGN GRAPHICS

- .1 Sign graphics: well defined, arranged for balanced appearance, and properly word and letter spaced.
- .2 Cut and spray process: mask surfaces, accurately cut-out image, spray apply uniform coating to obtain opaque finish to HWDSB sample.
- .3 Silk screen process: apply 2 colour photographic produced silk screen printed images to face side of transparent sign faces; face side of opaque sign faces.
- .4 Engraving: apply sign images using pantograph mechanical engraving machine to obtain incised paint-filled letters to match HWDSB sample.
- .5 Self-stick vinyl film: individual letters and numerals and symbols die cut from 0.1mm thick black integral colour, matte finish, exterior grade VC film, with self-stick adhesive backing.

2.03 CUT-OUT LETTERS

- .1 Cut letters and symbols from opaque coloured acrylic.
- .2 Helvetica typeface, upper and lower case: sizes and thicknesses as indicated.
 - .1 Make corners square cut.
- .3 Finish, after fabrication aluminum with clear anodizing.

2.04 CAST LETTERS

- .1 Cast letters of solid aluminum or plastic accurately formed to profiles as detailed; with smooth faces free from surface defects or blemishes.
- .2 Finish letters, after fabrication with colour anodizing belt polished high lustre with acrylic top coat to match HWDSB sample.

2.05 ILLUMINATED SIGN BOXES

- .1 Not Used.

2.06 NON- ILLUMINATED SIGN BOXES

- .1 Fabricate sign as detailed of opaque black acrylic, fiberglass.
- .2 Buff exposed edges and make radius corners.
- .3 Fabricate overhead hangers, wall brackets, or wall fasteners for installation.
 - .1 Exposed materials: compatible with materials used on illuminated signs.
 - .2 Concealed materials: steel with rust inhibitive, or galvanized finish to produce reasonably rigid sign.
- .4 Sign faces:
 - .1 Fabricate sign faces of black opaque or colour acrylic sheet.
 - .2 Installed face to present rigid surface with minimal distortion: to match HWDSB approved sample method.
- .5 Sign graphics: apply by silk screen, cut and spray, self-sticking vinyl film, decals, or cut-out acrylic letters.

2.12 FABRICATION

- .1 Fabricate signs in accordance with details, specifications and shop drawings.
- .2 Build units square, true, accurate to size, free from visual or performance defects.
- .3 Fit and securely join sections to obtain tight, closed joints.
- .4 Allow for thermal movement without distortion of components.
- .5 Exposed fasteners of same finish and colour as base material permitted where indicated and where approved by HWDSB.
- .6 Polish exposed edges of plastic and metal to smooth, slightly convex profile.
- .7 Do steel welding to CSA W59 and aluminum welding to CSA W59.2.
 - .1 Finish exposed welds flush and smooth.
- .8 Apply bituminous paint to aluminum in contact with dissimilar metals, concrete or masonry.
- .9 Manufacturer's nameplates on sign surface permitted in non visible locations in completed work.

2.13 FINISHES

- .1 Anodized aluminum:
 - .1 Clear finish: in uncoloured anodized finish
 - .1 Maximum VOC limit 50 g/L to GS-11 Standard to SCAQMD Rule 1113.
 - .2 Colour finish: to match HWDSB sample.
- .2 Galvanized finish: on irregular shaped articles, 381 g/m² zinc coating to ASTM A123/A123M
- .3 Baked enamel:
 - .1 One coat of conditioner to CGSB 31-GP-107M one coat of MPI #76 primer.
 - .2 At least two coats of MPI # 96.

- .3 One coat on interior surfaces.
- .4 Individually bake each coat.
- .4 Chrome and nickel plating: to ASTM B456, satin finish.
- .5 Prefinished metals: see PART 2, article on MATERIALS.
- .6 Bronze finishes: to match HWDSB sample.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for signage installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of HWDSB.
 - .2 Inform HWDSB of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from HWDSB.

3.02 INSTALLATION

- .1 Manufacturer's Instructions: compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheets.
- .2 Erect and secure signs plumb and level at elevations as directed by HWDSB.
- .3 Comply with sign manufacturer's installation instructions and approved shop drawings.
- .4 Mechanical attachment:
 - .1 To concrete or solid masonry: use lag screws and expansion bolts or screws and fibre plugs, as appropriate for stresses involved.
 - .2 To hollow masonry: use toggle bolts or equivalent.
 - .3 To steel: use bolts with nut and lock washers, self-tapping screws.
 - .1 Do steel welding to CSA W59 and aluminum welding to CSA W59.2.
 - .2 Finish exposed welds flush and smooth.
 - .4 To wood: use screws.
 - .5 Secure into framing members behind stud walls or above ceilings.
 - .6 Mechanical fasteners on exterior: non-staining, non-ferrous type.
 - .7 Fabricate special fasteners as required for installation conditions.
 - .8 Mechanical fasteners and methods of attachment subject to HWDSB approval.
 - .1 Obtain HWDSB approval before fixing to structural steel.
- .5 Adhesive attachment:
 - .1 Use self-stick adhesive foam tape to manufacturer's instructions to fix sign and prevent "rocking".
 - .2 Keep tape maximum 1.6 mm from edges.

3.03 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave signs clean.
 - .2 Remove debris from interior of sign boxes.
 - .3 Touch up damaged finishes.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Not used.

I.02 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM B456-17, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
 - .2 ASTM A653/A653M-23, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .3 ASTM A924/A924M-22a, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-I.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
 - .2 CAN/CGSB-I.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
 - .3 CGSB 31-GP-107MA-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.
- .4 CSA Group (CSA)
 - .1 CAN/CSA-B651-04, Accessible Design for the Built Environment.
 - .2 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures. Refer to HWDSB Front end document.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Canada.
 - .2 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.
- .4 Samples:
 - .1 Submit samples to HWDSB.
 - .2 Samples will be returned for inclusion into work.
- .5 Sustainable Standards Certification:
 - .1 Low-Emitting Materials: submit listing of laminate adhesives used in building, verifying that they contain no urea-formaldehyde.

I.04 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals. Refer to HWDSB front end document.

I.05 MAINTENANCE MATERIAL SUBMITTALS

- .1 Tools:
 - .1 Provide special tools required for assembly, disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals. Refer
 - .2 Deliver special tools to HWDSB.

I.06 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect toilet and bathroom accessories from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials.
 - .1 Materials and Resources Credit MRc2.1 Construction Waste Management: Divert 50% From Landfill and MRc2.2 Construction Waste Management: Divert 75% From Landfill: prepare Construction Waste Management plan.

2 PRODUCTS

2.01 MATERIALS

- .1 Sheet steel: to ASTM A653/A653M with ZF001 designation zinc coating.
- .2 Stainless steel sheet metal: to ASTM A167
- .3 Sustainability Characteristics:
 - .1 Laminate Adhesives.
 - .1 Urea Formaldehyde Free.
- .4 Stainless steel tubing: commercial grade, seamless welded, 1.2 mm wall thickness.
- .5 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.02 COMPONENTS

- .1 HWDSB to provide the following components:

- .1 Paper towel dispenser.
- .2 Toilet Paper dispenser.
- .3 Soap dispenser.
- .4 Signage as per guidelines provided by HWDSB.
- .2 GC to provide the following components:
 - .1 Hand Dryer approved by HWDSB.
 - .2 Sanitary napkin disposal containers.
 - .3 Wall-mounted open top, stainless steel garbage receptacle approved by HWDSB.
 - .4 Grab bars for Universal washroom.
 - .5 Mirror(s).
 - .6 Stainless steel shelf.
 - .7 Coat Hook.
- .2 Toilet tissue dispenser: double roll type, surface mounted, chrome plated steel frame, capacity of 500 double ply roll, roll under spring tension for controlled delivery.
- .2 Soap dispenser: lather push-in valve 64 mm spout, self contained 340 mL translucent polyethylene 1.14 L tank, stainless steel piston and valve assembly, tamper proof filler lock, surface mounted, exposed metal components chrome plated.
- .3 Feminine napkin/tampon dispenser: stainless steel surface unit type 304. Pivoting self closing lid. French/English napkin disposal label is embossed on lid. Acceptable product: Frost #622 Stainless Steel Wall Mount Receptacle.
- .5 Hand dryer: listed under re-examination service of ULC and CSA approved. Acceptable manufacturer: Slim World Air.
 - .1 Mounting: surface.
 - .2 Wall box: 16 gauge steel.
 - .3 Cover: stainless steel.
 - .4 Motor: universal type, 74.6 kW, 7500 RPM, resilient mounting, sealed, lubricated bearings, fuse protected.
 - .5 Fan: double inlet centrifugal type, dynamically balanced, directly mounted on motor shaft, 56.6 L/s.
 - .6 Heating element: protected by an automatic, resetting circuit breaker, isolated from nozzle.
 - .7 Electronic dryer: power controlled by infrared admitting, receiving electronic control device positioned to dryer on when hands are placed under nozzle. Operation to continue for no more than 80 seconds of continued use.
 - .8 Nozzle: stainless steel
- .6 Grab bars: 38mm clearance from wall, supports 900 lb if properly installed. Stainless Steel 1.5" Diameter. Brushed finish, peened grip with concealed mounting. Acceptable 1001-NP Series by Frost.
- .7 L Grab Bars: 38mm clearance from wall, supports 900 lb if properly installed. Stainless Steel 1.5" Diameter. Brushed finish, peened grip with concealed mounting. Acceptable 1001-NP Series by Frost.

- .8 Soap holder: surface mounted, 5mm thick stainless steel dished tray, self-draining, flush screws.
- .9 Waste receptacle: 61.6cm H x 38.9cm W x 19.1cm. Totally capacity: 50 liters. Stainless steel finish.
Acceptable Product: Frost 326 Wall Mounted Waste Receptacle.
- .10 Tilt mirror: wall mounted unit, fixed framed mirror 6 mm, 304 heavy-gauge stainless steel frame.
Tilt Mirror shall be Model B-293 of Bobrick Washroom Equipment, Inc.
- .11 Coat Hook: Collapsible safety coat hook, spring loaded to support 25 lb. Stainless steel finish.
Acceptable Product: Frost 1150-22 Stainless Steel Safety Coat Hook.

2.03 FABRICATION

- .1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.
- .2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.
- .3 Brake form sheet metal work with 1.5 mm radius bends.
- .4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- .5 Back paint components where contact is made with building finishes to prevent electrolysis.
- .6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CAN/CSA-G164
- .7 Shop assemble components and package complete with anchors and fittings.
- .8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.
- .9 Provide steel anchor plates and components for installation on studding and building framing.

2.04 FINISHES

- .1 Not used.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrates and surfaces to receive toilet and bathroom accessories previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to toilet and bathroom accessories installation.
- .2 Inform HWDSB of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from HWDSB.

3.02 INSTALLATION

- .1 Install and secure accessories rigidly in place as follows:
 - .1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.
 - .2 Hollow masonry units, existing plaster or drywall: use toggle bolts drilled into cell or wall cavity.

- .3 Solid masonry, marble, stone or concrete: use bolt with lead expansion sleeve set into drilled hole.
- .4 Toilet and shower compartments: use male to female through bolts.
- .2 Install grab bars on built-in anchors provided by Bobrick.
- .3 Use tamper proof screws/bolts for fasteners.
- .4 Fill units with necessary supplies shortly before final acceptance of building.

3.03 ADJUSTING

- .1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.
- .2 Lubricate moving parts to operate smoothly and fit accurately.

3.04 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for reuse and recycling.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.05 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by toilet and bathroom accessories installation.

3.06 SCHEDULE

- .1 Locate accessories where indicated and as follows. Exact locations determined by HWDSB.
- .2 Toilet tissue dispenser: Mounting height 900 mm above finished floor.
- .3 Paper towel dispenser: one in each washroom. Mounting height as per drawings.
- .4 Soap dispenser: one at each wash basin.
- .5 Feminine napkin/tampon dispenser: one for each female washroom. Maximum height of dispenser and operable part from floor 1200 mm.
- .7 Hand dryer: Maximum height of dispenser and operable part from floor 1200 mm.
- .8 Grab bar: one straight and one L bar in universal water closet. Height of grab bar from floor 750 mm. Side grab bar: maximum distance from rear wall 300 mm, minimum distance passed front edge of toilet 450 mm.
- .9 Soap holder: mounting height as per drawings.
- .10 Waste receptacle: one for each towel dispensers, adjacent to wash basin area. Mounting height as per drawings.
- .11 Tilt mirror: one at each accessible wash basin, height of bottom edge of mirror from floor 1000mm.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 07 84 00 – Firestopping
- .2 Section 09 22 16 – Non-Structural Metal Framing

I.02 REFERENCE STANDARDS

- .1 National Fire Protection Association (NFPA):
 - .1 NFPA 10, Standard for Portable Fire Extinguishers
- .2 ULC Standards (ULC):
 - .1 CAN/ULC-S115, Standard Method of Fire Tests of Firestop Systems
 - .2 CAN/ULC-S503, Standard for Carbon-Dioxide Fire Extinguishers
 - .3 CAN/ULC-S504, Standard for Dry Chemical Fire Extinguishers
 - .4 CAN/ULC-S507, Standard for Water Fire Extinguishers
 - .5 CAN/ULC-S508, Standard for the Rating and Fire Testing of Fire Extinguishers
 - .6 CAN/ULC-S532, Standard for the Regulation of the Servicing of Portable Fire Extinguishers
 - .7 CAN/ULC-S554, Standard for Water Based Agent Fire Extinguishers
 - .8 CAN/ULC-S566, Standard for Halocarbon Clean Agent Fire Extinguishers

I.03 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate wall framing and wall depth to accommodate semi-recessed extinguisher cabinets with Section 09 22 16 – Non-Structural Metal Framing.
- .2 Pre-Installation Meetings: Hold a meeting in accordance with Section 01 31 19 – Project Meetings with Contractor, impacted Subcontractors, and HWDSB to discuss minor revisions to locations and exact mounting heights of extinguisher cabinets in prominent locations to minimize cutting of wall tile align with nearby wall mounted equipment.
- .3 Sequencing: Install identification labels, decals, and lettering on site-painted extinguisher cabinets after painting is complete and completely dry.

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: Submit manufacturer's product literature and data sheets. Include product characteristics, performance criteria, listed temperature range, dimensions, colours, finishes, and limitations.
 - .1 Portable fire extinguishers: Indicate capacity.
 - .2 Extinguisher Cabinets in Fire-Resistance Rated Walls: Indicate listing by organization acceptable to the authority having jurisdiction (AHJ).
- .3 Shop Drawings: Submit schedule of portable fire extinguisher types, extinguisher cabinet types, finishes, accessories, and dimension from finished floor to top of portable fire extinguisher for

each room/area.

- .4 Manufacturers' Instructions: Submit manufacturer's installation instructions, special handling criteria, and recommendations for owner's regular inspection and testing of portable fire extinguishers.
- .5 Qualification Statements: When requested, submit evidence of installer's qualifications.

I.05 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals, and as follows:
 - .1 Operation and Maintenance Data: Submit portable fire extinguisher manufacturer's instruction manual describing installation, operation, inspection, and maintenance; refill or recharge schedules; and re-certification requirements.
 - .2 Submit a permanent file record in accordance with NFPA 10 for each portable fire extinguisher with the following information:
 - .1 Maintenance date and name of person and agency performing the maintenance, if applicable.
 - .2 Date of the last recharge and name of person and agency performing the recharge, if applicable.
 - .3 Hydrostatic retest date and name of person and agency performing the hydrostatic test, if applicable.
 - .4 Description of dents remaining after passing of the hydrostatic test, if applicable.
- .2 Warranty Documentation: Submit manufacturer's warranties.

I.06 MAINTENANCE MATERIAL SUBMITTALS

- .1 Space Parts: Supply one extra key for each type of lockable extinguisher cabinet. Label keys with the associated room identification number.

I.07 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Manufacturers: Provide all extinguisher cabinets of the same type from a single manufacturer.
 - .2 Installer: Holding an approval certificate of training from a public post-secondary educational institution, and employed by an agency that is certified annually by a recognized certification body as being compliant with CAN/ULC-S532.

I.08 DELIVERY, STORAGE, AND HANDLING

- .1 Perform as follows:
 - .1 Package and handle extinguisher cabinets to avoid scratching paint and glazed materials. Store extinguisher cabinets to avoid corrosion and portable fire extinguishers to avoid freezing.
 - .2 Maintain portable fire extinguishers in operating condition.

I.09 SITE CONDITIONS

- .1 Ambient Conditions: Install portable fire extinguishers after indoor temperatures are maintained within manufacturer's recommended range.

1.10 WARRANTY

- .1 Manufacturer's Warranty: Warranty portable fire extinguishers against defects in materials and fabrication for six years.

2 PRODUCTS

2.01 OWNER-SUPPLIED PRODUCTS

2.02 DESCRIPTION

- .1 Regulatory Requirements: Provide portable fire extinguishers that are listed and labelled in accordance with National Fire Code 2020, and conform to CAN/ULC-S508.
- .2 Portable fire extinguishers and extinguisher cabinets marked in accordance with recommendations of NFPA 10 and CAN/ULC-S508 including the following:
 - .1 Listing and labeling organization of extinguisher.
 - .2 Protect category, type of extinguisher.
 - .3 Extinguisher classification.
 - .4 Performance and fire test standards of extinguisher.

2.03 PORTABLE FIRE EXTINGUISHERS

- .1 Water Pump Tank Extinguishers: To CAN/ULC-S507, Rechargeable type, stored water tank type, manual pump and handle with discharge hose and nozzle, ULC listed.
 - .1 ULC Classification: Class A fires.
 - .2 Capacity: 9.1 L
 - .3 Cylinder Material: Stainless steel
 - .4 Cylinder Finish: Stainless steel, polished
- .2 Water Pressurized Extinguishers: To CAN/ULC-S507, Rechargeable type, stored pressure type, squeeze-grip operated, ULC listed.
 - .1 ULC Classification: Class A fires.
 - .2 Capacity: 9.46 L
 - .3 Cylinder Material: Stainless steel
 - .4 Cylinder Finish: Stainless steel, polished
- .3 Multi-Purpose Dry Chemical Extinguishers: To CAN/ULC-S504, Rechargeable type, cartridge operated type or stored pressure rechargeable type with hose and shut-off nozzle, aluminum brass valve, ULC listed.
 - .1 ULC Classification: Class A, B, and C fires.
 - .2 Capacity: 1.14 2.25 4.5 9 14 kg As indicated on Drawings.
 - .3 Cylinder Finish: Polyester powder coat paint, red colour.
- .6 Carbon Dioxide Extinguishers: To CAN/ULC-S503, extinguisher insulated handle, hose and horn discharge assembly, self-closing lever or squeeze-grip operation, fully charged, ULC listed.
 - .1 ULC Classification: Class B and C fires.

- .2 Capacity: 6.8kg
- .3 Cylinder Finish: Polyester powder coat paint, red colour

2.04 RECESSED MOUNTED EXTINGUISHER CABINETS

- .1 Recessed mounted type, approximate 6mm projection, galvanized steel with minimum 0.76 mm base metal thickness, factory painted white primer, fire-resistance rated type for wall where they are installed.
- .2 Cabinet Door: scored clear acrylic panel with breaker bar and chain fastened to cabinet.
- .3 Hardware: 180-degree opening piano hinge, latching but not locking device.

2.05 SURFACE MOUNTED EXTINGUISHER CABINETS

- .1 Surface-mounted type, galvanized steel tub with 0.76mm base metal thickness, factory painted white.
- .2 Cabinet Door: scored clear acrylic panel with breaker bar and chain fastened to cabinet.
- .3 Hardware: 180-degree opening piano hinge, latching but not locking device.

2.06 SEMI-RECESSED MOUNTED EXTINGUISHER CABINETS

- .1 Semi-recessed mounted type, approximate 25mm projection, galvanized steel tub with 0.76mm base metal thickness, factory painted white, fire-resistance rated type for wall where they are installed.
- .2 Cabinet Door: scored clear acrylic panel with breaker bar and chain.
- .3 Hardware: 180-degree opening piano hinge, recessed pull handle device.

2.07 ACCESSORIES

- .1 Extinguisher Brackets: To NFPA 10, factory fabricated, type recommended by extinguisher manufacturer, steel with polyester powder coat paint or stainless steel.
- .2 Key all lockable extinguisher cabinets the same.

2.08 IDENTIFICATION

- .1 At solid panel (opaque) extinguisher cabinet doors: Clearly mark with the words "FIRE EXTINGUISHER" in white individual letters decal on the door front.
- .2 Attach bilingual tag or label to extinguishers, indicating month and year of installation. Provide space for future service dates on tag/label.

3 EXECUTION

3.01 INSTALLATION

- .1 Install extinguisher cabinet brackets plumb, level, and in accordance with NFPA 10.
 - .1 Install fire rated extinguisher cabinets in fire separations to CAN/ULC-S115. Coordinate with Section 07 84 00 – Firestopping.
- .2 Mount portable fire extinguishers in cabinets and on brackets to heights and locations indicated on Drawings and in accordance with NFPA 10.
 - .1 Place portable fire extinguisher with operating instruction label facing outward. Do not obstruct the view of the operating instructions label with maintenance labels, test labels, or

other labels.

3.02 CLEANING

- .I Perform in accordance with Section 01 74 00 – Cleaning, and as follows:
 - .I Remove fingerprints from extinguisher cabinets and clean glazing.

END OF SECTION

I GENERAL

I.01 SECTION INCLUDES

- .1 Passenger Elevators:
 - .1 Drive: Roped hydraulic passenger elevators.

I.02 RELATED SECTIONS

- .1 Section 04 22 00 – Concrete Masonry Units
- .2 Section 07 11 13 – Bituminous Damproofing
- .3 Section 07 13 52 - Modified Bituminous Sheet Waterproofing
- .4 Section 22 14 29 – Plumbing Pumps
- .5 Division 26 - Electrical

I.03 REFERENCES

- .1 American Disabilities Act (ADA):
 - .1 ADAAG - Americans with Disabilities Act, Architectural Guidelines.
- .2 American Society of Mechanical Engineers (ASME):
 - .1 ASME A17.1 /CSA B-44 - Section 5.2 Safety Code for Elevators and Escalators, Limited-Use/Limited Application Elevators.
 - .2 ASME A17.5 - Elevator and Escalator Electrical Equipment.
- .3 National Fire Protection Association:
 - .1 NFPA 70
- 4. Canadian Standards Association (CSA):
 - .1 CSA B44 - Safety Code for Elevators and Escalators.
 - .2 CSA C22.1 - Canadian Electrical Code.
- .5 International Code Council (ICC):
 - .1 ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities.

I.04 SUBMITTALS

- .1 Submit under provisions of Section 01 30 00.
- .2 Product Data: Manufacturer's data sheets on elevators, including:
 - .1 Manufacturer's installation instructions, including preparation, storage and handling requirements.
 - .2 Include complete description of performance and operating characteristics.
 - .3 Show maximum and average power demands.
 - .4 Storage and handling requirements and recommendations.
- .3 Shop Drawings:
 - .1 Show typical details of assembly, erection, and anchorage.

- .2 Include wiring diagrams for power, control, and signal systems.
- .3 Show complete layout and location of equipment, including required clearances and coordination with hoistway.
- .4 Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- .5 Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- .6 Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic checking and adjustment of cable tension and periodic cleaning and maintenance of all railing and infill components.

I.05 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Firm with minimum 10 years' experience in manufacturing of elevators, with evidence of experience with similar installations of type specified.
- .2 Installer Qualifications: Licensed to install equipment of this scope, with evidence of experience with specified equipment. Installer shall maintain an adequate stock of replacement parts, have qualified people available to ensure fulfillment of maintenance and callback service without unreasonable loss of time in reaching project site.

I.06 PRE-INSTALLATION MEETINGS

- .1 Convene minimum two weeks prior to start of work of this section.
- .2 Review hoistway, electrical, fire alarm and other requirements with appropriate representatives.

I.07 DELIVERY, STORAGE, AND HANDLING

- .1 Store products in manufacturer's unopened packaging until ready for installation.
- .2 Store components off the ground in a dry covered area, protected from adverse weather conditions.

I.08 PROJECT CONDITIONS

- .3 Do not use elevator for hoisting materials or personnel during construction period.

I.09 WARRANTY

- .4 Standard Warranty: A two-year limited warranty covering replacement of defective parts and excluding labor. Preventive maintenance agreement required.
- .5 Extended Warranty: An additional five year limited warranty covering replacement of defective parts and excluding labor for a total of seven years.
 - .1 Preventive maintenance agreement required.
 - .2 Warranty Period: 5 years.

I.10 MAINTENANCE SERVICE

- .1 Service and maintenance for elevator system and components for the following period from Date of
 - .2 Substantial Completion.

.1 Maintenance Period: Seven years.

.3 Include systematic examination, adjustment, and lubrication of elevator equipment. Repair or replace parts whenever required. Use parts produced by manufacturer of original equipment. Replace wire ropes when necessary to maintain required factor of safety.

.4 Provide emergency call back service for this maintenance period.

.5 Perform maintenance work using competent and qualified personnel approved by elevator manufacturer or original installer.

2 PRODUCTS

2.01 MANUFACTURERS

.1 Acceptable Manufacturer:

.1 Garaventa Lift; United States - P.O. Box 1769, Blaine, WA 98231-1769. Canada - 18920 36th Ave., Surrey, BC V3Z 0P6. ASD. Toll Free: 800-663-6556. Tel: (604) 594-0422. Fax: (604) 594-9915. Email: productinfo@garaventlift.com; Web:www.garaventlift.com.

.2 Schindler Canada Headquarters. Toronto, Ontario Tel. 416.332.8280 www.ca.schindler.com

.2 Substitutions: Permitted with approval from HWDSB and JASON FUNG ARCHITECT INC.

2.02 PERFORMANCE AND DESIGN REQUIREMENTS

.1 Passenger Elevators are to be in Compliance with the Following:

- .1 ASME A17.1 - Safety Code for Elevators and Escalators, Limited-Use/Limited Application Elevators.
- .2 ASME A17.5 - Elevator and Escalator Electrical Equipment.
- .3 NFPA 70 - National Electric Code.

.2 Provide Passenger Elevator in Compliance with:

- .1 CSA B-44 - Safety Code for Elevators and Escalators, Limited-Use/Limited Application Elevators.
- .2 CSA - Canadian Electric Code.

.3 ADA: Provide passenger elevator in accordance with the requirements of Americans with Disabilities Act.

2.03 PASSENGER ELEVATORS

.1 Acceptable Manufactures:

- .1 Garaventa
- .2 Schindler
- .3 Approved equivalent by HWDSB and JASON FUNG ARCHITECT INC.

.2 Basis of Design:

- .1 Capacity: 2500 pounds.
- .2 Car Size: 80"W x 51 1/8"D x 90" H (dimensions can be modified to suite space)
- .3 Travel: As indicated on the Drawings.
- .4 Stops: As indicated on the Drawings.
- .5 Speed: UP: 96 FPM, DOWN 100 FPM
- .6 Pit Depth: Minimum depths required. As specified by manufacture

- .7 Total Overhead Clearance (Refuge Space):
 - .1 Hydraulic Drive: 135 inches (3330 mm) above finished upper landing floor.
- .8 Drive System: 1:2 Cable Hydraulic.
 - .1 Heavy Duty car sling.
 - .2 Roller guide shoes running on 8 lbs per ft steel T-rails.
 - .3 Quiet submersed pump and motor.
 - .4 Factory pre-set and tested 2-speed valve for smooth start and stop.
 - .5 Electronic Control Box Location: Machine room.
 - .6 Safety Features:
 - .1 Emergency back-up power with a manual lowering device.
 - .2 Safety brake system.
 - .3 Car operator with integral gate switch.
 - .4 Automatic bi-directional floor leveling.
 - .5 Emergency alarm button in car, Emergency keyed stop switch in car.
 - .6 Final limit switch.
 - .7 Overspeed valve.
 - .8 Low oil protection timer circuit.
- .9 Power Requirements: Per manufacturer's shop drawings.
 - .1 A Separate 115 Volt, 15 Amp Circuit is required for car lighting.
- .10 Controls:
 - .1 PLC Controller with integrated self-diagnostics.
 - .2 Fully automatic push button at car and landings with Braille markings.
 - .3 Automatic car light switch upon entry.
 - .4 Digital floor indicator in car.
 - .5 Car arrival lanterns in car door jamb.
 - .6 Arrival gong.
- .11 Car and Hoistway Doors:
 - .1 Two-speed.
 - .2 Horizontal sliding.
- .12 Standard Features:
 - .1 Car direction lantern comes with audio and visual signals.
 - .2 Full height photo-electric door sensors.
 - .3 Automatic home park feature; can be disengaged during installation if desired.
- .13 Machine Location: As indicated on the Drawings.

2.04 CAB DESIGN

- .1 Interior Walls:
 - .1 Colour: As selected by JASON FUNG ARCHITECT INC and approved by HWDSB.
 - .2 Cab Frame:
 - .3 Mild steel. Powder coated.
- .2 Ceiling Finish:
 - .1 Mild steel. Powder coated. Color: As selected by JASON FUNG ARCHITECT and approved by HWDSB.
- .3 Handrail Finish:
 - .1 Stainless Steel: Brushed.
- .4 Car Operating Panel Finish:

Stainless Steel: Brushed.

- .5 Floor: Unfinished plywood.
Floor Finish: GC to coordinate with elevator supplier and Consultant.
- .6 Lighting: Four recessed L.E.D. down lights.
- .7 Car Direction Lantern: Auto and visual signaling device indicating direction of travel and arrival at selected floor.
- .8 Car Doors: Two speed horizontal sliding.
 - .1 When Opened (W x H): 36 x 80 inch (915 x 2032 mm) clearance.
 - .2 Sensors: Full height photo-electric door sensors.
 - .3 Finish: Match cab.
 - .4 Finish: Stainless steel. Brushed.

2.05 HOISTWAY ENTRANCES

- .1 Hoistway Entrances: Two speed horizontal doors.
 - .1 When Open (W x H): 36 x 80 inch (915 x 2032 mm) clearance.
 - .2 Sensors: Full height photo-electric door sensors.
 - .3 Finish: Primed painted.
 - .4 Finish: Stainless Steel. Brushed.
- .2 Hall Call Stations:
 - .1 Push Button: Keyless.
 - .2 Push Button: Keyed.
 - .3 Finish: Stainless Steel. Brushed.

3 EXECUTION

3.01 EXAMINATION

- .1 Do not begin installation until preliminary work including hoistway, landings and machine space has been properly prepared.
- .2 Verify the Following:
 - .1 Hoistway is constructed in accordance with ASME17.1 /CSA B-44 and local codes.
 - .2 Hoistway and machine room environments have a maintainable temperature between 50 and 90 degrees F (15 and 32 degrees C) and between 5 and 90 percent non-condensing.
 - .3 Machine Room is provided with lighting, light switch and convenience outlet and conforms to CEC/NFPA and clear space requirements and local codes.
 - .4 Hoistway shaft and openings are of correct size and within tolerance.
 - .5 Electrical power is available and of correct characteristics.
- .3 If preliminary work is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- .1 Clean surfaces thoroughly prior to installation.
- .2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- .1 Install elevator in accordance with applicable regulatory requirements including ASME A17.1 /CSA B-44 and the manufacturer's instructions.
- .2 Install system components and connect to building utilities.
- .3 Accommodate equipment in space indicated.
- .4 Startup equipment in accordance with manufacturer's instructions.
- .5 Adjust for smooth operation.

3.04 FIELD QUALITY CONTROL

- .1 Perform tests in compliance with ASME A17.1 /CSA B-44 and as required by authorities having jurisdiction.
- .2 Schedule tests with agencies and Architect, Owner, and Contractor present.

3.05 FIELD SERVICES

- .1 Obtain required permits to perform tests. Perform tests required by regulatory agencies.
- .2 Schedule tests with agencies and Architect and Contractor present.
- .3 Submit test and approval certificates issued by jurisdictional authorities.

3.06 ADJUSTING

- .1 Adjust for smooth acceleration and deceleration of car so not to cause passenger discomfort.
- .2 Adjust automatic floor leveling feature at each floor to provide stopping zone of 1/4 inch (6 mm).

3.07 CLEANING

- .1 Remove protective coverings from finished surfaces.
- .2 Clean surfaces and components ready for inspection.

3.08 PROTECTION

- .1 Protect installed products until completion of project.
- .2 Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

I GENERAL

I.01 SECTION INCLUDES

- .1 Stair Lift for Straight or Turning Stairs.
- .2 Stair Lift for Straight Stairs with mains-powered drive.
- .3 Stair Lift for Straight Stairs with battery-powered drive.

I.02 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete: Anchor placement in concrete.
- .2 Section 04 20 00 - Unit Masonry: Anchor placement in masonry.
- .3 Section 06 10 00 - Rough Carpentry: Blocking in framed construction for lift attachment.
- .4 Section 09 21 16 - Gypsum Board Assemblies: Stair walls.
- .5 Section 26 31 00 - Photovoltaic Collectors: Building Fire Alarm Integration system to connect the lift control system with the building fire alarm system.
- .6 Division 26 - Electrical: Electrical power service panel and wiring connections.
- .7 Division 26 - Electrical: Concealed low voltage control wiring.
- .8 Division 26 - Electrical: Intercom and wiring.

I.03 REFERENCES

- .1 ASME A17.5 - Elevator and Escalator Electrical Equipment.
- .2 ASME A18.1a 2001 - Safety Standard for Platform Lifts and Stairway Chairlifts.
- .3 CSA B44.1 - Elevator and Escalator Electrical Equipment.
- .4 CSA B355 - Lifts for Persons with Physical Disabilities.
- .5 ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities.
- .6 NFPA 70 - National Electric Code.
- .7 CSA - National Electric Code.

I.04 SUBMITTALS

- .1 Submit under provisions of Section 01 30 00.
- .2 Product Data: Manufacturer's data sheets on each product to be used, including:
 - .1 Submit manufacturer's installation instructions, including preparation, storage and handling requirements.
 - .2 Include complete description of performance and operating characteristics.
 - .3 Show maximum and average power demands.
- .3 Shop Drawings:

- .1 Show typical details of assembly, erection and anchorage.
- .2 Show complete layout and location of equipment, including required clearances.
- .4 Selection Samples: For each finished product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- .5 Verification Samples: For each finished product specified, two samples, representing actual product, color, and patterns.

I.05 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Firm with minimum 10 years documented experience in manufacturing of inclined wheelchair platform lifts of installations of type specified.
- .2 Installer Qualifications: Firm licensed to install equipment of this scope, with evidence of experience with specified equipment. Installer shall maintain an adequate stock of replacement parts and have qualified people available to ensure timely maintenance and callback service at the project site.

I.06 REGULATORY REQUIREMENTS

- .1 Provide platform lifts in compliance with:
 - .1 ASME A18.1 - Safety Standard for Platform Lifts and Stairway Chairlifts.
 - .2 ASME A17.5 - Elevator and Escalator Electrical Equipment.
 - .3 NFPA 70 - National Electric Code.
- .2 Provide platform lifts in compliance with:
 - .1 CSA B355 - Lifts for Persons with Physical Disabilities.
 - .2 CSA B44.1/ASME A17.5 - Elevator and Escalator Electrical Equipment.
 - .3 CSA - National Electric Code.

I.07 DELIVERY, STORAGE, AND HANDLING

- .1 Store products in manufacturer's unopened packaging until ready for installation.
- .2 Store components off the ground in a dry covered area, protected from adverse weather conditions.

I.08 PROJECT CONDITIONS

- .1 Do not use wheelchair lift for hoisting materials or personnel during construction period.

I.09 WARRANTY

- .1 Warranty: Provide a two year limited warranty covering replacement of defective parts and excluding labor. Preventive maintenance agreement required.
- .2 Extended Warranty: Provide an additional five year limited warranty covering replacement of defective parts and excluding labor for a total of seven years. Preventive maintenance agreement required.

1.10 MAINTENANCE SERVICE

- .1 Furnish service and maintenance for elevator system and components for the following period from Date of Substantial Completion.
 - .1 Seven years.
- .2 Include systematic examination, adjustment, and lubrication of elevator equipment. Repair or replace parts whenever required. Use parts produced by manufacturer of original equipment. Replace wire ropes when necessary to maintain required factor of safety.
- .3 Provide emergency call back service for this maintenance period.
- .4 Perform maintenance work using competent and qualified personnel approved by elevator manufacturer or original installer.

2 PRODUCTS

2.01 MANUFACTURERS

- .1 Acceptable Manufacturer: Garaventa Lift, Surrey, BC V3Z 0P6. ASD. Toll Free: 800-663-6556. Tel: (604) 594-0422. Fax: (604) 594-9915.
- .2 Substitutions: Permitted with approval from HWDSB and JASON FUNG ARCHITECT INC.
- .3 Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.02 STAIR LIFT FOR STRAIGHT OR TURNING STAIRWAYS

- .1 Inclined Platform Lift: Garaventa Stair-Lift, inclined platform lift for straight and turning stairways. Lift consists of a tubular guide rail system, a folding platform that is moved along the guide rails by a rope sprocket drive system, overspeed safety system and call stations at each landing. Conform to the following design requirements:
 - .1 Application:
 - .1 Indoor.
 - .2 Platform Load Rating: 660 lbs (330 kg).
 - .3 Travel Speed: 20 fpm (101.6 mm/s), slowing to 50 percent of rated speed before entering and while rounding corners.
 - .4 Platform Deck: 16 gauge (1.6 mm) sheet metal coated with electrostatically applied and baked anti-skid Sandex black paint.
 - .5 Platform Operation:
 - .1 Automatic Fold: Folded and unfolded electrically from the call station.
 - .2 Emergency Manual Fold: When unit is left in the open position, platform may be manually folded and retained in closed position.
 - .6 Under Platform Obstruction Sensing:

- .1 Provide an under platform sensing device to stop the platform from traveling in the downward direction when encountering 4 lbs (1.8 kg) of pressure.
- .2 Platform is permitted to travel in the opposite direction of obstruction to allow clearing.
- .7 Passenger Restraining Arms:
 - .1 Platform equipped with retractable passenger restraining arms in compliance with ASME A18.1a.
 - .2 Arms stop moving when an obstruction causing 4 lbs (1.8 kg) of pressure is encountered and will immediately retract when the signal is removed.
 - .3 Provide with means to manually unlock and open the restraining arms for passenger emergency evacuation.
 - .4 Arms are folded and unfolded electrically from the call stations or platform controls.
 - .5 Top of arms mounted 37-3/8 inches (948 mm) above the platform deck. When in guarding position the arms are located above the perimeter of the platform.
 - .6 The gaps between ends of arms shall not exceed 4 inches (100 mm).
- .8 Boarding Ramps:
 - .1 Provide boarding sides of platform with retractable ramps positioned for travel at a height of 6 inches (152 mm) measured vertically above the platform deck.
 - .2 Lock ramps in their guarding positions during travel. When the platform is at the landing, only the retractable ramp servicing the landing shall be operable.
 - .3 Ramps shall be folded and unfolded electrically.
 - .4 Retractable ramps, in the guarded position, shall withstand a force of 125 lbs (556 N) applied on any 4 inch (100 mm) by 4 inch (100 mm) area. This force shall not cause the height of the ramp, at any point in its length, to be less than 6 inches (152 mm) measured vertically above the platform deck.
 - .5 Provide a means to manually unlock the ramps for emergency evacuation when platform is located at a landing.
 - .6 Provide with a bi-directional obstruction sensitive device on the travel direction side end of the platform to stop lift when 1.8 kg (4 lbs.) of pressure is encountered. Platform is permitted to travel in the opposite direction of obstruction to allow clearing.
 - .7 When platform folds, passenger restraining arms shall fold down and be covered by the folded platform.
- .9 Platform Kick Plate:
 - .1 Provide non-boarding and non-guide-rail side of the platform with a kick plate barrier not less than 6 inches (152 mm) in height, measured vertically from the platform deck.

- .2 When the platform is folded the side-wall shall cover the platform controls providing protection from vandalism.
- .10 Pedestrian Safety Lights:
 - .1 Equip platform with amber pedestrian safety lights located at both ends of the platform to alert pedestrian traffic that the platform is on the stairway.
- .11 Hand Grips:
 - .1 Equip platform with two 6-7/8 inch (174 mm) long by 1-1/4 inch (32 mm) diameter aluminum hand grips or grab bars on the front face of the platform with the top being 33-1/4 inch (845 mm) above the platform deck.
- .12 Clearance Dimensions:
 - .1 When folded platform shall not protrude more than 12-5/8 inches (321 mm) to 13-5/8 inches (346 mm) from mounting surface.
 - .2 When unfolded and in use platform shall not protrude more than 40 inches (1015 mm) to 41 inches (1040 mm) from wall.
- .13 Controls:
 - .1 Platform Controls: 24 V Low Voltage type.
 - .2 Platform equipped with emergency stop switch located within reach of the passenger 37-1/8 inches (942 mm) above platform deck. When activated emergency stop button shall cause electric power to be removed from the drive system stopping lift immediately.
 - .3 Operating controls shall be two separate 1-1/2 inches (36 mm) round continuous pressure buttons with directional arrows mounted on the front surface of the platform control panel.
 - .4 Directional buttons shall prompt the user with the available travel direction by illuminating the appropriate button.
 - .5 When platform arrives at landing and the user releases the directional button, the passenger restraining arms and boarding ramp shall unfold automatically allowing passenger to disembark.
 - .6 Platform shall equipped for:
 - .1 Keyed Operation.
- .14 Passenger Seat: Fold-down type with safety belt.
- .15 Side Loading Platform: Provide with automatic folding ramps and kickplates at boarding sides of platform.
- .16 Platform Deck Light: Integral lamp automatically activated when platform is in unfolded position.
- .17 Platform Security Lock: Provide to prevent unauthorized unfolding of the platform.

- .18 Attendant Hand Held Pendant Control: Provide with plug-in socket on platform control panel.
 - .19 Autofold Platform: Provide to automatically fold platform into storage position when left unused in open position at a landing for:
 - .1 A delay of 3 minutes.
 - .20 Pedestrian Audio Alert: Provide chime mounted on platform to indicate platform is folded up and in motion, traveling on stairway.
 - .21 Platform On Board Emergency Alarm: Provide platform with on board alarm that sounds when emergency stop button is pushed. Provide battery back up for platform on board alarm.
 - .22 Remote Platform Boarding: Platform shall travel beyond standard boarding position to remote boarding location away from stairs. Provide with ramp extensions 3 inch (76 mm) extruded aluminum added to the boarding ramps.
 - .23 Under Hanger Sensing: Provide bottom of platform hanger with a sensing plate to stop the platform from traveling in the downward direction when encountered with 4 lbs (1.8Kg) of pressure. It shall be possible to drive the platform away from the obstruction.
 - .24 Side of Hanger Obstruction Device: Provide a sensor that detects obstructions in the path of the side of the hanger. Lift shall stop immediately and not travel until the obstruction is removed. It shall be possible to drive the platform away from the obstruction.
- .2 Drive and Guide Rail System
- .1 Operation:
 - .1 Motor: 2 H.P. electric motor with an integrated brake.
 - .2 Required Power: 208-240 VAC, single phase, 50/60 Hz. on a dedicated 20 amp circuit. Rated current shall be 7 amps for operation with rated load.
 - .3 Locate roped sprocket drive system consisting of a motor, gearbox and PCC controller (Programmable Configuration Controller) at the upper end of the tubes. PCC controller shall be custom programmed to soft start and stop and the slow down platform travel speed for all corners and landings of the lift. Normal operating speed shall be 20 feet per minute (6 m per minute), slowing to 50 percent of this speed before entering and while rounding corners.
 - .4 Equip drive with an emergency manual lowering system.
 - .2 Standard Drive Cabinet:
 - .1 Cabinet: 20-1/2 inches (520 mm) wide by 41-1/2 inches (1053 mm) high by 10-5/8 inches (270 mm) deep.
 - .2 Cabinet door is key locked and monitored with an electrical cutout safety switch.
 - .3 Provide an integrated lockable main disconnect switch and breaker on the drive cabinet.

- .3 Compact Drive Cabinet with Separate Control Box:
 - .1 Compact drive cabinet will house all mechanical drive system components and shall be located at the end of the tube system.
 - .2 Controller box will contain all the electrical components of the drive system and be located up to 20 feet (6 M) away from the compact drive. Control box dimensions are 12 inches (305 mm) wide by 24 inches (610 mm) high by 11-1/4 inches (284 mm) deep.
 - .3 Provide an integrated lockable mains disconnect and breaker in the compact drive control box.
- .4 Guide Rail:
 - .1 Construct of two 2 inch (51 mm) diameter steel tubes spaced 23-5/8 inches (600 mm) apart vertically. Tubes will run parallel to the stairs and horizontal to landings throughout the length of travel.
 - .2 When negotiating a horizontal landing a third 2 inch (51 mm) diameter steel tube shall be added to the tube system to guide and stabilize platform.
 - .3 Tube system shall not protrude more than 4-7/8 inches (125 mm) to 5-7/8 inches (150 mm) from the wall.
 - .4 Suspension means contained in the tubes shall be a 3/8 inch (8 mm) diameter galvanized steel core wire rope with a breaking strength of 9460 pounds (4300 kg).
 - .5 Locate overspeed safety at the bottom of the tube assembly and shall consist of a mechanical overspeed sensor and brake with electrical drive cut-out protection.
 - .6 Provide a final limit switch at the upper end of the tubes to stop the platform if it travels past the normal terminal stopping device.
- .5 Auxiliary Power: Provide battery back-up system for normal up / down lift operation during power failure for a minimum period of 1/2 hour with rated load.
- .6 Platform Storage Beyond Upper/Lower Landings:
 - .1 Platform shall travel in the folded position beyond the upper landing at the top stair nose to a remote parking position away from the stairs.
- .7 Final Limit Switch at Lower Landing: Platform will land over a flight of stairs and will have a final lower limit switch.
- .8 Rail Mounting:
 - .1 Direct Mount Solid Walls: Rails directly mounted to the stairway wall.
 - .2 Direct Mount Wood Stud Walls: Upper rail attached to a 2 inch (51 mm) by 8 inch (203 mm) board that is secured to the wall. Lower rail attached to a 2 inch (51 mm) by 4 inch (102 mm) board secured to the wall. Fasten each board to every available stud with a minimum of two fasteners.
 - .3 Tower Mount Struts: Provide with 2-1/2 inches (65 mm) by 2-1/2 inches (65 mm) hollow structural steel tubular posts to support the guide rails.

- .9 In-Fill Safety Panels: Provide a filler panel system to act as a barrier where existing handrails are removed and there is no wall behind the lift. Filler panels between the support posts shall be between 34 inches (864 mm) and 38 inches (965 mm) above the stair nosing.
 - .1 Steel Screen Fill Panels: Supports posts with steel mesh infill.
 - .2 Filler Panel Mounting Brackets: Brackets welded to support posts to allow for a barrier panel system supplied by others.
 - .3 Steel Tube Filler: Provide additional 2 inch (51 mm) diameter steel tubes added to the guide rail system for aesthetics or to create a further safety barrier with a maximum 6 inch (152 mm) opening between tubes.
- .3 Pedestrian Handrail Integrated with Guide Rail:
 - .1 A third rail acting as a handrail shall be added where existing handrails are either removed or blocked by the lifting equipment.
 - .2 The top of the handrail gripping surface shall be between 34 inches (864 mm) and 38 inches (965 mm) above the stair nosing and have a smooth gripping surface 1-1/2 inch (38 mm) in diameter.
 - .3 Handrail shall be in the same vertical plane as the guide rail system.
 - .4 Handrails shall be mounted to the tube assembly and shall not be interrupted by newel posts, or other construction elements or obstructions.
- .4 Call Stations:
 - .1 Provide a call station at each serviced landing that will automatically shut off if left unattended for over 2 minutes.
 - .2 Call stations, 24 V low voltage with four illuminated 2 inches (51 mm) by 2 inches (51 mm) square membrane touch sensitive buttons: one touch platform fold, one touch platform unfold and two directional call and send buttons.
 - .3 Provide call stations to prompt the user with the next sequential step of operation. Call station buttons will emit an audible "beep" when pushed to confirm button activation to the user.
 - .4 Provide intermediate stops between the upper and lower landings
 - .5 Call stations shall equipped for:
 - .1 Keyed Operation.
 - .6 Provide Attendant Call buttons on each call station.
 - .7 Call Station Mounting:
 - .1 Lower and Intermediate landing call station.
 - .1 Provide surface mounted call station.
 - .2 Provide flush mounting call station painted finish collars to trim all call stations that are recessed into the walls.

- .2 Upper landing call station.
 - .1 Provide surface mounted call station on guide rail.
 - .2 Surface mount on wall.
 - .3 Provide flush mounting call station painted finish collars to trim all call stations that are recessed into the walls.
- .3 Provide free-standing mounting pedestals for call stations located as follows:
 - .1 Lower landing.
 - .2 Upper landing.
- .5 Additional Safety or Code Requirements
 - .1 Wall Mounted Audio Visual Alerts: Provide with adjustable volume control that sound while the lift is in operation and are visible by pedestrian traffic from all flights and landings.
 - .2 Building Fire Alarm Integration: Coordinate with Section 26 31 00 - Photovoltaic Collectors. If the lift is not in operation when the building fire alarm system is activated power will be cut to the lift preventing use during fire evacuation. If the lift is in use when the building fire alarm system is activated, the lift shall only allow the passenger to travel to the designated landing with the emergency exit.
- .6 Finish Environment Requirements:
 - .1 Design and fabricate lift to manufacturer's standard design for indoor location.
 - .2 Stainless Steel Components: Design and fabricate lift using the following:
 - .1 Guide rails shall be supplied in stainless steel.
 - .2 Handrails shall be supplied in stainless steel.
 - .3 Support towers shall be supplied in stainless steel.
 - .4 Drive box shall be supplied in stainless steel.
 - .5 Platform sensing plate shall be supplied in stainless steel.
 - .6 Fasteners for rail assembly and anchoring shall be supplied in stainless steel.
 - .3 Design and fabricate lift to manufacturer's standard design for outdoor location.
 - .1 Lift to include all modifications recommended by manufacturer for reliable performance in outdoor climate of lift installation site.
 - .2 Provide an outdoor weatherproofing package including zinc rich primer on steel surfaces, weather-resistant sealant on the electrical components, stainless steel or plated fasteners and a weatherproofed stainless steel or zinc plated drive box.
 - .3 Platform control cover shall be fabricated of a Silver Grey injection-molded polymer.
 - .4 Painting: After pretreating paint with electrostatically applied and baked powder coat as follows:

- .1 Fine Textured Satin Grey (RAL 7030).
- .2 Custom color as selected by Architect from manufacturers standard RAL colors.

2.03 STAIR LIFT FOR STRAIGHT STAIRWAYS

.1 Inclined Platform Lift: Garaventa Stair-Lift Model XPRESS II to serve one flight of straight stairs, with two landings and two stops. Lift consists of an extruded aluminum guide rail, a folding platform that is moved along the guide rail by an integrated rack and pinion drive system, overspeed safety system and call stations at each landing and powered by buildings main power supply. Conform to the following design requirements:

- .1 Application:
 - .1 Indoor.
- .2 Platform Load Rating: 550 lbs (250 kg).
- .3 Travel Speed: 13 fpm (4 m/min) traveling up; 16 fpm (5 m/min) traveling down.
- .4 Platform Deck: Surface shall be slip resistant.
- .5 Platform Operation:
 - .1 Automatic Fold: Folded and unfolded electrically from the call station.
 - .2 Emergency Manual Fold: When left in the open position, platform may be manually folded and retained in the closed position.
- .6 Under Platform Obstruction Sensing:
 - .1 Provide under-platform sensing device to stop platform from traveling in the downward direction when encountering 4 lb/f (20 N) of pressure.
 - .2 Platform is permitted to travel in the opposite direction of the obstruction to allow clearing.
- .7 Passenger Restraining Arms:
 - .1 Platform equipped with retractable passenger restraining arms in compliance with ASME A18.1a.
 - .2 Arms stop moving when an obstruction causing 4 lb/f (20 N) of pressure is encountered and immediately retract when signal is removed.
 - .3 Arms folded and unfolded electrically from the call stations or platform controls.
 - .4 Provide with means to manually unlock and open the restraining arms for passenger emergency evacuation.
 - .5 Top of arms mounted 32 inches (800 mm) to 38 inches (1000 mm) above platform deck. When in guarding position arms are located above the perimeter of the platform.
 - .6 Gaps between ends of the arms shall not exceed 4 inches (100 mm).

- .8 Boarding Ramps:
 - .1 Provide boarding sides of platform with retractable ramps positioned for travel at a height of 6 inches (150 mm) measured vertically above platform deck.
 - .2 Lock ramps in guarding positions during travel. When platform is at the landing, only the retractable ramp servicing the landing shall be operable.
 - .3 Ramps folded and unfolded electrically.
 - .4 Retractable ramps, in the guarded position, shall withstand a force of 125 lb/f (550 N) applied on any 4 inches (100 mm) by 4 inches (100 mm) area. This force shall not cause the height of the ramp, at any point in its length, to be less than 6 inches (150 mm) measured vertically above the platform deck.
 - .5 Provide a means to manually unlock the ramps for emergency evacuation when platform is located at landing.
 - .6 Provide with a bi-directional obstruction sensitive device on the travel direction side end of the platform to stop the lift when 4 lb/f (20 N) of pressure is encountered. Platform is permitted to travel in the opposite direction of obstruction to allow clearing.
- .9 Platform Sidewall:
 - .1 Provide on the non-boarding and non-guide rail side of the platform a sidewall of not less 6 inches (150 mm) in height, measured vertically from the platform deck.
 - .2 When the platform is folded sidewall shall cover the platform controls, providing protection from vandalism.
- .10 Hand Grips:
 - .1 Equip platform with a 1-1/4 inch (32 mm) tubular steel hand grip or grab bar at the top of the platform. Hand grip is to cover the entire width of the platform.
- .11 Clearances Dimensions:
 - .1 Platform shall not protrude more than 10-1/4 inches (260 mm) from the mounting surface when folded and stored.
 - .2 Platform shall not protrude more than 40-1/4 inches (1020 mm) from the mounting surface when unfolded and in use.
- .12 Controls:
 - .1 Controls: 24 VDC Low Voltage type.
 - .2 Platform equipped with emergency stop switch located within reach of passenger. Emergency stop button shall cause electric power to be removed from the drive system stopping lift immediately.
 - .3 Platform operating controls shall be two separate 1-1/2 inch (36 mm) diameter round illuminated continuous pressure buttons with directional arrows, mounted on the front surface of the platform control panel.

- .4 When the platform arrives at landing and the user releases the directional control button, the passenger restraining arms and boarding ramp shall unfold automatically allowing passenger to disembark.
- .5 Platform control panel includes a receptacle for an optional plug-in hand-held attendant pendant control.
- .6 Platform equipped for:
 - .1 Keyed Operation.
 - .7 Provide control wiring to allow the platform to be folded into the storage position from the opposite call station.
 - .8 Provide control wiring to allow the platform to be called to the opposite landing in the folded open position.
- .13 Passenger Seat: Fold-down type with safety belt. Minimum rated load of 250 lbs (115 kg).
- .14 Side Loading Platform: Provide with automatic folding ramps and kick plates at boarding sides of platform.
- .15 Platform Security Lock: Provide to prevent unauthorized unfolding of the platform.
- .16 Attendant Hand-Held Pendant Control: Provide lift with a plug-in pendant control for attendant operation.
- .17 Autofold Platform: Automatically folds platform into storage position when left unused in open position at any landing for:
 - .1 A delay of 3 minutes.
- .18 Platform on-Board Emergency Alarm: Provide platform with an on-board alarm that sounds when emergency stop button is pushed. The alarm shall have a battery back-up so that it will continue to function if lift power is lost.
- .2 Drive and Guide Rail System:
 - .1 Operation:
 - .1 Motor: 3/4 HP (0.6 kW) electric motor with an integrated brake.
 - .2 Required Power: 208-240 VAC, single phase, 50/60 Hz. on a dedicated 20 amp circuit.
 - .3 Power Transmission: Worm gear reduction to a pinion moving on a fixed gear rack.
 - .4 Provide a frequency inverter to smoothly start and stop the platform motion.
 - .5 Locate drive carriage and associated control devices within the platform conveyance.
 - .6 Provide an upper final limit switch to stop the lift in the event of a failure of the primary limit switch.

- .7 Equip drive system with an hour counter.
- .2 Guide Rail System:
 - .1 Two-part guide rail system consisting of:
 - .1 Main Upper Rail: Anodized aluminum extrusion weighing 8 lb/ft (11.9 kg/m) with integrally mounted zinc plated gear rack.
 - .2 Lower Rail: 1-1/2 inches (38 mm) by 2-1/2 inches (64 mm) anodized aluminum extrusion.
 - .2 Rail Mounting:
 - .1 Rails directly mounted to the stairway wall.
 - .2 Upper rail attached to a 2 inch (51 mm) by 8 inch (203 mm) board that is secured to the wall. Lower rail attached to a 2 inch (51 mm) by 4 inch (102 mm) board secured to the wall. Fasten each board to every available stud with a minimum of two fasteners.
 - .3 Mount rails to steel support posts secured to the lower landing floor and stair treads. Support posts shall be 2-1/2 inches (64 mm) by 2-1/2 inches (64 mm) hollow structural steel.
 - .3 Provide a mechanical stop at the upper landing to prevent over-travel of the drive carriage in the event of a switch failure.
- .3 Provide overspeed governor and brake on upper carriage drive, containing mechanical overspeed sensor and lock, with electrical drive cut-out protection.
- .4 Provide with manual handwheel for emergency operation.
- .5 Emergency Battery Operation:
 - .1 Auxiliary Power: Provide an external battery back-up system for normal up/down lift operation during a power failure for a minimum period of one hour with rated load.
- .3 Pedestrian Grabrail Integrated with Guide Rail:
 - .1 Provide a pedestrian grabrail to be mounted to the top of the upper rail.
 - .2 The top of the grabrail gripping surface shall be between 31 inches (785 mm) and 50 inches (1270 mm) above the stair nosing and have a smooth gripping surface 1-1/2 inch (38 mm) in diameter.
 - .3 Grabrail will be on the same plane as the upper rail of the lift.
 - .4 Grabrail shall meet local code requirements for height above stair noses depending on stair angle and platform size.
- .4 Call Stations:
 - .1 Provide surface mounted call stations at both landings.
 - .2 Call station:

- .1 Operating voltage 24V wired.
- .2 9V DC wireless.
- .3 Call stations shall be provided with directional control buttons for call and send.
- .4 A one-touch control system shall be used to automatically fold/unfold the platform, boarding ramps and passenger restraining arms.
- 5 Call stations shall be equipped for:
 - .1 Keyed Operation.
- .6 Provide Attendant Call buttons on each call station.
- .7 Mounting:
 - .1 Lower landing call station:
 - .1 Surface mounted call station.
 - .2 Flush mounted call station: Provide powder-coated trim collar.
 - .3 Pedestal mounted call station: Provide free-standing mounting pedestal.
 - .2 Upper landing call station:
 - .1 Surface mounted call station.
 - .2 Flush mounted call station: Provide powder-coated trim collar.
 - .3 Pedestal mounted call station: Provide free-standing mounting pedestal.
- .5 Additional Safety or Code Requirements:
 - .1 Wall Mounted Audio-Visual Alert: Provide wall mounted audio-visual alert(s) with adjustable volume control that sound while the lift is in operation and are visible by pedestrian traffic from all flights and landings.
 - .2 Building Fire Alarm Integration: Coordinate with Section 26 31 00 - Photovoltaic Collectors. If the lift is not in operation when the building fire alarm system is activated power will be cut to the lift preventing use during fire evacuation. If the lift is in use when the building fire alarm system is activated, the lift shall only allow the passenger to travel to the designated landing with the emergency exit.
- .6 Finish:
 - .1 Design and fabricate lift to manufacturer's standard design for indoor and outdoor locations.
 - .1 Aluminum guide rails and ramps to be anodized aluminum. Steel components shall be painted with electrostatically applied and baked powder coat as follows:
 - .1 Fine Textured Silver Moon (RAL 7047).
 - .2 Custom color as selected by Architect from an RAL color chart.

.2 Electrical printed circuit boards and control transformers to be treated with a conformal coating for resistance to ambient moisture.

.2 Platform Cover: Provide a durable and weather resistant nylon platform cover for protection.

3 EXECUTION

3.01 EXAMINATION

- .1 Do not begin installation until substrates have been properly prepared.
- .2 Verify required supports are correct.
- .3 Verify electrical rough-in is at correct locations.
- .4 If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- .1 Clean surfaces thoroughly prior to installation.
- .2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- .1 Install platform lifts in accordance with in compliance with regulatory requirements specified and the manufacturer's instructions.
- .2 Install system components and connect to building utilities.
- .3 Accommodate equipment in space indicated.
- .4 Startup equipment in accordance with manufacturer's instructions.
- .5 Adjust for smooth operation.

3.04 FIELD QUALITY CONTROL

- .1 Perform tests in compliance with regulatory requirements specified and as required by authorities having jurisdiction.
- .2 Schedule tests with agencies and Architect, Owner, and Contractor present.

3.05 PROTECTION

- .1 Protect installed products until completion of project.
- .2 Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 09 91 23 - Interior Painting

I.02 REFERENCE STANDARDS

- .1 National Plumbing Code of Canada 2020

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

I.04 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals. Refer to HWDSB front end document.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.
 - .1 Operation and maintenance manual approved by, and final softcopies deposited with, HWDSB before final inspection.
 - .2 Operation data to include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .6 Valves schedule and flow diagram.
 - .7 Colour coding chart.
 - .3 Maintenance data to include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
 - .4 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified.

- .5 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to HWDSB and JASON FUNG ARCHITECT INC. for approval. Submission of individual data will not be accepted unless directed by HWDSB and JASON FUNG ARCHITECT INC..
 - .2 Make changes as required and re-submit as directed by JASON FUNG ARCHITECT INC. and HWDSB.
- .6 Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .7 Site records:
 - .1 JASON FUNG ARCHITECT INC. will coordinate and provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
 - .2 Transfer information to reproducibles, revising reproducibles to show work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection.
- .8 As-built drawings:
 - .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
 - .3 Submit to JASON FUNG ARCHITECT INC. for approval and make corrections as directed.
 - .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
 - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .9 Submit copies of as-built drawings for inclusion in final TAB report.

I.05 MAINTENANCE MATERIAL SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Furnish spare parts as follows:
 - .1 One set of packing for each pump.
 - .2 One casing joint gasket for each size pump.
 - .3 One glass for each gauge glass.
- .3 Provide one set of special tools required to service equipment as recommended by manufacturers.
- .4 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

I.06 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging,

labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

- .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 NOT USED

- .1 Not used.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.
- .2 Inform HWDSB and JASON FUNG ARCHITECT INC. of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from JASON FUNG ARCHITECT INC..

3.02 PAINTING REPAIRS AND RESTORATION

- .1 Do painting in accordance with Section 09 91 23 - Interior Painting.
- .2 Prime and touch up marred finished paintwork to match original.
- .3 Restore to new condition, finishes which have been damaged.

3.03 SYSTEM CLEANING

- .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.04 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.05 DEMONSTRATION

- .1 HWDSB and JASON FUNG ARCHITECT INC. will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .3 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .5 Instruction duration time requirements as specified in appropriate sections.

3.06 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials in accordance with Section 01 74 19 - Waste Management and Disposal
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.07 PROTECTION

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

I GENERAL

I.01 SUMMARY

- .1 Section Includes: Materials and installation for plumbing pumps.

I.02 RELATED REQUIREMENTS

- .1 Section 22 05 00 – Common Work results for Plumbing

I.03 REFERENCE STANDARDS

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
 - .1 Safety Data Sheets (SDS)

I.04 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meeting: Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations in accordance with Section 01 31 19 - Project Meetings.
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Coordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

I.05 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's product literature, specifications and data sheet for fixtures and equipment.
 - .2 Submit WHMIS SDS. Indicate VOC's for adhesive and solvents during application and curing.
- .3 Shop Drawings: Submit shop drawings to indicate:
 - .1 Equipment, including connections, fittings, control assemblies and ancillaries. Identify whether factory or site assembled.
 - .2 Wiring and schematic diagrams.
 - .3 Dimensions and recommended installation.
 - .4 Pump performance and efficiency curves.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Instructions: submit manufacturer's installation instructions.
- .6 Manufacturers' Site Reports: manufacturers' site reports specified.

I.06 CLOSEOUT SUBMITTALS

- .1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals, include:

- .1 Manufacturers name, type, model year, capacity and serial number.
- .2 Details of operation, servicing and maintenance.
- .3 Recommended spare parts list with names and addresses.

1.07 QUALITY ASSURANCE

- .2 Not used.

1.08 DELIVERY, STORAGE, AND HANDLING

- .1 Not used.

2 PRODUCTS

2.01 MATERIALS

- .1 Not used.

2.02 DOMESTIC HOT WATER CIRCULATING PUMPS

- .1 Not used.

2.03 DOMESTIC WATER BOOSTER SYSTEM

- .1 Not used.

2.04 SUMP PUMP VERTICAL SHAFT

- .1 Capacity as indicated.
- .2 Construction: duplex.
 - .1 Vertical shaft centrifugal, cast iron case, bronze impeller, stainless steel shaft.
 - .2 Column and cast iron parts protected with baked epoxy paint.
 - .3 Non-corrosive cone type strainer cleanable without pump removal from sump.
 - .4 Vertical outlet case tapped for NPSI-1/2.
 - .5 Graphite bronze self lubricated lower bearing.
- .3 Motor: as indicated, rated for continuous duty, built-in overload protection, drip-proof, complete with three m of three-wire rubber covered cord.
- .4 Control: heavy duty snap-action switch complete with two adjustable plastic or rubber coated weights on corrosion resistant chain or cable.

2.05 SUMP PUMP SUBMERSIBLE

- .1 Not used.

2.06 BILGE AND SEWAGE PUMP

- .1 Not used.

3 EXECUTION

3.01 INSTALLATION

- .1 Make piping and electrical connections to pump and motor assembly and controls as indicated.
- .2 Ensure pump and motor assembly do not support piping.
- .3 Align vertical pit mounted pump assembly after mounting and securing cover plate.
- .4 Place 150 mm sand under sump pit tank.

3.02 SITE QUALITY CONTROL

- .1 Site Tests/Inspection:
 - .1 Check power supply.
 - .2 Check starter protective devices.
- .2 Start-up, check for proper and safe operation.
- .3 Check settings and operation of hand-off-auto selector switch, operating, safety and limit controls, audible and visual alarms, over-temperature and other protective devices.
- .4 Adjust flow from water-cooled bearings.
- .5 Adjust impeller shaft stuffing boxes, packing glands.

3.03 START-UP

- .1 General:
 - .1 Procedures:
 - .1 Check power supply.
 - .2 Check starter O/L heater sizes.
 - .3 Start pumps, check impeller rotation.
 - .4 Check for safe and proper operation.
 - .5 Check settings, operation of operating, limit, safety controls, over-temperature, audible/visual alarms, other protective devices.
 - .6 Test operation of hands-on-auto switch.
 - .7 Test operation of alternator.
 - .8 Adjust leakage through water-cooled bearings.
 - .9 Adjust shaft stuffing boxes.
 - .10 Adjust leakage flow rate from pump shaft stuffing boxes to manufacturer's recommendations.
 - .11 Check base for free-floating, no obstructions under base.
 - .12 Run-in pumps for 12 continuous hours.
 - .13 Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.
 - .14 Adjust alignment of piping and conduit to ensure full flexibility.
 - .15 Eliminate causes of cavitation, flashing, air entrainment.
 - .16 Measure pressure drop across strainer when clean and with flow rates as finally set.
 - .17 Replace seals if pump used to degrease system or if pump used for temporary heat.

.18 Verify lubricating oil levels.

3.04 DOMESTIC HW CIRCULATING PUMPS

.1 Not used.

3.05 PERFORMANCE VERIFICATION (PV) PRESSURE BOOSTER PUMPS

.1 Not used.

3.06 PERFORMANCE VERIFICATION (PV) - TANKLESS PRESSURE BOOSTER SYSTEM

.1 Not used.

3.07 PERFORMANCE VERIFICATION (PV) - HYDROPNEUMATIC PRESSURE BOOSTER SYSTEM

.1 Not used.

3.08 PV - SANITARY AND PUMPS

.1 Application tolerances:

- .1 Flow: plus 10%; minus 0%.
- .2 Pressure: plus 10%; Minus 5%.

.2 PV Procedures:

- .1 Fill sump at rate slower than capacity of pump #1.
 - .2 Record levels at which pump #1 starts and stops. Determine flow rate by observing time taken to down water level.
 - .3 Fill sump at rate faster than capacity of pump #1 but slower than capacities of pumps #1 and #2 operating in parallel.
 - .4 Record levels at which pumps start and stop - water level rising and water level falling.
 - .5 Verify operation of alternator.
 - .6 Adjust water level controls as necessary.
 - .7 Fill sump at rate faster than capacities of pumps #1 and #2 operating in parallel.
 - .8 Record levels at pump starts and stops - water level rising and falling.
 - .9 Check operation of alternator.
 - .10 Adjust level controls as necessary.
 - .11 Check level at which high water level alarm starts and stops. Adjust as necessary.
- .3 Check removability of pumps for servicing without interfering with installation or operation of other equipment.
- .4 Verify non-clog capability and maximum size of solids, using procedures recommended by manufacturer.

3.09 REPORTS

- .1 Reports, supplemented as specified. Include:
 - .1 PV results on approved PV Report Forms.

- .2 Product Information report forms.
- .3 Pump performance curves (family of curves) with final point of actual performance.

3.10 TRAINING

- .1 Training of O&M personnel, supplemented as specified.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

I.02 REFERENCE STANDARDS

- .1 American National Standards Institute/Air Movement and Control Association (ANSI/AMCA):
 - .1 ANSI/AMCA Standard 99-16, Standards Handbook
 - .2 ANSI/ASHRAE 51-16 (ANSI/AMCA 210-16), Laboratory Methods of Testing Fans for Aerodynamic Performance Rating
 - .3 ANSI/AMCA Standard 300-24, Reverberant Room Method for Sound Testing of Fans
 - .4 ANSI/AMCA Standard 301-22, Methods for Calculating Fan Sound Ratings from Laboratory Test Data
- .2 The Master Painters Institute (MPI):
 - .1 Architectural Painting Specification Manual, current edition
 - .1 MPI #18, Primer, Zinc Rich, Organic

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, product literature and data sheets for HVAC fans and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Provide:
 - .1 Fan performance curves showing point of operation, bhp or kW and efficiency.
 - .2 Sound rating data at point of operation.

I.04 MAINTENANCE MATERIAL SUBMITTALS

- .1 Spare Parts:
 - .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
 - .1 Supply:
 - .1 Matched sets of belts.
 - .2 Supply list of individual manufacturer's recommended spare parts for equipment, include:
 - .1 Bearings and seals.
 - .2 Addresses of suppliers.
 - .3 List of specialized tools necessary for adjusting, repairing or replacing.

I.05 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store, and handle materials in accordance with Section Section 01 61 00 - Common Product Requirements.

- .2 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, well-ventilated area.
 - .2 Store and protect HVAC fans from nicks, scratches, and blemishes.
- .3 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 PERFORMANCE CRITERIA

- .1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards in force.
 - .1 Capacity: flow rate, static pressure, bhp W, efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.
 - .2 Fans: statically and dynamically balanced, constructed in conformity with ANSI/AMCA Standard 99.
 - .3 Sound ratings: comply with ANSI/AMCA Standard 301, tested to ANSI/AMCA Standard 300. Supply unit with ANSI/AMCA certified sound rating seal.
 - .4 Performance ratings: based on tests performed in accordance with ANSI/AMCA Standard 210. Provide unit with ANSI/AMCA certified rating seal, except for propeller fans smaller than 300 mm diameter.
 - .5 HVAC Fans: ENERGY STAR certified.

2.02 FANS GENERAL

- .1 Motors:
 - .1 For use with variable speed controllers.
 - .2 Sizes as indicated.
 - .3 Two speed with two windings and speeds as indicated.
 - .4 Two speed with split winding, constant or variable torque.
 - .5 Motor Speed: variable
- .2 Accessories and hardware: matched sets of V-belt drives, adjustable slide rail motor bases, belt guards, coupling guards fan inlet or outlet safety screens as indicated and as specified.
- .3 Factory primed before assembly in colour standard to manufacturer.
- .4 Scroll casing drains: as indicated.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed are acceptable for

HVAC fans installation in accordance with manufacturer's instructions.

- .1 Visually inspect substrate in presence of HWDSB.
- .2 Inform HWDSB of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.02 FAN INSTALLATION

- .1 Install fans as indicated, complete with resilient mountings, flexible electrical leads and flexible connections.
- .2 Provide sheaves and belts required for final air balance.
- .3 Bearings and extension tubes to be easily accessible.
- .4 Access doors and access panels to be easily accessible.

3.03 ANCHOR BOLTS AND TEMPLATES

- .1 Size anchor bolts to withstand seismic acceleration and velocity forces.

3.04 SITE QUALITY CONTROL

- .1 Not Used.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

I.02 REFERENCE STANDARDS

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, product literature and data sheets for [diffusers, registers and grilles] and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Indicate following:
 - .1 Capacity.
 - .2 Throw and terminal velocity.
 - .3 Noise criteria.
 - .4 Pressure drop.
 - .5 Neck velocity.
- .3 Samples:
 - .1 Samples are required for following:
 - .1 Submit duplicate 300 x 300 mm samples of each type.
- .4 Sustainable Design Submittals:
 - .1 Construction Waste Management:
 - .1 Submit project Waste Management Plan or Waste Reduction Workplan highlighting recycling and salvage requirements.
 - .2 Recycled Content:
 - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer and post-industrial content, and total cost of materials for project.
 - .4 Regional Materials: submit evidence that project incorporates required percentage 15% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

I.04 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Include:
 - .1 Keys for volume control adjustment.

- .2 Keys for air flow pattern adjustment.

I.05 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect diffuser, registers and grilles from nicks, scratches, and blemishes.
- .4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section Section 01 74 19 - Waste Management and Disposal.
- .5 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 SYSTEM DESCRIPTION

- .1 Performance Requirements:
 - .1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards.

2.02 GENERAL

- .1 To meet capacity, pressure drop, terminal velocity, throw, noise level, neck velocity [as indicated].
- .2 Frames:
 - .1 Full perimeter gaskets.
 - .2 Plaster frames where set into plaster or gypsum board and as specified.
 - .3 Concealed fasteners.
- .3 Concealed manual volume control damper operators.
- .4 Colour: as directed by HWDSB.

2.03 MANUFACTURED UNITS

- .1 Grilles, registers, and diffusers of same generic type, products of one manufacturer.

2.04 SUPPLY GRILLES AND REGISTERS

- .1 General: with [opposed blade dampers].
- .2 Type SA: steel or aluminum, 21 mm border, double deflection with airfoil shape, horizontal face and vertical rear bars.

- .3 Type SB: steel or aluminum, 21 mm border, double deflection with airfoil shape, vertical face and horizontal rear bars.
- .4 Type SC: steel or aluminum, 21 mm border, single deflection with airfoil shape horizontal face bars.
- .5 Type SD: steel or aluminum, 21 mm border, single deflection with airfoil shape vertical face bars.

2.05 RETURN AND EXHAUST GRILLES AND REGISTERS

- .1 General: with opposed blade dampers.
- .2 Type RA: steel or aluminum, 19 mm border, single 45 degrees deflection, horizontal face bars.
- .3 Type RB: steel or aluminum, 19 mm border, single 45 degrees deflection, vertical face bars.
- .4 Type RC: RB: steel or aluminum, 19 mm border, 25 x 25mm egg crate type face bars.

2.06 DIFFUSERS

- .1 General: volume control dampers with flow straightening devices and blank-off quadrants and gaskets.
- .2 Type DA: steel or aluminum, round type, having adjustable pattern, lay-in mounted.
- .3 Type DB: steel or aluminum, square type, having adjustable pattern, lay-in mounted.
- .4 Type DC: steel or aluminum, square or rectangular multi-pattern lay-in mounted.
- .5 Type DD: steel or aluminum, square, lay-in and or surface mounted, perforated type.

2.07 LINEAR GRILLES

- .1 Bar core type with margin as indicated.
- .2 Plaster frame, sealing strip and accessories as indicated.
- .3 Air volume control damper with concealed adjustment.
- .4 Floor and sill grilles to be capable of supporting 90kg point load weight between supports with negligible deflection and be pencil proof.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for diffuser, register and grille installation in accordance with manufacturer's instructions.
 - .1 Visually inspect substrate in presence of HWDSB.
 - .2 Inform HWDSB of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from HWDSB.

3.02 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Install with flat head stainless steel or cadmium plated screws in countersunk holes where fastenings are visible.

- .3 Bolt grilles, registers and diffusers, in place, in gymnasium and similar game rooms.
- .4 Provide concealed safety chain on each grille, register and diffuser in gymnasium and similar game rooms [and elsewhere as indicated].

3.03 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings
- .2 Section 26 29 03 - Control Devices

I.02 DEFINITIONS

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SPI 122.

I.03 REFERENCE STANDARDS

- .1 CSA Group
 - .1 CSA C22.1:21, Canadian Electrical Code, Part I (25th Edition), Safety Standard for Electrical Installations.
- .2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SPI 122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Submit for review single line electrical diagrams and locate as indicated.
 - .1 Electrical distribution system in main electrical room.
- .4 Certificates:
 - .1 Provide CSA certified equipment and material.
 - .2 Submit test results of installed electrical systems and instrumentation.
 - .3 Permits and fees: in accordance with General Conditions of contract.
 - .4 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.
 - .5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to JASON FUNG ARCHITECT INC. and HWDSB.

I.05 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.
 - .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
 - .2 Operating instructions to include following:

- .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
 - .3 Safety precautions.
 - .4 Procedures to be followed in event of equipment failure.
 - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
 - .4 Post instructions where directed.
 - .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
 - .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

I.06 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification labels for control items in English and French.
- .4 Use one label for both languages.

2.02 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product

Requirements.

- .2 Material and equipment to be CSA certified.
- .3 Factory assemble control panels and component assemblies.

2.03 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- .1 Not used

2.04 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of authority having jurisdiction.
- .2 Decal signs, minimum size 175 x 250 mm.

2.05 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.06 EQUIPMENT IDENTIFICATION

- .1 Not used.

2.07 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, numbered coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1
- .4 Use colour coded wires in communication cables, matched throughout system.

2.08 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

2.09 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.
- .2 Inform HWDSB and JASON FUNG ARCHITECT INC. of unacceptable conditions immediately upon discovery.

- .3 Proceed with installation only after unacceptable conditions have been remedied JASON FUNG ARCHITECT INC..

3.02 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise
- .2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise

3.03 NAMEPLATES AND LABELS

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed

3.04 CONDUIT AND CABLE INSTALLATION

- .1 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.05 LOCATION OF OUTLETS

- .1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.
- .2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.
- .4 Locate light switches on latch side of doors.
 - .1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

3.06 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
 - .1 Local switches: 1400 mm.
 - .2 Wall receptacles:
 - .1 General: 300 mm.
 - .3 Panelboards: as required by Code or as indicated.
 - .4 Fire alarm stations: 1500 mm.
 - .5 Fire alarm bells: 2100 mm.
 - .6 Wall mounted speakers: 2100 mm.
 - .7 Clocks: 2100 mm.

3.07 CO-ORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.08 FIELD QUALITY CONTROL

- .1 Load Balance:
 - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
 - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
 - .3 Provide upon completion of work, load balance report as directed in PART I - ACTION AND INFORMATIONAL SUBMITTALS, phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.
- .2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
 - .1 Power generation and distribution system including phasing, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
 - .5 Systems: fire alarm, communications.
 - .6 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
- .3 Carry out tests in presence of JASON FUNG ARCHITECT INC..
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.09 SYSTEM STARTUP

- .1 Instruct HWDSB in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.10 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

I GENERAL

I.01 SUMMARY

- .1 This Section includes requirements for selective demolition and removal of electrical communications and safety and security components including removal of conduit, junction boxes, and incidentals required to complete work described in this Section ready for new construction.

I.02 RELATED REQUIREMENTS

- 15 Section 02 41 19 - Selective Demolition
- .7 Section 02 82 00 – Asbestos Abatement

I.03 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated. Inform HWDSB and JASON FUNG ARCHITECT INC. of electrical items that are unable to be reused.
- .4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.
- .5 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by Federal Hazardous Products Act (RSC 1985) including latest amendments.

I.04 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA S350 M1980 [(R2003)], Code of Practice for Safety in Demolition of Structures

I.05 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Action Submittals: Provide in accordance with Section 01 33 00 - Submittal Procedures before starting work of this Section:
 - .1 Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 - Waste Management and Disposal
 - .2 Landfill Records: Indicate receipt and acceptance of selective demolition waste.

I.06 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.
- .2 Scheduling: Account for HWDSB's continued occupancy requirements during selective demolition with Section 02 41 19 – Selective Demolition and schedule staged occupancy and worksite activities as a defined Activity in Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart.

I.07 QUALITY ASSURANCE

- .1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

I.08 SITE CONDITIONS

- .1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition on date that tender is accepted.
 - .1 Hazardous substances will be removed by a hazardous abatement specialist engaged by HWDSB before start of Work.
- .3 Existing Hazardous Substances: MTE CONSULTANTS INC. has performed a hazardous substances assessment and identified materials requiring abatement as follows:
 - .1 Hazardous substances are as defined in Hazardous Products Act.
 - .2 Hazardous substances will be removed by Abatement Contractor as a part of Contract before starting Work in accordance with work results described in Related Requirements listed above.
- .4 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in Work; immediately notify HWDSB, JASON FUNG ARCHITECT INC. and MTE CONSULTANTS INC. if materials suspected of containing hazardous substances are encountered and perform following activities:
 - .1 Refer to Section 01 41 00 - Regulatory Requirements for directives associated with specific material types.
 - .2 Hazardous substances will be as defined in Hazardous Products Act.
 - .3 Stop work in area of suspected hazardous substances.
 - .4 Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.
 - .5 Hazardous substances will be removed by Abatement Contractor under a separate contract or as a change to Work.
 - .6 Proceed only after written instructions have been received HWDSB and JASON FUNG ARCHITECT INC..

I.09 SALVAGE AND DEBRIS MATERIALS

- .1 Demolished items become Contractor's property and will be removed from Project site; except for items indicated as being reused, salvaged, or otherwise indicated to by HWDSB or within the Architectural drawings.
- .2 Carefully remove materials and items designated for salvage and store in a manner to prevent damage or devaluation of materials.
 - .1 Leave main electrical distribution panel in place; panel can be used for temporary construction power for this and subsequent contracts; coordinate temporary power connections with

HWDSB.

2 PRODUCTS

2.01 MATERIALS

- .1 General Patching and Repair Materials: Refer to Section Section 02 41 19 - Selective Demolition for listing of patching and repair materials incidental to removal or demolition of components associated with work of this Section.
- .2 Electrical Repair Materials: Use only new materials, CSA or ULC labelled as appropriate and matching components remaining after work associated with components identified for removal or demolition are completed
- .3 Fire stopping Repair Materials: Use fire stopping materials compatible with existing fire stopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect the work of this Section before tendering the Bid; JASON FUNG ARCHITECT INC. will not consider claims for extras for work or materials necessary for proper execution and completion of the contract that could have been determined by a site visit.

3.02 PREPARATION

- .1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
 - .1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
 - .2 Notify HWDSB and JASON FUNG ARCHITECT INC. and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
 - .3 Prevent debris from blocking drainage inlets.
 - .4 Protect mechanical systems that will remain in operation.
- .2 Protection of Building Occupants: Sequence demolition work so that interference with the use of the building by the HWDSB and users is minimized and as follows:
 - .1 Prevent debris from endangering safe access to and egress from occupied buildings.
 - .2 Notify HWDSB and JASON FUNG ARCHITECT INC. and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.03 EXECUTION

- .1 Demolition and Removal: Coordinate requirements of this Section with information contained in Section 02 41 19 Selective Demolition and as follows:

- .1 Disconnect electrical circuits and panel feeders; maintain electrical service and main distribution panel as is, ready for subsequent Work.
- .2 Remove existing luminaires, electrical devices and equipment including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
- .3 Perform demolition work in a neat and workmanlike manner:
 - .1 Remove tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
 - .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.
- .4 Place weatherproof blank cover plates on exterior outlet boxes remaining after demolition and removal activities.
- .5 Remove existing conduits, boxes, cabling and wiring associated with removed luminaires, electrical devices and equipment.
- .6 Grind off conduits and make flush with surface of concrete where conduits are cast into concrete; seal open ends of conduit with silicone sealant and leave in place.
- .7 Seal open ends of conduit with silicone sealant and leave in place where they are inaccessible or cannot be removed without damaging adjacent construction.

3.04 CLOSEOUT ACTIVITIES

- .1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) except where explicitly noted otherwise for materials being salvaged for re use in new construction.
- .2 Hazardous Substances Disposal: Arrange for disposal of hazardous substances in accordance with requirements of Section 02 82 00 – Asbestos Abatement and refer to the Designated Substance Audit Report prepared by MTE CONSULTANTS INC.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 26 05 00 – Acoustic Ceilings Suspension Assemblies.
- .2 Section 26 05 34 – Conduits Conduit Fastenings and Conduit Fittings.

I.02 REFERENCE STANDARDS

- .1 Not used.

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.

I.04 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect hangers and supports from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 SUPPORT CHANNELS

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted or suspended.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for hangers and supports installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate.
 - .2 Inform HWDSB and JASON UNG ARCHITECT INC. of unacceptable conditions immediately

upon discovery.

- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from JASON FUNG ARCHITECT INC..

3.02 INSTALLATION

- .1 Secure equipment to poured concrete with expandable inserts.
- .3 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.
- .4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .5 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
 - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
 - .3 Beam clamps to secure conduit to exposed steel work.
- .6 Suspended support systems.
 - .1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.
 - .2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.
- .9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .11 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of JASON FUNG ARCHITECT INC..
- .13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

3.03 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 26 05 00 – Common Work Results for Electrical.

I.02 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
 - .2 CSA C22.2 No. 45, Rigid Metal Conduit.
 - .3 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .4 CSA C22.2 No. 83, Electrical Metallic Tubing.
 - .5 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit.
 - .6 CAN/CSA C22.2 No. 227.3, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada.

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheets.
 - .1 Submit cable manufacturing data.
- .3 Quality assurance submittals:
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

I.04 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse in accordance with Section 01 74 19 - Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

2 PRODUCTS

2.01 CABLES AND REELS

- .1 Provide cables on reels or coils.
 - .1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.
- .2 Each coil or reel of cable to contain only one continuous cable without splices.
- .3 Identify cables for exclusively dc applications.

- .4 Reel and mark shielded cables rated 2,001 volts and above.

2.02 CONDUITS

- .1 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside
- .2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.
- .3 Flexible metal conduit: to CSA C22.2 No. 56, steel.
- .4 Flexible pvc conduit: to CAN/CSA-C22.2 No. 227.3.

2.03 CONDUIT FASTENINGS

- .1 One hole malleable iron straps to secure surface conduits NPS 2 50 mm and smaller.
 - .1 Two hole steel straps for conduits larger than NPS 2 50 mm.
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Threaded rods, 6 mm diameter, to support suspended channels.

2.04 CONDUIT FITTINGS

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.
- .2 Ensure factory “ells” where 90 degrees bends for NPS 1 25 mm and larger conduits.
- .3 Watertight connectors and couplings for EMT.
 - .1 Set-screws are not acceptable.

2.05 EXPANSION FITTINGS FOR RIGID CONDUIT

- .1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 200 mm linear expansion.
- .2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.
- .3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.06 FISH CORD

- .1 Not used.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.02 INSTALLATION

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

- .2 Conceal conduits except in mechanical and electrical service rooms in unfinished areas.
- .3 Minimum conduit size for lighting and power circuits: NPS 3/4 19 mm.
- .4 Remove and replace blocked conduit sections.
 - .1 Do not use liquids to clean out conduits.
- .5 Dry conduits out before installing wire.

3.03 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
- .4 Group conduits wherever possible on suspended and surface channels.
- .5 Do not pass conduits through structural members except as indicated.
- .6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.04 CONCEALED CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Do not install horizontal runs in masonry walls.

3.05 CONDUITS IN CAST-IN-PLACE CONCRETE

- .1 Not used.

3.06 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

- .1 Not used.

3.07 CONDUITS UNDERGROUND

- .1 Not used.

3.08 CLEANING

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

I GENERAL

I.01 SUMMARY

- .1 This Section specifies the Contractor's responsibilities related to commissioning of electrical systems and their contribution to the overall commissioning work specified in the relevant Technical Sections of Division 01 of the Contract Documents.
- .2 Construction Team: Contractor is responsible for performing tests and verification activities specified in the relevant Sections of Division 26 of the Contract Documents, and submitting reports to HWDSB and JASON FUNG ARCHITECT INC..
 - .1 Subcontractors: electrical subcontractors participate in commissioning activities in coordination with site quality control requirements for Work they are providing.
 - .3 Contractor coordinates the work of subcontractors with the commissioning requirements of this Section.
- .3 Commissioning Authority (CxA): the CxA may assign a commissioning specialist with expertise in building electrical systems, to undertake its commissioning responsibilities related to this Section.
- .4 HWDSB will designate a person to represent the interests of the facility related to work specified in the relevant Sections of Division 26.
 - .1 HWDB may designate an additional representative to participate in the commissioning process and facilitate the transfer of electrical systems to the facility's O&M staff.
- .5 The requirements of this Section do not replace testing requirements specified in the relevant Sections of Division 26, or reporting activities to demonstrate compliance with electrical code requirements to the authorities having jurisdiction.

I.02 RELATED REQUIREMENTS

- .1 Not used.

I.03 ACRONYMS

- .1 BMM - Building Management Manual
- .2 CT – Construction Team
- .3 Cx - Commissioning
- .4 CxA – Commissioning Authority
- .5 EMCS - Energy Monitoring and Control Systems
- .6 FPT – Functional Performance Testing
- .7 O&M - Operation and Maintenance

I.04 DEFINITIONS

- .1 Construction Team: the term Construction Team is used in this Section to designate inclusively the Contractor, subcontractors, manufacturers/suppliers and other support disciplines that are responsible for construction/installation of the Work specified in these specifications.
- .2 Cx Plan: a document developed under the responsibility of the CxA to specify the project's commissioning requirements, as specified in Section 01 91 13 – General Commissioning

Requirements Section 01 91 13.13 – Commissioning Plan.

- .4 Cx Team: the commissioning team consists of project members that participate in the development, refinement and execution of the Cx Plan.

I.05 REFERENCE STANDARDS

- .1 CSA Group (CSA):
 - .1 CSA Z320-11, Building Commissioning

I.06 ADMINISTRATIVE REQUIREMENTS

- .1 Construction Team – Cx Representative: Contractor to designate a person from the Construction Team to review and coordinate commissioning activities specified in this Section.
 - .1 Representative to be acceptable to HWDSB with the following qualifications:
 - .1 Technical personnel with a minimum of 5 years' experience in construction, testing and commissioning of electrical systems.
 - .2 Site supervisor or project manager within the Construction Team, with direct responsibilities for supervising the execution of work specified in the relevant Sections of Division 26.
 - .2 Coordination: coordinate the responsibilities of the Construction Team in the Cx process with the responsibilities of other participants that form part of the Cx Team.
 - .1 Coordinate the participation of electrical subcontractors, inspection/testing agencies and manufacturers in reviewing the Cx Plan, submittals and in assisting testing and demonstration activities related to their work.
 - .2 Coordinate commissioning activities with execution of the work during the course of construction to allow Cx participants and the authority having jurisdiction (AHJ) to fulfill their responsibilities for witnessing tests and reviewing installation before concealment of work.
 - .3 Coordinate start-up of electrical motors supplied as specified in the relevant Sections of other Divisions of the Contract Documents, with the equipment supplier.
 - .4 Review interfaces with other work to ensure submittals and installation requirements are coordinated with other trades, including:
 - .1 Electrical distribution serving equipment supplied as specified in the relevant Sections of other Divisions of the Contract Documents, including disconnects and starters.
 - .2 Interlocks between generator equipment and generator room ventilation systems.
 - .3 Interlocks between emergency power systems and systems considered life safety such as elevator systems and fire alarm systems.
 - .3 Notification: notify the HWDSB and JASON FUNG ARCHITECT INC. of activities associated with the commissioning process.

I.07 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide required information in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Electrical Cx Schedule:
 - .1 Submit proposed schedule before start of commissioning conferences indicating key activities critical to the commissioning process including:

- .1 Inspection of electrical systems.
- .2 Commissioning phases: static verification, start-up, functional performance testing, systems orientation, O&M manuals submissions, training sessions.
- .3 Integrated Testing activities.
- .2 Review the proposed schedule through the course of the work and notify the HWDSB and JASON FUNG ARCHITECT INC. of modifications required.
- .1 Approved Cx Forms: CxA reviews and approves the final format to use through the commissioning process.
 - .1 Review the forms proposed by CxA and submit comments with proposed adjustments.
 - .2 Contractor may submit its own preferred format for review by the CxA. This may include manufacturer provided checklists.
- .2 Submit completed static verification and start-up checklists within 48 hours of completion of verification of equipment or system.
- .3 Testing Equipment: submit a list of proposed testing equipment for performing electrical Cx activities and related tests in accordance with Section 01 91 13 – General Commissioning Requirements.
- .4 Site Quality Control Submittals: submit manufacturers certificates and reports demonstrating compliance of Work, as specified in the relevant Sections of Division 26.

1.08 CLOSEOUT SUBMITTALS

- .1 Submit O&M data and as-built information in accordance with Section 01 78 00 – Closeout Submittals.
- .1 Site Modifications: record changes to installations, system configuration and/or controls that were made during the commissioning process to meet the required performance of electrical equipment and systems.

2 PRODUCTS

2.01 EQUIPMENT

- .1 Furnish special tools or equipment required for:
 - .1 Verifying or adjusting equipment/system components.
 - .2 Accessing equipment, enclosures or control cabinets.
 - .3 Interfacing with equipment controls or integrated system diagnostics.
- .2 Furnish instruments and equipment required to perform testing and validate performance of electrical systems through the commissioning process or as specified in the relevant Sections of Division 26.

3 EXECUTION

3.01 STATIC VERIFICATION

- .1 Perform static verification of components, equipment and systems in accordance with Section 01 91 13 – General Commissioning Requirements in coordination with performing the following

activities:

- .1 Verify installation and connection of equipment, sub-systems and systems.
- .2 Confirm accessibility to electrical equipment and components for inspection and O&M activities.
- .3 Record equipment and systems information including: manufacturer, model number, serial number and rated capacities.
- .4 Confirm proper location of lighting control devices as per design and to achieve intended functionality.
- .5 Confirm completion of labelling and identification of electrical equipment.
- .6 Confirm identification of circuits in each distribution panel including: circuit labels and a clear panel legend showing the load and a short description of each circuit.
- .7 Confirm completion and documentation of equipment prestart-up tests, including manufacturer's factory tests.
- .8 Confirm adequate protection of electrical systems during construction.
- .9 Confirm electrical systems and service entrance are protected from major precipitation events and minor flooding.
- .10 Confirm electrical cabinets and enclosures are equipped with protective covers.
- .11 Confirm seismic and vibration controls for electrical equipment/systems are installed in accordance with design details and manufacturer's recommendations.

3.02 START-UP

- .1 Refer to Section 01 91 13 - General Commissioning Requirements for commissioning requirements.
- .2 Perform start-up of equipment and systems in accordance with Section 01 91 13 – General Commissioning Requirements in coordination with performing the following activities:
 - .1 Initial site energization.
 - .2 Contractor/manufacturer start-up of equipment.
 - .3 Start-up of electrical systems including site electrical tests, and verification and adjustment of overload trips and other protection devices, based on the site's electrical coordination study.
 - .4 Electrical start-up of mechanical equipment including measuring voltage and amperage, and verifying and adjusting overload trips and other protection devices.
 - .5 Site electrical tests including:
 - .1 Measurement of voltage and voltage drop at major equipment.
 - .2 Confirming phase rotation.
 - .3 Megger testing to confirm proper insulation resistance of electrical circuits, feeders and equipment.
 - .4 Harmonic measurements.
 - .5 Power factor measurements.
 - .6 Verification of proper load balancing.

3.03 FUNCTIONAL PERFORMANCE TESTING

- .1 Perform Functional Performance Testing (FPT) on electrical equipment and systems in accordance with 01 91 13 – General Commissioning Requirements and as directed by JASON FUNG ARCHITECT INC..
- .2 Operate equipment as directed by HWDSB and JASON FUNG ARCHITECT INC. to demonstrate and validate that equipment, sub-systems and systems function and perform in accordance with design requirements.
- .3 FPT activities include:
 - .1 Verify proper operation of electrical systems and equipment in the following modes of operation:
 - .1 Systems operation on normal power.
 - .2 Systems operation on emergency power.
 - .3 Normal operation – no alarm conditions.
 - .4 Systems operation in alarm condition.
 - .5 Manual operation mode.
 - .6 Automatic operation mode.
 - .2 Verify operation of generator and emergency power systems including:
 - .1 Performance and switching operation of generator equipment, automatic transfer switches and uninterruptible power systems.
 - .2 Verify generator interface to the generator ventilation system, fire alarm system, elevator equipment, fire suppression system and building EMCS.
 - .3 Verify operation of safety cutouts, alarms and interlocks.
 - .4 Verify operation of emergency lights.
 - .5 Confirm alarms are generated and transmitted effectively to the intended notification system (e.g. pilot light, control panel, EMCS, remote surveillance system).
 - .6 Confirm and optimize electrical peak shaving controls.
 - .7 Verify full integration of on-site power generation systems in all modes of operation.
 - .8 Verify metering equipment is calibrated and properly reporting energy data on displays and integrated systems.
 - .9 Conduct receptacle testing.
 - .10 Verify illumination measurements and adjust lighting output levels to achieve design levels.
 - .11 Optimize interior and exterior lighting controls including scheduling, occupancy sensor settings and daylight sensor calibration.
 - .12 Verify system response to the following emergency conditions:
 - .1 Full or partial loss of grid power.
 - .2 Loss of fuel to back-up power generation systems.

3.04 CX OF INTEGRATED SYSTEMS

- .1 Not used.

3.05 SITE QUALITY CONTROL

- .I Manufacturer's Site Services: obtain certificates and reports from manufacturer verifying compliance of Work and submit Manufacturer's Site Reports as described in PART I - ACTION AND INFORMATIONAL SUBMITTALS.
- .I Provide manufacturer's site services to complete start-up activities and assist in Functional Performance Testing as specified in the relevant Sections of Division 26.

3.06 CLOSEOUT ACTIVITIES

- .I Corrections: Provide equipment, materials and labor as required to correct installation and/or equipment deficiencies identified through the commissioning process.

END OF SECTION

I GENERAL

I.01 SUMMARY

- .1 Section Includes:
 - .1 Materials and installation for low voltage control system designed to provide remote switching of lighting loads by use of:
 - .1 Low voltage momentary contact switches.
 - .2 Manual switch control.

I.02 RELATED REQUIREMENTS

- .1 Section 26 05 00 - Common Work Results for Electrical
- .2 Section 26 50 00 - Lighting

I.03 REFERENCE STANDARDS

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
 - .1 Safety Data Sheets (SDS)
- .2 Illuminating Engineering Society (IES) Standards
- .3 ASHRAE Standards
 - .1 ASHRAE 90.1- Energy Standard for Buildings except Low-Rise Residential Buildings

I.04 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
 - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Safety Data Sheets (SDS) in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC content.
- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Shop drawings: Submit drawings stamped and signed by professional engineer registered or licensed in ONTARIO, Canada.
- .3 Closeout Submittals:
 - .1 Submit maintenance data in accordance with Section 01 78 00 - Closeout Submittals.
- .4 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Test reports:
 - .1 Submit certified test reports indicating compliance with specifications for specified performance characteristics and physical properties.

- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

- .1 Not used.

1.06 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store, and handle in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
 - .1 Waste Management and Disposal: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 SUSTAINABLE REQUIREMENTS

- .1 Not used.

2.02 MATERIALS

- .1 Control system: by one manufacturer and assembled from compatible components.

2.03 REMOTE CONTROL SWITCHES

- .1 Single pole, double throw, momentary contact, standard duty, 25 V, double push-button.

2.04 LOW VOLTAGE RELAYS

- .1 Electrically operated by momentary impulse, mechanically latched until activated.
- .2 Two coil solenoid type with one coil to close relay contacts and one coil to open relay contacts.
- .3 Operating voltage: 24 V, AC.
- .4 Load contacts: 20 A, 120 V, AC.
- .5 Auxiliary contacts for pilot light.
- .6 Coloured pre-stripped leads.

2.05 CONTROL TRANSFORMER

- .1 Low voltage power Class 2, input 120 V, AC, 60 Hz, output 20 VA at 24 V.

2.06 RECTIFIER

- .1 Silicon type: 24 V, AC, 60 Hz input, 20 A intermittent duty output.

2.07 MANUAL CONTROL

- .1 Eight circuit manual master selector switch mounted in 100 mm square box with:
 - .1 Master lock-out switch.
 - .2 Individual red jewelled pilot lights.
- .3 Nine circuit manual dial-type master selector.
- .4 Twelve circuit manual dial-type master selector.

2.08 MOTOR OPERATED MASTER CONTROL

- .1 Not used.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.
- .2 Connect existing corridor lighting to BAS.

3.02 INSTALLATION

- .1 Locate and install equipment in accordance with manufacturer's recommendations and as indicated.
- .2 BAS to control all corridor lights ON/OFF based off security panel output through a H/A/O (Hand/Auto/Off) contactor.
- .3 Hand mode - Corridor lights are ON regardless of BAS command.
- .4 Off mode - Corridor lights are OFF regardless of BAS command.
- .5 Auto mode – Corridor lights turn ON and OFF based on BAS command. If the system is armed, then corridor lights are OFF. If system is disarmed, all corridor lights are ON.
- .6 Motion sensors on corridor lights dim to 50% if no motion is detected after 10 minutes.
- .7 Upon a triggered burglar alarm when the system is armed, alarm output is sent to BAS. BAS will then turn ON all corridor lights until the alarm is cleared or the system is disarmed.
- .8 Security panel to send BAS the armed/disarmed status and alarm information. Lights are to be programmed to operate based on the above sequence.

3.03 SITE QUALITY CONTROL

- .1 Site Tests:
 - .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Actuate control units in presence of HWDSB and JASON FUNG ARCHITECT INC. to demonstrate lighting circuits are controlled as designated.
 - .3 Schedule site visits, to review Work, as directed in PART I - QUALITY ASSURANCE.

3.04 CLEANING

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess

materials, rubbish, tools and equipment.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 26 05 00 - Common Work Results for Electrical

I.02 REFERENCE STANDARDS

- .2 CSA Group (CSA)
 - .1 CSA C22.2 No.42, General Use Receptacles, Attachment Plugs and Similar Devices.
 - .2 CAN/CSA C22.2 No.42.1, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
 - .3 CSA C22.2 No.55, Special Use Switches.
 - .4 CSA C22.2 No.111, General-Use Snap Switches (Bi-national standard, with UL 20).

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

I.04 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for wiring devices for incorporation into manual.

I.05 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wiring devices from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.01 SWITCHES

- .1 Switches to: CSA C22.2 No.55 and CSA C22.2 No.111.
- .2 Manually-operated general purpose AC switches with following features:
 - .1 Terminal holes approved for No. 10 AWG wire.
 - .2 Silver alloy contacts.

- .3 Urea or melamine moulding for parts subject to carbon tracking.
- .4 Suitable for back and side wiring.
- .5 Ivory toggle.
- .3 Switches of one manufacturer throughout project.

2.02 RECEPTACLES

- .1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA C22.2 No.42 with following features:
 - .1 Ivory urea moulded housing.
 - .2 Suitable for No. 10 AWG for back and side wiring.
 - .3 Break-off links for use as split receptacles.
 - .4 Eight back wired entrances, four side wiring screws.
 - .5 Triple wipe contacts and rivetted grounding contacts.
- .2 Single receptacles CSA type 5-15 R, 125 V, 15 A, U ground with following features:
 - .1 Ivory urea moulded housing.
 - .2 Suitable for No. 10 AWG for back and side wiring.
 - .3 Four back wired entrances, 2 side wiring screws.
- .3 Other receptacles with ampacity and voltage as indicated.
- .4 Receptacles of one manufacturer throughout project.

2.03 SPECIAL WIRING DEVICES

- .1 Special wiring devices:
 - .1 Clock hanger outlets, 15 A, 125 V, 3 wire, grounding type, suitable for No. 10 AWG for installation in flush outlet box.

2.04 WIRING DEVICES FOR COMPUTER ROOMS

- .1 Not used.

2.05 COVER PLATES

- .1 Cover plates for wiring devices to: CSA C22.2 No.42.1.
- .2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.
- .3 Stainless steel, vertically brushed, 1 mm thick cover plates plastic ivory brown cover plates, thickness 2.5 mm for wiring devices mounted in flush-mounted outlet box.
- .4 Sheet metal Cast cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.
- .5 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.
- .6 Weatherproof spring-loaded cast aluminum cover plates complete with gaskets for single receptacles or switches.

2.06 SOURCE QUALITY CONTROL

- .1 Cover plates from one manufacturer throughout project.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wiring devices installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate.
 - .2 Inform HWDSB and JASON FUNG ARCHITECT INC. of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from JASON FUNG ARCHITECT INC..

3.02 INSTALLATION

- .1 Switches:
 - .1 Install single throw switches with handle in "UP" position when switch closed.
 - .2 Install switches in gang type outlet box when more than one switch is required in one location.
 - .3 Mount toggle switches at height in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Receptacles:
 - .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
 - .2 Mount receptacles at height in accordance with Section 26 05 00 - Common Work Results for Electrical.
 - .3 Where split receptacle has one portion switched, mount vertically and switch upper portion.
 - .4 Install GFI type receptacles in wet areas.
- .3 Cover plates:
 - .1 Install suitable common cover plates where wiring devices are grouped.
 - .2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.03 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for reuse in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.04 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
- .3 Repair damage to adjacent materials caused by wiring device installation.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 26 09 24 – Lighting Control Devices Low Voltage

I.02 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI):
 - .1 ANSI C82.1, Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast
 - .2 ANSI C82.4, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps Multi Supply Type
- .2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE):
 - .1 ANSI/IEEE C62.41.2, Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits
- .3 ASTM International (ASTM):
 - .1 ASTM F1137/F1137M-19, Standard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners
- .5 Interference-Causing Equipment Standard (ICES):
 - .1 ICES-005-18, Lighting Equipment
- .6 ULC Standards (ULC):
 - .1 UL 8753 , Field-Replaceable Light Emitting Diode (LED) Light Engines
 - .2 UL 2388, Flexible Lighting Products

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Photometric data to include: VCP Table where applicable and spacing criterion.
- .4 Quality Assurance Submittals: Provide in accordance with Section 01 43 00 - Quality Assurance.
 - .1 Manufacturer's Instructions: Submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

I.04 QUALITY ASSURANCE

- .1 Provide mock-ups in accordance with Section 01 43 00 - Quality Assurance.

I.05 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store, and handle materials.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Divert unused metal materials from landfill to metal recycling facility.
- .4 Disposal and recycling of fluorescent lamps as per local regulations.

- .5 Disposal of old PCB filled ballasts.

2 PRODUCTS

2.01 LAMPS

- .1 Incandescent Lamps Clear, A19, 100 Watt with 1000 hour lamp life, rough-service rated; or as indicated.
- .2 Tungsten Halogen Lamps: Clear, T-3, 300 Watt, RSC base, 2000 hour lamp life, 5000 lumens; or as indicated.
- .3 Fluorescent Lamps: T8, 32 Watt, medium bi-pin, rapid-start, 4100 K, 30,000 hour lamp life, 2950 initial lumens, CRI 80; or as indicated.
- .4 Metal Halide Lamps: Clear, BT37, 400 Watt, mogul base, horizontal burn, 4100 K, 15,000 hour lamp life, 36,000 initial lumens, CRI65, open or enclosed type to suit the luminaire; or as indicated.
- .5 Low Pressure Sodium lamps: Clear, T21, 135 Watt, BY22d base, horizontal burn, 16,000 hour lamp life, 22,000 initial lumens; or as indicated.
- .6 High Pressure Sodium Lamps: Clear, ED18, 400 Watt, mogul base, 30 000 hour lamp life, 54 000 initial lumens; or as indicated.
- .7 Compact Fluorescent Lamps: 18 Watt, G24q-2 base, 12 000 hour lamp life, 12 000 initial lumens, 4100 K, CRI 80; or as indicated.

2.02 BALLASTS

- .1 Fluorescent Ballast: CBM and CSA certified, energy efficient type, IC electronic dimmable.
 - .1 Rating: voltage as indicated, for use with 2-32W, rapid start lamps.
 - .2 Totally encased and designed for 40°C ambient temperature.
 - .3 Power Factor: Minimum 95% with 95% of rated lamp lumens.
 - .4 Current Crest Factor: 1.7 maximum.
 - .5 Harmonics: 10% maximum THD.
 - .6 Operating Frequency of Electronic Ballast: 20 kHz minimum.
 - .7 Total Circuit Power: 62 Watts
 - .8 Ballast Factor: Greater than 0.90.
 - .9 Sound Rated: Class A
 - .10 Mounting: integral with luminaire.
- .2 Metal halide Ballast:
 - .1 Rating: voltage as indicated, for use with 1-400W metal halide lamp. Provide circuitry for quartz re-strike standby light where indicated.
 - .2 Totally encased and designed for 40°C ambient temperature.
 - .3 Power Factor: minimum 95 % with 95% of rated lamp lumens.
 - .4 Type: constant wattage autotransformer, isolated secondary or solid state.
 - .5 Input Voltage Range: plus or minus 10% of nominal.
 - .6 Minimum starting temperature: minus 30°C at 90% line voltage.

- .7 Mounting: indoor or integral with luminaire.
- .8 Current Crest Factor: 1.7 maximum current.
- .3 High Oressure Sodium Ballast: to ANSI C82.4 design.
 - .1 Rating: voltage as indicated, for use with I-400W high pressure sodium lamp.
 - .2 Totally encased and designed for 40°C ambient temperature.
 - .3 Power Factor: minimum 95% with 95% of rated lamp lumens.
 - .4 Type: with matching ignitor as recommended by manufacturer.
 - .5 Input Voltage Range: plus 5% to minus 5%
 - .6 Minimum starting temperature: minus 40°C at 90% line voltage.
 - .7 Mounting: indoor or integral with luminaire.
 - .8 Current Crest Factor: 1.7 maximum current.
- .4 Low Pressure Sodium Ballast:
 - .1 Rating: voltage as indicated, for use with I-35W low pressure sodium lamp.
 - .2 Totally encased and designed for 40°C ambient temperature.
 - .3 Power Factor: minimum 95% with 95% of rated lamp lumens.
 - .4 Type: constant wattage autotransformer or auto-lag.
 - .5 Input Voltage Range: plus or minus 20% of nominal.
 - .6 Minimum Starting Temperature: minus 34°C at 90% line voltage.
 - .7 Mounting: indoor or integral with luminaire.

2.03 FINISHES

- .1 Light fixture finish and construction to meet ULC listing and CSA certification related to intended installation.

2.04 OPTICAL CONTROL DEVICES

- .1 As indicated in luminaire schedule.

2.05 LUMINAIRES

- .1 As indicated in luminaire schedule.

3 EXECUTION

3.01 INSTALLATION

- .1 Locate and install luminaires as indicated.
- .2 Provide adequate support to suit ceiling system.

3.02 WIRING

- .1 Connect luminaires to lighting circuits:
 - .1 Install flexible or rigid conduit for luminaires as indicated.

3.03 LUMINAIRE SUPPORTS

- .1 For suspended ceiling installations support luminaires independently of ceiling or support luminaires from ceiling grid in accordance with local inspection requirements.

3.04 LUMINAIRE ALIGNMENT

- .1 Align luminaires mounted in continuous rows to form straight uninterrupted line.
- .2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.05 CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

I GENERAL

I.01 RELATED REQUIREMENTS

- .1 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings

I.02 REFERENCE STANDARDS

- .1 CSA Group (CSA):
 - .1 CSA C22.2 No.141, Emergency Lighting Equipment

I.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for emergency lighting and include product characteristics, performance criteria, physical size, finish and limitations.

I.04 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for emergency lighting for incorporation into manual.

I.05 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store, and handle materials in accordance with Section Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors and in accordance with manufacturer's recommendations in a clean, dry, well-ventilated area.
 - .2 Store and protect emergency lighting from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 19 - Waste Management and Disposal.
- .5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan in accordance with Section Section 01 74 19 - Waste Management and Disposal.

I.06 WARRANTY

- .1 For batteries in this Section 26 52 13.13 - Emergency Lighting, 12 months warranty period is extended to 120 months.

2 PRODUCTS

2.01 EQUIPMENT

- .1 Emergency lighting equipment: to CSA C22.2 No.141
- .2 Supply voltage: 12 V.
- .3 Operating time: 120 minutes.
- .4 Battery: sealed, maintenance free.
- .5 Charger: shall provide a continuous high charge to recharge the battery, when the battery is at full capacity, the charger will shut-off. Periodically the charger shall provide a pulse of energy to keep the battery topped off. The charger shall be current limited, temperature compensated, short-circuit proof and reverse polarity protected.
- .7 Solid state transfer circuit.
- .8 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.
- .11 Signal lights: solid state, for 'AC Power ON' and 'High Charge'.
- .12 Lamp heads: The unit shall come complete with fully adjustable 12V or 24V/12 WW or 20 W quartz halogen lamps. . Each lamp shall be housed in an impact-resistant polycarbonate cube.
- .13 Cabinet: suitable for direct or shelf mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.
- .14 Finish: Factory White. Cube lens to be frosted.
- .15 Refer to Lumacell specification sheet and installation requirements.
- .15 Auxiliary equipment:
 - .1 Dust-tight relay.
 - .2 Voltmeter.
 - .3 Test switch.
 - .4 Time delay relay.
 - .5 Battery disconnect device.

2.02 WIRING OF REMOTE HEADS

- .1 Conduit in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
- .2 Conductors as indicated in accordance with manufacturer's recommendations.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for emergency lighting installation in accordance with manufacturer's instructions.
 - .1 Visually inspect substrate.
 - .2 Inform HWDSB and JASON FUNG ARCHITECT INC. of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after

receipt of written approval to proceed from JASON FUNG ARCHITECT INC..

3.02 INSTALLATION

- .1 Install unit equipment and remote mounted fixtures.
- .2 Direct heads.
- .3 Connect exit lights to unit equipment.

3.03 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: in accordance with Section 01 74 19 - Waste Management and Disposal.

3.04 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by emergency lighting installation.

END OF SECTION

I GENERAL

I.01 SUMMARY

- .1 This section includes exit signs units with battery back-ups or remote fixture mounting for ordinary location use.

I.01 RELATED REQUIREMENTS

- .1 Not used.

I.02 REFERENCES

- .1 Underwriters Laboratories, Inc. (UL):
 - .1 UL924, Standard for Safety of Emergency Lighting and Power Equipment
- .2 National Fire Prevention Association (NFPA):
 - .1 NFPA 101, Life Safety Code
- .3 National Fire Protection Association (NFPA):
 - .1 NFPA 70, National Electrical Code (NEC)
- .4 Canadian Standards Association (CAS):
 - .1 CSA C22.2 No.141, Unit Equipment for Emergency Lighting
 - .2 CSA C860, Performance of Internally Lighted Exit signs
 - .3 CSA C22.1, Canadian Electrical Code Part I (CEC)

I.03 SUBMITTALS

- .1 Comply with Section 01 33 00 – Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's descriptive literature and product specifications for each product.
 - .2 Manufacturer's product drawings.
- .3 Manufacturer's installation instructions

I.04 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Products shall be free of defects in material and workmanship.
- .2 Furnished products are listed and/or certified by third party agencies as suitable for the intended purpose.
- .3 All units will be certified that they have been tested prior to shipping.

I.05 WARRANTY

- .1 Product is warranted free of defects in material and workmanship.
- .2 Product is warranted to perform the intended function within design limits.

2 PRODUCTS

2.01 GENERAL

- .1 Exit signs units shall be UL Listed and/or CSA Certified to
 - .1 C22.2 No 141 and C860 for Canada
- .2 Exit signs units shall perform self-testing in accordance with NFPA 101 if provided. This shall not be regulated in Canada.

2.02 MANUFACTURERS

- .1 Not Used.

2.03 DESIGN AND PERFORMANCE REQUIREMENTS

- .1 LA Series Extruded Aluminum Pictogram Exit Sign:
 - .1 Equipment shall operate with universal 2-wire AC input voltage of 120 to 347VAC at less than 2.5W and universal 2-wire DC input voltage from 6 to 24VDC at less than 1.5W for single and double face signs.
 - .2 The equipment shall be suitable for wall, end, or ceiling mount. The housing shall be constructed of rugged extruded aluminum and have a maximum depth of 2-1/2”.
 - .3 The faceplate(s) shall be constructed of extruded Aluminum and shall incorporate a protective clear poly-carbonate panel.
 - .4 Each face plate shall come standard with two legend films for pictogram and direction selection. The light source shall be white light-emitting diodes (LED) and shall provide even illumination in normal and emergency operation.
 - .5 The pictogram Exit Sign in a Self-Powered configuration shall use a sealed Nickel-Cadmium battery of 2.4V nominal voltage and shall stay illuminated during emergency operation for at least 120 minutes upon AC failure.
 - .6 The pictogram Exit Sign shall be CSA 22.2 No. 141-15 certified.

3 EXECUTION

3.01 INSTALLATION

- .1 Installation shall be in accordance to the NEC, CEC and manufacturer’s instructions.

END OF SECTION



Bennetto Elementary School

Accessibility Project

Designated Substance Audit Report

Project Location:

47 Simcoe Street East, Hamilton, ON

Prepared for:

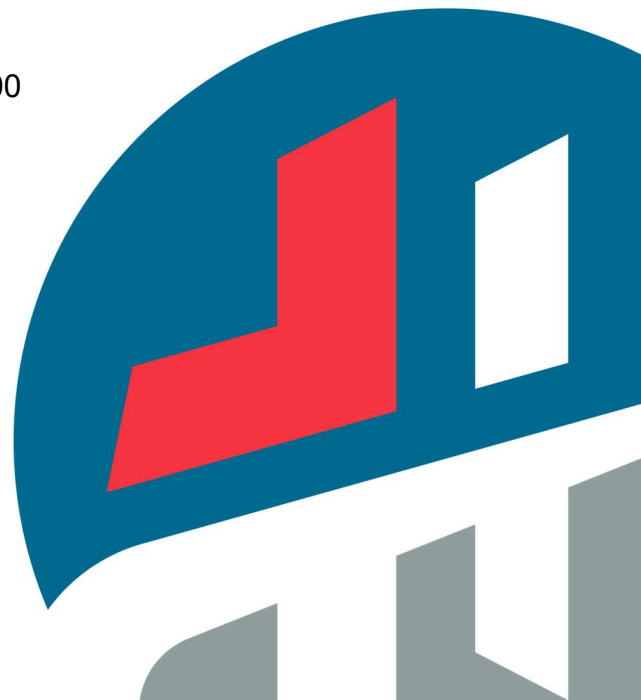
Hamilton-Wentworth District School Board
20 Education Court
Hamilton, ON L8N 3L1

Prepared by:

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November 29, 2024

MTE File No.: 56044-100





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1.0 INTRODUCTION

1.1 Authorization

MTE Consultants Inc. (MTE) was retained by Hamilton-Wentworth District School Board (the Client) to conduct a Designated Substance Audit for the building located at 47 Simcoe Street East in Hamilton, Ontario.

The purpose of the audit was to identify the presence of Designated Substances within the building in accordance with Section 30 of the Occupational Health & Safety Act (OHSA), in advance of an accessibility upgrade renovation. This report meets the requirements of Section 30 of the OHSA and the requirements of Ontario Regulation (O. Reg.) 278/05.

2.0 SCOPE OF WORK

As requested by the Client, this assessment was limited to the following areas:

- First-floor corridor
- Room 102
- Room 167
- Second Floor Corridor
- Roof Section A

These areas, as depicted in Appendix C, are referred to in the following sections as the “Subject Areas”.

The Scope of Work for this assessment was completed by MTE and included the following activities:

- Review of existing or historical reports and documentation pertaining to Designated Substances within the building;
- Visual inspection of accessible locations within the Subject Area to identify the following suspect Designated Substances and Hazardous Building Materials:
 - Asbestos;
 - Lead;
 - Mercury;
 - Silica;
 - Mould growth;
 - Ozone Depleting Substances; and,
 - Polychlorinated Biphenyls limited to fluorescent light ballasts;
- The following Designated Substances are not expected to be present due to the building use or in a form that is hazardous: Acrylonitrile, Arsenic, Benzene, Coke Oven Emissions, Ethylene Oxide, Isocyanates, and Vinyl Chloride;
- Collection of bulk building material samples suspected to contain asbestos;
- Collection of paint scrape samples suspected to contain lead;
- Submission of samples to an accredited and/or qualified laboratory;
- Interpretation of laboratory results; and,
- Preparation of this report of findings and recommendations.

3.0 METHODOLOGY AND ASSESSMENT CRITERIA

This audit was conducted using visual and laboratory identification methods for the assessment of materials outlined in Section 2.0 and their corresponding location and use. Materials that are determined to be asbestos-containing materials (ACM) are further classified by their friability and condition. The areas outlined in Section 2.0 were inspected and limited to building components, materials and service connections. Notwithstanding that reasonable attempts were made to identify all Designated Substances, the possibility of concealed substances and material exists and may not become visible until substantial demolition has occurred and therefore are currently undocumented. All work was conducted in accordance with industry accepted methods and MTE Standard Operating Procedures and did not include the following:

- Materials indicated in this report as “Potentially Concealed”;
- Locations that may be hazardous to the surveyor (located at heights, electrical equipment, confined spaces);
- Where invasive inspection could cause consequential damage to the property or impair the integrity of the equipment, such as sealants, exterior finishes, underground services or components of mechanical equipment;
- Locations concealed by building finishes that require substantial demolition or removal for access or determination of quantities (plumbing or electrical lines);
- Non-permanent items or personal contents, furnishings; and,
- Settled dust or airborne agents unless otherwise stated.

4.0 ASSESSMENT AND RESULTS

An inspection of the building was conducted by MTE on October 17, 2024.

A description of the building and assessed finishes is provided below. Refer to Section 4.1 for a summary of findings.

Building Element	Description
Exterior Finishes	Flat roof system
Mechanical Systems/Insulations	Roof mounted central air conditioning Fibreglass insulation on pipe straight
Electrical/Plumbing Systems	Fluorescent Light tubes
Floor Finishes	Vinyl floor tiles Terrazzo
Wall Finishes	Concrete Block
Ceiling Finishes	Concrete Block 2' x 4' Random Pinhole ceiling tiles (06/17/23 manufacturing date stamp) 2' x 4' Small Fissure Random Pinhole ceiling tiles

The roof section with the subject area was inspected to have the following composition:

Roof Section A

- Gravel
- Tar Membrane
- Fibreboard

- Polyisocyanurate Foam Board
- Intermediate Tar Layer
- Vapour Barrier
- Steel Deck

4.1 Findings and Analytical Results

A summary of sampling locations and analytical results are included in **Appendix A**.

Laboratory certificates of analysis are included in **Appendix B**.

Figures of inspected areas are included in **Appendix C**.

A Photographic Log is included in **Appendix D**.

A detailed summary of findings and recommended actions is provided in **Table 4.3 of Appendix A**.

4.1.1 Asbestos

Asbestos was used in building materials throughout the years with a peak usage in the 1950s and 1960s. While the manufacture of most ACM was banned in the 1970s, buildings constructed in the 1980s have the potential for ACM as well. In 1986, legislation limiting the use of asbestos in consumer products was introduced.

As part of this inspection, a total of 29 bulk samples of suspect ACM were submitted for asbestos analysis with a total of 36 analyses being performed. The difference between the number of samples submitted and the number of samples analysed can be a function of either the stop-positive method or the requirement of analyzing multiple layers, performed by the laboratory, from a single sample reported as additional samples or subsets of a sample.

Bulk samples were submitted for asbestos analysis to Paracel Laboratories Ltd. (Paracel), in Mississauga, Ontario. Paracel is certified under the Canadian Association of Laboratory Accreditation to perform asbestos analysis of bulk samples (accreditation number A3762). Laboratory analysis was conducted in accordance with the United States Environmental Protection Agency (USEPA), Test Method EPA/600-R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, June, 1993 by Polarized Light Microscopy (PLM) as prescribed by O. Reg. 278/05.

Based on the laboratory results and visual identification, ACM was confirmed present at the time of the inspection. In addition, suspect ACM was either observed or may potentially be concealed by building finishes.

4.1.2 Lead

Lead was historically used in mortar pigments, ceramic glazing; plumbing solder, electrical equipment and electronics solder, in pipe gaskets as packing in cast iron bell and spigot joints of sanitary drains, flexible plumbing connections, flashing panels, acoustical dampeners, phone cable casing and some architectural applications. In buildings constructed after 1990, these applications are no longer applicable outside of specialized uses (shielding for medical imaging etc.).

As part of this inspection, a total of 3 paint scrape samples were collected from surfaces and represent the paint colours observed throughout the Subject Areas.

Samples were submitted for laboratory analysis by ASTM D3335-85A "Standard Method to Test for Low Concentrations of Lead in Paint by Atomic Absorption Spectrophotometry" following MOE Method E3470 Inductively Coupled Plasma Optical Emission Spectrometry to Paracel

Laboratories Ltd., in Ottawa, Ontario. Paracel is accredited by the Canadian Association of Laboratory Accreditation to perform bulk lead analysis of paint.

Based on the laboratory results and visual identification, no lead-containing materials were confirmed present at the time of the inspection; however, lead-containing solder on copper pipe connections or lead pipe gaskets may potentially be concealed in buried lines or wall cavities.

4.1.3 Mercury

Mercury is typically used in building service applications such as fluorescent light tubes, compact fluorescent bulbs, metal halide (sodium halide) lamp bulbs, and neon lights as a vapour. Mercury may exist in thermostats and pipe or mechanical equipment thermometers as a liquid. Mercury is presumed to be present in the above materials.

Mercury-containing materials were visually identified at the time of the inspection.

4.1.4 Silica

Silica is present in rock, stone, soil, and sand. Masonry products such as concrete block, brick, and mortar, as well as concrete and associated products contain silica. Due to its ubiquitous nature, silica was historically used in a wide variety of building materials and is still used today in new construction.

Building materials that are presumed to contain silica were visually identified at the time of the inspection.

4.1.5 Mould

No water damaged or mould growth impacted building materials were observed during the inspection.

4.1.6 Polychlorinated Biphenyls (PCB)

Suspect PCB-containing light ballasts were visually identified during the inspection. All live electrical equipment that could not be properly and safely de-energized was not assessed, therefore light ballasts were not inspected. Light ballasts which were not accessed, will require additional investigation to determine their PCB content when removed from service.

4.1.7 Ozone-Depleting Substances (ODS)

ODS are chemical compounds that include chlorofluorocarbons (cfcs), hydrochlorofluorocarbons (hcfcs), halons, methyl bromide, carbon tetrachloride, hydrobromofluorocarbons, chlorobromomethane, and methyl chloroform which are widely used in cooling and refrigeration. The use of ODS is regulated under Ontario Regulation 463/10 *Ozone Depleting Substances and Other Halocarbons Made under the Environmental Protection Act*.

Building components presumed to contain ODS were identified at the time of the inspection.

4.2 Conclusions and Recommendations

A detailed summary of recommended actions is provided in **Table 4.3 of Appendix A**.

In accordance with Section 30 of OHSAA and Section 8 of O. Reg. 278/05, the Owner must provide a copy of this report to all contractors doing work at the building. The Owner must also provide a copy of this report to all prospective contractors.

Should any additional suspect Designated Substances be discovered during building renovation demolition, work in the vicinity should cease and the materials should not be disturbed until proper notification, testing and abatement instructions are provided. All waste generated as a result of any and all work at the Site must be handled, transported and disposed of in accordance with Ontario Regulation 347 made under the Environmental Protection Act and local by-laws. Based on the assessment findings and analytical results, the following abatement measures are presented. It should be noted that the recommended actions are the minimum required actions, as prescribed by the appropriate Acts, regulations, guidelines, standards, codes and general best practice measures.

4.2.1 Asbestos

ACMs were identified during the assessment. If these materials, including those deemed or suspected, will be disturbed, or will likely be disturbed, during building maintenance, renovations, construction, or demolition activities, they must be handled and disposed of in accordance with the procedures prescribed by O. Reg. 278/05.

All asbestos work must be conducted by contractors who are trained in the type of asbestos operations required, and should be overseen by a qualified third party Health, Safety and Environmental professional. In order to conduct Type 3 asbestos operations, contractors must be certified as Asbestos Abatement Workers AAW (Trade code 253W) and Asbestos Abatement Supervisors AAS (Trade code 253S) by The Ministry of Training, Colleges and Universities (Ministry of Advanced Education and Skills Development) as prescribed by Section 20 of O. Reg. 278/05. Suspect or visually confirmed ACM must be deemed to be asbestos-containing and treated as if they contain a type of asbestos other than Chrysotile.

ACM may be present in concealed locations and if construction, renovation, alteration, or maintenance activities are planned, invasive inspections of concealed locations for potential ACM must be performed prior to such activities.

Should any suspect ACM be discovered during the course of construction, renovation, alteration, or maintenance activities, work which disturbs the material must cease immediately. Suspect ACM must be treated as asbestos-containing or sampled prior to disturbance to assess the presence of asbestos.

4.2.2 Lead

No lead-containing materials were confirmed present during the assessment, however, low level lead-containing paint is present and the following general procedures are recommended as a precautionary measure as per the Environmental Abatement Council of Canada's (EACC) *Lead Guideline for Construction, Renovation, Maintenance or Repair (October 2014)*:

- General dust control;
- The washing of hands and face at on-site facilities;
- No smoking, eating, chewing gum or drinking in the work area; and,
- No removal of painted surfaces by means of abrasive blasting.

4.2.3 Mercury

Mercury-containing materials were identified. All mercury containing materials or sources should be removed, intact, prior to any work which may disturb or damage them and cause worker exposure to mercury liquid and/or vapour.

On-site crushing of mercury-containing materials should not occur. Care should be taken to ensure safe storage of the above until recycling or disposal can be coordinated. Under current legislation, mercury waste requires handling and disposal in accordance with Ontario Regulation 490/09 of the OHSA and Ontario Regulation 347 of the Environmental Protection Act.

4.2.4 Silica

Silica is presumed to be present; therefore, special requirements for management and handling are required. The contractor should also consult MOL Occupational Health and Safety Branch's Guideline: *Silica on Construction Projects* (April 2011) for the procedures and methods required to remove and dispose of silica-containing materials.

4.2.5 Mould

No water damage or suspect mould growth was observed during the assessment therefore no special management and handling requirements are warranted.

4.2.6 Polychlorinated Biphenyls (PCB)

Suspect PCB-containing fluorescent light ballasts were identified but could not be conclusively classified as PCB-containing or non-PCB-containing.

It is the responsibility of the owner to inspect, or ensure the inspection of all light ballasts as they are removed from service to make certain they are properly classified as PCB-containing or non-PCB containing. Fixtures will require dismantling to access date stamps (located on the back of the ballast) in order to be correctly classified in accordance with Environment Canada's document "*Identification of Lamp Ballasts Containing PCBs, Report EPS 2/CC/2 (revised), August 1991*".

Statutory Orders and Regulations (SOR)/2008-273, the *PCB Regulations*, made under the *Canadian Environmental Protection Act*, permits continued use of in-service PCB-containing light ballasts until the end of service life or until December 31, 2025.

4.2.7 Ozone Depleting Substances (ODS)

Building components presumed to contain ODS were identified and special requirements for management, handling and disposal by the owner, constructor, contractor, sub-contractors and workers apply.

Under current legislation, there are no requirements to remove ODSs from service simply because they are present. However, prior to commencing any work where this equipment will be dismantled, destroyed or disposed of, the refrigerant must be drained by a licensed technician and tagged with a notice indicating that the equipment no longer contains refrigerant. The appropriate notices or records shall be maintained in accordance with O. Reg. 463/10 for a minimum of two (2) years and shall include, but not be limited to, service records, transfers/releases of refrigerants, refrigerant types and refrigerant systems.

5.0 LIMITATIONS

Services performed by **MTE Consultants Inc.** (MTE) were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the Environmental Engineering & Consulting profession. No other representation expressed or implied as to the accuracy of the information, conclusions or recommendations is included or intended in this report.

This report was completed for the sole use of MTE and the Client. It was completed in accordance with the approved Scope of Work referred to in Section 2.0. As such, this report may not deal with all issues potentially applicable to the site and may omit issues that are or may be of interest to the reader. MTE makes no representation that the present report has dealt with all-important environmental features, except as provided in the Scope of Work. All findings and conclusions presented in this report are based on site conditions, as they existed during the time period of the investigation. This report is not intended to be exhaustive in scope or to imply a risk-free facility.

Any use which a third party makes of this report, or any reliance on, or decisions to be made based upon it, are the responsibility of such third parties. MTE accepts no responsibility for liabilities incurred by or damages, if any, suffered by any third party as a result of decisions made or actions taken, based upon this report. Others with interest in the site should undertake their own investigations and studies to determine how or if the condition affects them or their plans.

It should be recognized that the passage of time might affect the views, conclusions and recommendations (if any) provided in this report because environmental conditions of a property can change. Should additional or new information become available, MTE recommends that it be brought to our attention in order that we may re-assess the contents of this report.

All of which is respectfully submitted,

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Appendix A

Tables

TABLE 4.1: BULK ASBESTOS SAMPLE SUMMARY TABLE

Sample #	Location	Material Description	Asbestos Results (% Type)	Is Material ACM
S01A	ROOM 167	12"X12" VINYL FLOOR TILE - WHITE WITH BLUE FLECK	ND	NO
		MASTIC	ND	NO
S01B	ROOM 167	12"X12" VINYL FLOOR TILE - WHITE WITH BLUE FLECK	ND	NO
		MASTIC	ND	NO
S01C	ROOM 167	12"X12" VINYL FLOOR TILE - WHITE WITH BLUE FLECK	ND	NO
		MASTIC	ND	NO
S02A	ROOM 167	CEILING MORTAR	ND	NO
S02B	ROOM 167	CEILING MORTAR	ND	NO
S02C	ROOM 167	CEILING MORTAR	ND	NO
S03A	ROOM 102	12"X12" VINYL FLOOR TILE - GREY WITH BROWN FLECK	<MDL	ND
		MASTIC	2% CHRYSOTILE	YES
S03B	ROOM 102	12"X12" VINYL FLOOR TILE - GREY WITH BROWN FLECK	<MDL	NO
		MASTIC	NA	YES
S03C	ROOM 102	12"X12" VINYL FLOOR TILE - GREY WITH BROWN FLECK	<MDL	NO
		MASTIC	NA	YES
S04A	ROOM 102	2'X4' CEILING TILE - SMALL FISSURE RANDOM PINHOLE	ND	NO
S04B	ROOM 102	2'X4' CEILING TILE - SMALL FISSURE RANDOM PINHOLE	ND	NO
S04C	ROOM 102	2'X4' CEILING TILE - SMALL FISSURE RANDOM PINHOLE	ND	NO
S05A	SAMPLED IN 2ND FLOOR CORRIDOR (ALSO OBSERVED THROUGHOUT INTERIOR)	CONCRETE BLOCK MORTAR	ND	NO
S05B	SAMPLED IN 2ND FLOOR CORRIDOR (ALSO OBSERVED THROUGHOUT INTERIOR)	CONCRETE BLOCK MORTAR	ND	NO
S05C	SAMPLED IN 2ND FLOOR CORRIDOR (ALSO OBSERVED THROUGHOUT INTERIOR)	CONCRETE BLOCK MORTAR	ND	NO
S05D	SAMPLED IN 2ND FLOOR CORRIDOR (ALSO OBSERVED THROUGHOUT INTERIOR)	CONCRETE BLOCK MORTAR	ND	NO
S05E	SAMPLED IN 2ND FLOOR CORRIDOR (ALSO OBSERVED THROUGHOUT INTERIOR)	CONCRETE BLOCK MORTAR	ND	NO
S06A	SECOND FLOOR CORRIDOR	12"X12" VINYL FLOOR TILE - GREY WITH WHITE AND GREY OATMEAL PATTERN	ND	NO
		MASTIC	ND	NO
S06B	SECOND FLOOR CORRIDOR	12"X12" VINYL FLOOR TILE - GREY WITH WHITE AND GREY OATMEAL PATTERN	ND	NO
		MASTIC	ND	NO
S06C	SECOND FLOOR CORRIDOR	12"X12" VINYL FLOOR TILE - GREY WITH WHITE AND GREY OATMEAL PATTERN	ND	NO
		MASTIC	ND	NO
S07A	ROOF	MEMBRANE	ND	NO
S07B	ROOF	MEMBRANE	ND	NO
S07C	ROOF	MEMBRANE	ND	NO
S08A	ROOF	INTERMEDIATE TAR LAYER	ND	NO
S08B	ROOF	INTERMEDIATE TAR LAYER	ND	NO
S08C	ROOF	INTERMEDIATE TAR LAYER	ND	NO
S09A	ROOF	VAPOUR BARRIER	ND	NO
S09B	ROOF	VAPOUR BARRIER	ND	NO
S09C	ROOF	VAPOUR BARRIER	ND	NO

NA: Not Analyzed due to stop positive method ND: No asbestos fibres detected above the laboratory minimum detection limit

TABLE 4.1: BULK ASBESTOS SAMPLE SUMMARY TABLE

Sample #	Location	Material Description	Asbestos Results (% Type)	Is Material ACM
<p>A bulk material sample containing 0.5% or more asbestos therefore establishes that material as asbestos-containing. In accordance with Table 1 of O. Reg. 278/05, a minimum number of samples for the material to be classified as non asbestos. A homogeneous material is defined by O. Reg. 278/05 "as material that is uniform in colour and texture". Homogeneous samples are identified by an alphabetical suffix to sample names to represent multiple samples of a homogeneous material. When a homogeneous material is analysed it is determined to be asbestos-containing upon the first positive detection of asbestos equal to or greater than 0.5%. Subsequent samples of the same material are therefore not analysed. Some bulk samples are comprised of multiple layers and as such will require multiple analysis. In such cases each layer is isolated at the laboratory and analysed individually to determine asbestos content. As a result the laboratory may report additional samples beyond the submitted number of samples or include multiple analyses as subsets within a sample.</p>				

TABLE 4.2: LEAD IN PAINT SAMPLE SUMMARY TABLE

Sample #	Location	Colour	Material	Lead Content (ug/g)	Classification
LP1	SAMPLED IN ROOM 167 (BUT OBSERVED THROUGHOUT THE FIRST FLOOR)	WHITE	WALL	26	LOW LEVEL LEAD-CONTAINING
LP2	ROOM 102	OFF-WHITE	WALL	329	LOW LEVEL LEAD-CONTAINING
LP3	2ND FLOOR CORRIDOR	CREAM	WALL	6	LOW LEVEL LEAD-CONTAINING
<p>"<": The samples analysed reported concentrations of lead to be less than 1000 ug/g and are therefore classified as low level lead-containing. However, no lead concentrations were reported above the sample specific laboratory detection limit.</p>					
<p>As outlined in EACO's Lead Guideline for Construction, Renovation, Maintenance or Repair (October 2014), for the purpose of classifying surface coatings and mortars by laboratory analysis, any material containing lead at a concentration:</p> <ul style="list-style-type: none"> • Greater than 0.5% by weight (5,000 µg/g, mg/kg, ppm) is considered lead-based; • Between 0.1 % and 0.5% by weight (1,000 to 5,000 µg/g, mg/kg, ppm) is considered lead-containing; or • Less than 0.1% (1,000 µg/g, mg/kg, ppm) is considered low level lead-containing. 					

Table 4.3 - Summary of Designated Substances and Recommended Actions

47 Simco Street East, Hamilton, Ontario

Material	Location(s)	Material Description	Management Requirements If No Impacts to Material	Recommended Actions If Material Will Be Or Likely Be Impacted By Maintenance, Renovation, Construction or Demolition Activities
Asbestos Non-Friable	Room 102	12"x12" Grey with Brown Fleck Floor Tile Mastic	In place management in accordance with O. Reg. 278/05	<p>Non-asbestos containing tiles contaminated with asbestos-containing mastics are to be managed, handled and disposed of in accordance with O. Reg. 278/05. Removal in accordance with O. Reg. 278/05</p> <p>Type 1 Operation – Hand held tools only with dust suppression</p> <p>OR</p> <p>Type 2 Operation – Power tools with HEPA vacuum attachment in conjunction with dust suppression</p>
Low Level Lead Containing Paint	Throughout First Floor Corridor	White Paint on Walls	None	<p>General hygiene procedures during renovation activities:</p> <ul style="list-style-type: none"> • General dust control, • Washing of hands and face at on-site facilities, • No smoking, eating, chewing gum or drinking in the work area, • No abrasive blasting.
	Room 102	Off-White Paint on Walls		
	2nd Floor Corridor	Off-White Paint on Walls		
Potentially Concealed Lead	Throughout Interior of Building on Plumbing Connections	Lead Solder on Copper Pipe	In place management in accordance with EACC's Lead Guideline	Removal prior to renovation/demolition activities in accordance with EACC's Lead Guideline as a: Class 1 Operation
Potentially Concealed Lead	Concealed on Sanitary/Waste Lines	Lead Packed Pipe Gaskets	None	Invasive inspection prior to renovation or demolition activities. If confirmed present, removal in accordance with EACC's Lead Guideline as a: Class 1 Operation
Mercury	Throughout Interior of Building in Thermostats	Mercury Switch	None	Intact removal and storage with no on-site crushing and disposal of materials to a licensed facility
Mercury	Throughout Interior of Building in Light Fixtures	Fluorescent Light Tubes in Light Fixtures	None	Intact removal and storage with no on-site crushing and disposal of materials to a licensed facility

Table 4.3 - Summary of Designated Substances and Recommended Actions

47 Simco Street East, Hamilton, Ontario

Material	Location(s)	Material Description	Management Requirements If No Impacts to Material	Recommended Actions If Material Will Be Or Likely Be Impacted By Maintenance, Renovation, Construction or Demolition Activities
Silica	Throughout Interior and Exterior of Building	Brick and Mortar, Terrazzo,; Concrete Block	None	Conduct any work during renovation, demolition activities in accordance with the Ministry of Labour Guideline Silica on Construction Projects
Potentially Concealed PCBs	Light Fixtures Throughout	Fluorescent Light Ballasts in Light Fixtures	SOR/2008-273, the PCB Regulations, permits continued use of in-service PCB-containing light ballasts until the end of service life or until December 31, 2025	Assess Each Ballast Upon Removal From Service Appropriate storage and disposal of any PCB-containing ballasts in accordance with SOR/2008-273
ODS	Roof	Rooftop Air Conditioning Units	None	Prior to the removal and disposal of equipment suspected of containing ODS, a licensed technician should be retained to drain and tag the equipment in a manner authorized under O. Reg. 463/10

Notes:

- 1) A copy of this report should be provided to all prospective contractors prior to quotation, in accordance with Section 30 of the Occupational Health and Safety Act.
- 2) Recommended actions are the minimum required actions, as prescribed by the appropriate Acts, regulations, guidelines, standards, codes and general best practice measures. Prior to demolition, the Contractor may choose to alter the approach and combine or break out sections of work. This is acceptable provided that the appropriate Acts, regulations, guidelines, standards and codes are followed and afford protection for the health and safety of workers, occupants and the public that is at least equal to the protection that would be provided by complying with the minimum requirements.
- 3) All waste generated is subject to characterization and disposal in accordance with Ontario Regulation 347.

Appendix B

Laboratory Certificates of Analysis

Certificate of Analysis

MTE Consultants Inc. (Burlington)

1016 Sutton Drive, Unit A
Burlington, ON L7L 6B8
Attn: Gavin Oakes

Client PO:
Project: 56044-100 - Bennetto Access Upgrades DSA
Custody:

Report Date: 28-Oct-2024
Order Date: 22-Oct-2024

Order #: 2443119

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

Parcel ID	Client ID
2443119-01.1	S01A - 12x12 VFT - White with Blue Fleck - Room 167
2443119-01.2	S01A - 12x12 VFT - White with Blue Fleck - Room 167
2443119-02.1	S01B - 12x12 VFT - White with Blue Fleck - Room 167
2443119-02.2	S01B - 12x12 VFT - White with Blue Fleck - Room 167
2443119-03.1	S01C - 12x12 VFT - White with Blue Fleck - Room 167
2443119-03.2	S01C - 12x12 VFT - White with Blue Fleck - Room 167
2443119-04	S02A - Ceiling Mortar - Room 167
2443119-05	S02B - Ceiling Mortar - Room 167
2443119-06	S02C - Ceiling Mortar - Room 167
2443119-07.1	S03A - 12x12 VFT - Grey with Brown Fleck - Room 102
2443119-07.2	S03A - 12x12 VFT - Grey with Brown Fleck - Room 102
2443119-08.1	S03B - 12x12 VFT - Grey with Brown Fleck - Room 102
2443119-08.2	S03B - 12x12 VFT - Grey with Brown Fleck - Room 102
2443119-09.1	S03C - 12x12 VFT - Grey with Brown Fleck - Room 102
2443119-09.2	S03C - 12x12 VFT - Grey with Brown Fleck - Room 102
2443119-10	S04A - 2x4 CT - Small Fissure Random Pin - Room 102
2443119-11	S04B - 2x4 CT - Small Fissure Random Pin - Room 102
2443119-12	S04C - 2x4 CT - Small Fissure Random Pin - Room 102
2443119-13	S05A - Concrete Block Mortar
2443119-14	S05B - Concrete Block Mortar
2443119-15	S05C - Concrete Block Mortar
2443119-16	S05D - Concrete Block Mortar
2443119-17	S05E - Concrete Block Mortar
2443119-18.1	S06A - 12x12 VFT - Grey with White/Grey Oatmeal - Second Floor Corridor
2443119-18.2	S06A - 12x12 VFT - Grey with White/Grey Oatmeal - Second Floor Corridor
2443119-19.1	S06B - 12x12 VFT - Grey with White/Grey Oatmeal - Second Floor Corridor

Approved By:



Emma Diaz
Senior Analyst

Certificate of Analysis

Report Date: 28-Oct-2024

Client: **MTE Consultants Inc. (Burlington)**

Order Date: 22-Oct-2024

Client PO:

Project Description: **56044-100 - Bennetto Acess Upgrades DSA**

2443119-19.2	S06B - 12x12 VFT - Grey with White/Grey Oatmeal - Second Floor Corridor
2443119-20.1	S06C - 12x12 VFT - Grey with White/Grey Oatmeal - Second Floor Corridor
2443119-20.2	S06C - 12x12 VFT - Grey with White/Grey Oatmeal - Second Floor Corridor
2443119-21	S07A - Roof Membrane
2443119-22	S07B - Roof Membrane
2443119-23	S07C - Roof Membrane
2443119-24	S08A - Tar Intermediate Layer
2443119-25	S08B - Tar Intermediate Layer
2443119-26	S08C - Tar Intermediate Layer
2443119-27	S09A - Tar Paper Vapour Barrier
2443119-28	S09B - Tar Paper Vapour Barrier
2443119-29	S09C - Tar Paper Vapour Barrier

Certificate of Analysis
 Client: MTE Consultants Inc. (Burlington)
 Client PO:

Report Date: 28-Oct-2024
 Order Date: 22-Oct-2024

Project Description: 56044-100 - Bennetto Aceso Upgrades DSA

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

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
2443119-01.1	17-Oct-24	White/Blue	Vinyl Floor Tile	No	Client ID: S01A - 12x12 VFT - White with Blue Fleck - Room 167	
					Non-Fibers	100
2443119-01.2	17-Oct-24	Yellow	Mastic	No	Client ID: S01A - 12x12 VFT - White with Blue Fleck - Room 167	
					Non-Fibers	100
2443119-02.1	17-Oct-24	White/Blue	Vinyl Floor Tile	No	Client ID: S01B - 12x12 VFT - White with Blue Fleck - Room 167	
					Non-Fibers	100
2443119-02.2	17-Oct-24	Yellow	Mastic	No	Client ID: S01B - 12x12 VFT - White with Blue Fleck - Room 167	
					Non-Fibers	100
2443119-03.1	17-Oct-24	White/Blue	Vinyl Floor Tile	No	Client ID: S01C - 12x12 VFT - White with Blue Fleck - Room 167	
					Non-Fibers	100
2443119-03.2	17-Oct-24	Yellow	Mastic	No	Client ID: S01C - 12x12 VFT - White with Blue Fleck - Room 167	
					Non-Fibers	100
2443119-04	17-Oct-24	Grey/White	Mortar/Texture Coat	No	Client ID: S02A - Ceiling Mortar - Room 167	
					Non-Fibers	100
						[AS-LR-NA]
2443119-05	17-Oct-24	White	Texture Coat	No	Client ID: S02B - Ceiling Mortar - Room 167	
					Non-Fibers	100
2443119-06	17-Oct-24	White	Texture Coat	No	Client ID: S02C - Ceiling Mortar - Room 167	
					Non-Fibers	100
2443119-07.1	17-Oct-24	Grey/Brown	Vinyl Floor Tile	Yes	Client ID: S03A - 12x12 VFT - Grey with Brown Fleck - Room 102	
					[ASTrc]Chrysotile	<MDL
					Non-Fibers	100
						[AS-PT]
2443119-07.2	17-Oct-24	Black	Mastic	Yes	Client ID: S03A - 12x12 VFT - Grey with Brown Fleck - Room 102	
					Chrysotile	2
					Non-Fibers	98
2443119-08.1	17-Oct-24	Grey/Brown	Vinyl Floor Tile	Yes	Client ID: S03B - 12x12 VFT - Grey with Brown Fleck - Room 102	
					[ASTrc]Chrysotile	<MDL
					Non-Fibers	100
						[AS-PT]

Certificate of Analysis
Client: MTE Consultants Inc. (Burlington)
Client PO:

Report Date: 28-Oct-2024
Order Date: 22-Oct-2024

Project Description: 56044-100 - Bennetto Acess Upgrades DSA

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

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
2443119-08.2	17-Oct-24	Black	Mastic		Client ID: S03B - 12x12 VFT - Grey with Brown Fleck - Room 102 not analyzed, positive stop	
2443119-09.1	17-Oct-24	Grey/Brown	Vinyl Floor Tile	Yes	Client ID: S03C - 12x12 VFT - Grey with Brown Fleck - Room 102 [ASTrc]Chrysotile Non-Fibers	<MDL 100
2443119-09.2	17-Oct-24	Black	Mastic		Client ID: S03C - 12x12 VFT - Grey with Brown Fleck - Room 102 not analyzed, positive stop	
2443119-10	17-Oct-24	Grey	Ceiling Tile	No	Client ID: S04A - 2x4 CT - Small Fissure Random Pin - Room 102 Cellulose MMVF Non-Fibers	40 30 30
2443119-11	17-Oct-24	Grey	Ceiling Tile	No	Client ID: S04B - 2x4 CT - Small Fissure Random Pin - Room 102 Cellulose MMVF Non-Fibers	40 30 30
2443119-12	17-Oct-24	Grey	Ceiling Tile	No	Client ID: S04C - 2x4 CT - Small Fissure Random Pin - Room 102 Cellulose MMVF Non-Fibers	40 30 30
2443119-13	17-Oct-24	Grey	Mortar	No	Client ID: S05A - Concrete Block Mortar Non-Fibers	100
2443119-14	17-Oct-24	Grey	Mortar	No	Client ID: S05B - Concrete Block Mortar Non-Fibers	100
2443119-15	17-Oct-24	Grey	Mortar	No	Client ID: S05C - Concrete Block Mortar Non-Fibers	100
2443119-16	17-Oct-24	Grey	Mortar	No	Client ID: S05D - Concrete Block Mortar Non-Fibers	100

Certificate of Analysis
 Client: MTE Consultants Inc. (Burlington)
 Client PO:

Report Date: 28-Oct-2024
 Order Date: 22-Oct-2024

Project Description: 56044-100 - Bennetto Acess Upgrades DSA

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

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
2443119-17	17-Oct-24	Grey	Mortar	No	Client ID: S05E - Concrete Block Mortar	
					Non-Fibers	100
2443119-18.1	17-Oct-24	Grey	Vinyl Floor Tile	No	Client ID: S06A - 12x12 VFT - Grey with White/Grey Oatmeal - Second Floor Corridor	
					Non-Fibers	100
2443119-18.2	17-Oct-24	Black	Mastic	No	Client ID: S06A - 12x12 VFT - Grey with White/Grey Oatmeal - Second Floor Corridor	
					Non-Fibers	100
2443119-19.1	17-Oct-24	Grey	Vinyl Floor Tile	No	Client ID: S06B - 12x12 VFT - Grey with White/Grey Oatmeal - Second Floor Corridor	
					Non-Fibers	100
2443119-19.2	17-Oct-24	Black	Mastic	No	Client ID: S06B - 12x12 VFT - Grey with White/Grey Oatmeal - Second Floor Corridor	
					Non-Fibers	100
2443119-20.1	17-Oct-24	Grey	Vinyl Floor Tile	No	Client ID: S06C - 12x12 VFT - Grey with White/Grey Oatmeal - Second Floor Corridor	
					Non-Fibers	100
2443119-20.2	17-Oct-24	Black	Mastic	No	Client ID: S06C - 12x12 VFT - Grey with White/Grey Oatmeal - Second Floor Corridor	
					Non-Fibers	100
2443119-21	17-Oct-24	Black	Roof Membrane	No	Client ID: S07A - Roof Membrane	
						[AS-PRE]
					Cellulose	30
2443119-22	17-Oct-24	Black	Roof Membrane	No	Client ID: S07B - Roof Membrane	
						[AS-PRE]
					Cellulose	30
2443119-23	17-Oct-24	Black	Roof Membrane	No	Client ID: S07C - Roof Membrane	
						[AS-PRE]
					Cellulose	30
2443119-24	17-Oct-24	Black	Tar Layer	No	Client ID: S08A - Tar Intermediate Layer	
						[AS-PRE]
					Cellulose	20
	MMVF	10				
	Non-Fibers	70				

Certificate of Analysis
 Client: MTE Consultants Inc. (Burlington)
 Client PO:

Report Date: 28-Oct-2024
 Order Date: 22-Oct-2024

Project Description: 56044-100 - Bennetto Aceso Upgrades DSA

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

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
2443119-25	17-Oct-24	Black	Tar layer	No	Client ID: S08B - Tar Intermediate Layer	[AS-PRE]
					Cellulose	20
					MMVF	10
					Non-Fibers	70
2443119-26	17-Oct-24	Black	Tar Layer	No	Client ID: S08C - Tar Intermediate Layer	[AS-PRE]
					Cellulose	20
					MMVF	10
					Non-Fibers	70
2443119-27	17-Oct-24	Brown	Vapour Barrier	No	Client ID: S09A - Tar Paper Vapour Barrier	[AS-PRE]
					Cellulose	90
					Non-Fibers	10
2443119-28	17-Oct-24	Brown	Vapour Barrier	No	Client ID: S09B - Tar Paper Vapour Barrier	[AS-PRE]
					Cellulose	90
					Non-Fibers	10
2443119-29	17-Oct-24	Brown	Vapour Barrier	No	Client ID: S09C - Tar Paper Vapour Barrier	[AS-PRE]
					Cellulose	90
					Non-Fibers	10

* MMVF: Man Made Vitreous Fibers: Fiberglass, Mineral Wool, Rockwool, Glasswool
 ** 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	28-Oct-24

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

Certificate of Analysis

Report Date: 28-Oct-2024

Client: MTE Consultants Inc. (Burlington)

Order Date: 22-Oct-2024

Client PO:

Project Description: 56044-100 - Bennetto Acess Upgrades DSA

Qualifier Notes

Sample Qualifiers :

AS-LR-NA: Layers/materials inseparable, combined and not analysed separately

AS-PRE: Due to the difficult nature of the bulk sample (interfering fibers/binders), additional NOB preparation was required prior to analysis

AS-PT: Asbestos quantitation by PLM Point Count method.

ASTrc: Trace asbestos was observed below the noted detection limit but could not be accurately quantified.

Work Order Revisions | Comments

None



Parcel ID: 2443119



Office
319 St. Laurent Blvd.
Va, Ontario K1G 4J8
300-749-1947
race@paracellabs.com

Chain of Custody
(Lab Use Only)

Page 1 of 1

Client Name: MTE Consultants	Project Reference: 56044-100 - Bennetto Access Upgrades DSA	<input type="checkbox"/> Immediate <input type="checkbox"/> 1 Day <input type="checkbox"/> 4 Hour <input type="checkbox"/> 2 Day <input type="checkbox"/> 8 Hour <input type="checkbox"/> 3 Day <input checked="" type="checkbox"/> Regular
Contact Name: Gavin Oakes; Aaron Rows	Quote #: MTE Standing Offer	
Address: 1016 Sulton Drive, Unit A	PO #:	
Burlington, ON L7L 6B8	Email Address: goakes@mte85.com	
Telephone: 905-639-2552	arows@mte85.com	
		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

Parcel Order Number: 2443119		Asbestos - Bulk				
Sample ID	Sampling Date	Air Volume (L)	Analysis Required	Identify Distinct Building Materials to Be Analyzed (if not specified, all materials identified will be analyzed) *	Positive Stop?	
1	S01 A-C - 12"x12" VFT - White with Blue Fleck - Room 167	17 Oct 24	-	PLM		<input checked="" type="checkbox"/>
2	S02 A-C - Ceiling Mortar - Room 167	17 Oct 24	-	PLM		<input checked="" type="checkbox"/>
3	S03 A-C - 12"x12" VFT - Grey with Brown Fleck - Room 102	17 Oct 24	-	PLM		<input checked="" type="checkbox"/>
4	S04 A-C - 2'x4' CT - Small Fissure Random Pin - Room 102	17 Oct 24	-	PLM		<input checked="" type="checkbox"/>
5	S05 A-E - Concrete Block Mortar	17 Oct 24	-	PLM		<input checked="" type="checkbox"/>
6	S06 A-C - 12"x12" VFT - Grey with white/grey oatmeal - Second Floor Corridor	17 Oct 24	-	PLM		<input checked="" type="checkbox"/>
7	S07 A-C - Roof Membrane	17 Oct 24	-	PLM		<input checked="" type="checkbox"/>
8	S08 A-C - Tar Intermediate Layer	17 Oct 24	-	PLM		<input checked="" type="checkbox"/>
9	S09 A-C - Tar Paper Vapour Barrier	17 Oct 24	-	PLM		<input type="checkbox"/>
10						<input type="checkbox"/>
11						<input type="checkbox"/>
12						<input type="checkbox"/>

* If left blank, all distinct materials identified in the samples will be analyzed and reported separately as per EPA 600/R-93/116. Additional charges will apply.

Comments: _____ Method of Delivery: *Parcel*

Relinquished By (Sign): _____	Received at Depot: _____	Received at Lab: <i>JK</i>	Verified By: <i>JK</i>
Relinquished By (Print): _____	Date/Time: _____	Date/Time: <i>Oct 22/24</i>	Date/Time: <i>Oct 22/24</i>
Date/Time: _____		<i>P.47</i>	<i>10.01</i>

Certificate of Analysis

MTE Consultants Inc. (Burlington)

1016 Sutton Drive, Unit A
Burlington, ON L7L 6B8
Attn: Gavin Oakes

Client PO:
Project: 56044-100 - Bennetto Access Upgrades DSA
Custody:

Report Date: 28-Oct-2024
Order Date: 22-Oct-2024

Order #: 2443122

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

Parcel ID	Client ID
2443122-01	LP01 - White - Throughout 1st Floor
2443122-02	LP02 - Cream - Room 102
2443122-03	LP03 - Cream - 2nd Floor Corridor

Approved By:



Milan Ralitsch, PhD
Senior Technical Manager

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Certificate of Analysis

Report Date: 28-Oct-2024

Client: MTE Consultants Inc. (Burlington)

Order Date: 22-Oct-2024

Client PO:

Project Description: 56044-100 - Bennetto Access Upgrades DSA

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-MS	EPA 6020 - Digestion - ICP-MS	25-Oct-24	25-Oct-24

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: 28-Oct-2024

Client: MTE Consultants Inc. (Burlington)

Order Date: 22-Oct-2024

Client PO:

Project Description: 56044-100 - Bennetto Access Upgrades DSA

Sample Results

Lead					Matrix: Paint	
Parcel ID	Client ID	Sample Date	Units	MDL	Result	
2443122-01	LP01 - White - Throughout 1st Floor	17-Oct-24	ug/g	5	26	
2443122-02	LP02 - Cream - Room 102	17-Oct-24	ug/g	5	329	
2443122-03	LP03 - Cream - 2nd Floor Corridor	17-Oct-24	ug/g	5	6	

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	64.6	5	ug/g	73.1			12.40	50	
Matrix Spike									
Lead	50.7	5.00	ug/g	ND	95.5	70-130			



Parcel ID: 2443122



1 Blvd
5438
St. John's
NL
A1B 1X9

Parcel Order Number (Lab Use Only) 2443122	Chain Of Custody (Lab Use Only)
---	------------------------------------

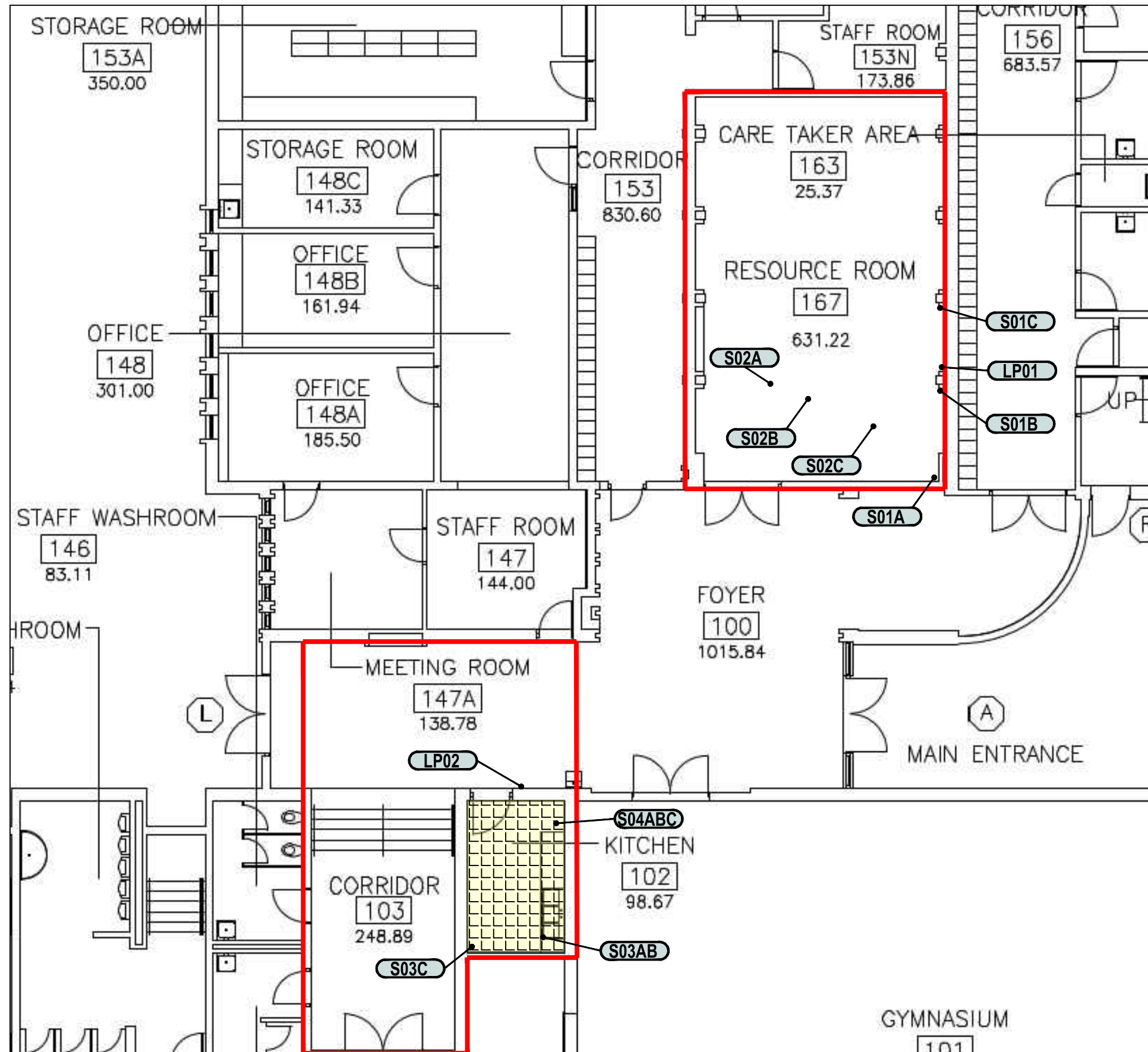
Client Name: MTE Consultants	Project Ref: 56044-100 - Bennetto Access Upgrades DSA	Page <u>1</u> of <u>1</u>
Contact Name: Gavin Oakes, Aaron Rows	Quote #: MTE Standing Offer	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular Date Required: _____
Address: 1016 Sutton Drive, Unit A Burlington, ON L7L 6B8	PO #:	
Telephone: 905-639-2552	E-mail: goakes@mte85.com arows@mte85.com	

<input type="checkbox"/> REG 153/04 <input type="checkbox"/> REG 406/19 Other Regulation <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/Fine <input type="checkbox"/> REG 558 <input type="checkbox"/> PWQO <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> CCME <input type="checkbox"/> MISA <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/Other <input type="checkbox"/> Table _____ For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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	Sample Taken		Lead												
				Date	Time													
1 LPO1 - white - throughout 1st Floor	P	-	1	17 Oct 24	9:00pm	X												
2 LPO2 - Clean - Room 102	P	-	1	↓	↓	X												
3 LPO3 - Clean - 2nd Floor Corridor	P	-	1	↓	↓	X												
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:			Method of Delivery: Pump/ator		
Relinquished By (Sign): Gavin Rows	Received By Driver/Depot:	Received at Lab: Jm	Verified By: Jm		
Relinquished By (Print): Aaron Rows	Date/Time:	Date/Time: 10/22/24 950	Date/Time: 10/22/24 1041		
Date/Time: Oct 21 - 11:00 am	Temperature: _____ °C	Temperature: -	pH Verified: <input type="checkbox"/> By: NA		

Appendix C

Figures



Notes:
 ALL DRAWINGS TO BE REFERENCED WITH THE DSA REPORT. LOCATIONS AND QUANTITIES ARE APPROXIMATE.
 ALL KNOWN OR SUSPECT DESIGNATED SUBSTANCES ARE NOT DEPICTED ON THIS FIGURE. REFER TO THE DSA REPORT FOR A COMPLETE LIST OF IDENTIFIED KNOWN AND SUSPECT DESIGNATED SUBSTANCES.
 THIS FIGURE IS COLOUR DEPENDENT. PHOTOCOPIES MAY ALTER INTERPRETATION OF FIGURE. ALWAYS REFER TO ORIGINAL DRAWINGS AND DSA REPORT.

Designated Substances and Hazardous Materials Legend

- S02CD Sample Identification
- Scope of Work
- [Hatched Box] ACM Vinyl Floor Tile Mastic



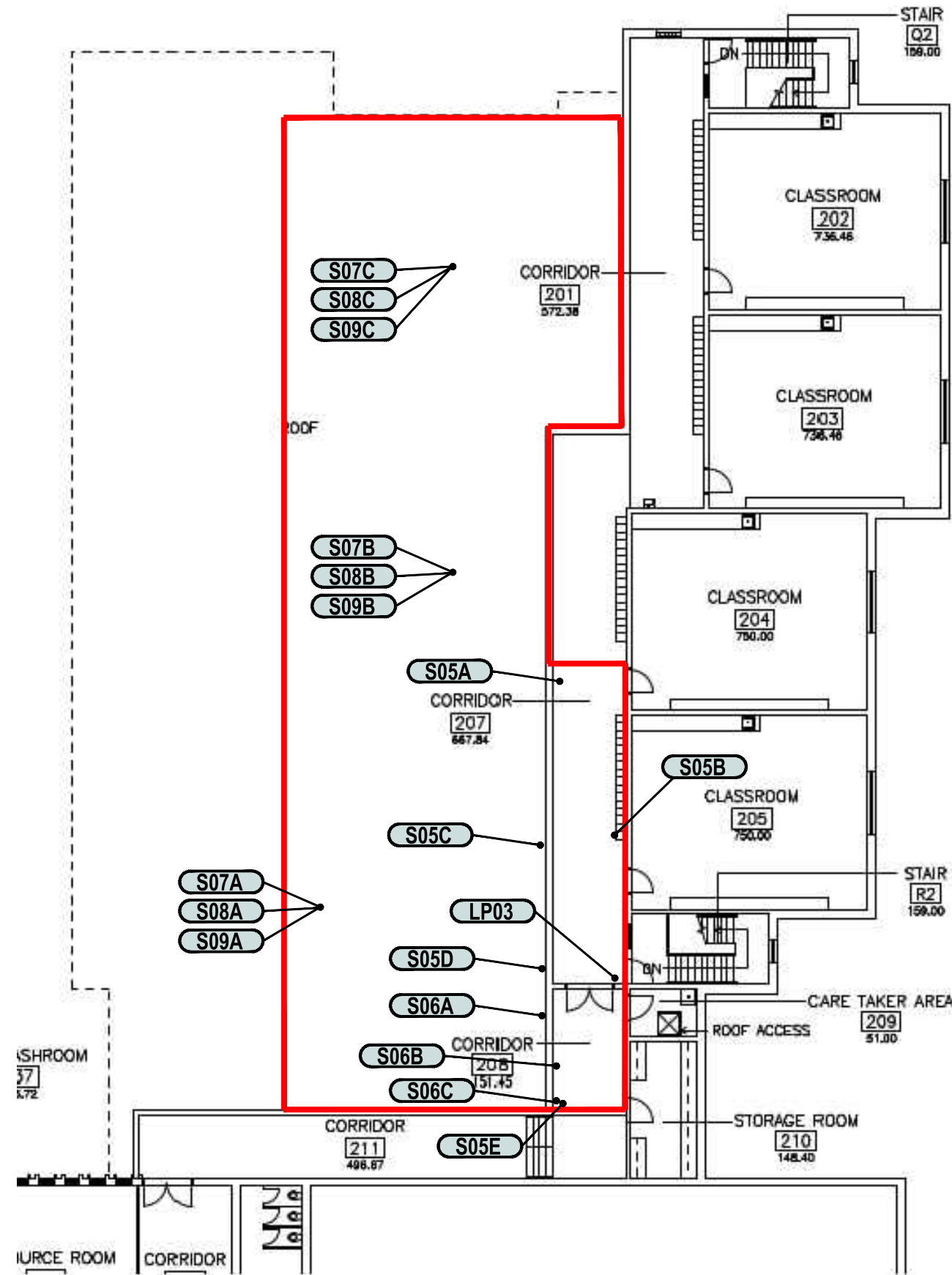
Ph. (905) 639-2552 www.mte85.com

CLIENT
 HAMILTON-WENWORTH DISTRICT SCHOOL BOARD

PROJECT
 DESIGNATED SUBSTANCE AUDIT

DRAWING
 BENNETTO ELEMENTARY SCHOOL
 FIRST FLOOR
 47 SIMCOE STREET EAST
 HAMILTON, ONTARIO

Project Manager	G. OAKES	Date	October 2024
Baseplan By	MTE	Project No.	56044-100
Figure By	SXS	Drawing No.	1.0
Scale	N.T.S.		



Notes:
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Designated Substances and Hazardous Materials Legend

- S02CD Sample Identification
- Scope of Work



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 HAMILTON-WENWORTH DISTRICT SCHOOL BOARD

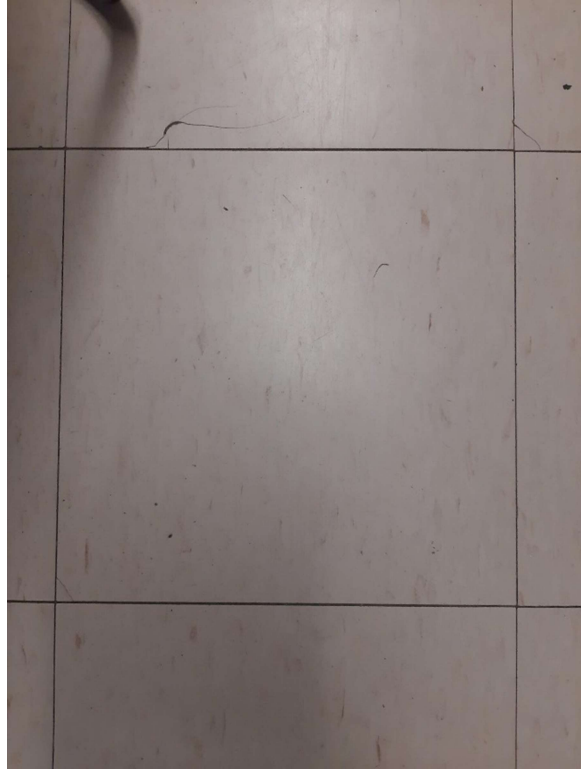
PROJECT
 DESIGNATED SUBSTANCE AUDIT

DRAWING
 BENNETTO ELEMENTARY SCHOOL
 SECOND FLOOR
 47 SIMCOE STREET EAST
 HAMILTON, ONTARIO

Project Manager	G. OAKES	Date	October 2024
Baseplan By	MTE	Project No.	56044-100
Figure By	SXS	Drawing No.	2.0
Scale	N.T.S.		

Appendix D

Photographic Log



Photograph No. 1 – 12”x12” Grey with brown fleck vinyl floor tiles observed in Room 102 were sampled (S03A,B,C) and are not asbestos containing; however, the associated mastic is asbestos containing.



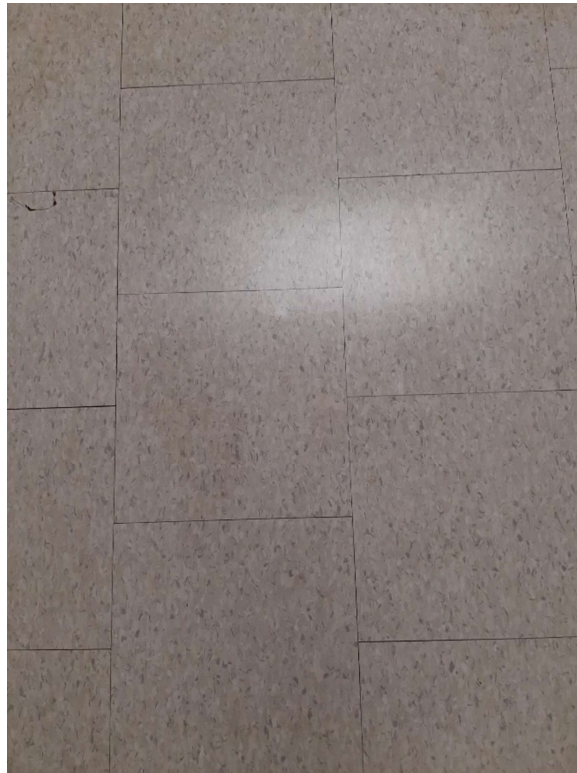
Photograph No. 2 – 12”x12” White with blue fleck vinyl floor tiles observed in Room 167 were sampled (S01A,B,C). The tiles and mastic are non-asbestos.



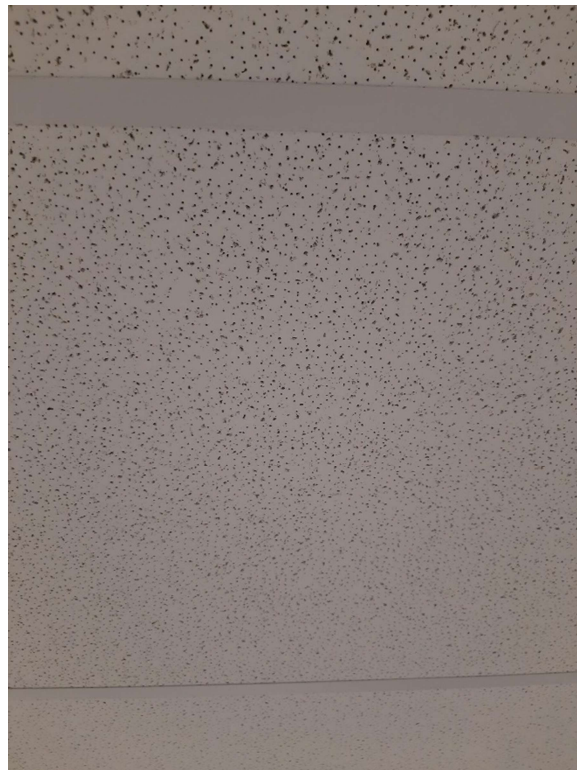
Photograph No. 3 – The concrete mortar on the ceiling of room 167 was sampled (S02A,B,C) and is not asbestos-containing.



Photograph No. 4 – 2'x4' small fissure random pinhole ceiling tiles were observed in room 102 and were sampled (S04A,B,C). The ceiling tiles are not asbestos-containing.



Photograph No. 5 – 12"x12" grey with white and grey oatmeal pattern vinyl floor tiles observed in the second floor corridor were sampled (S06A,B,C). The vinyl floor tiles and associated mastic are non-asbestos.



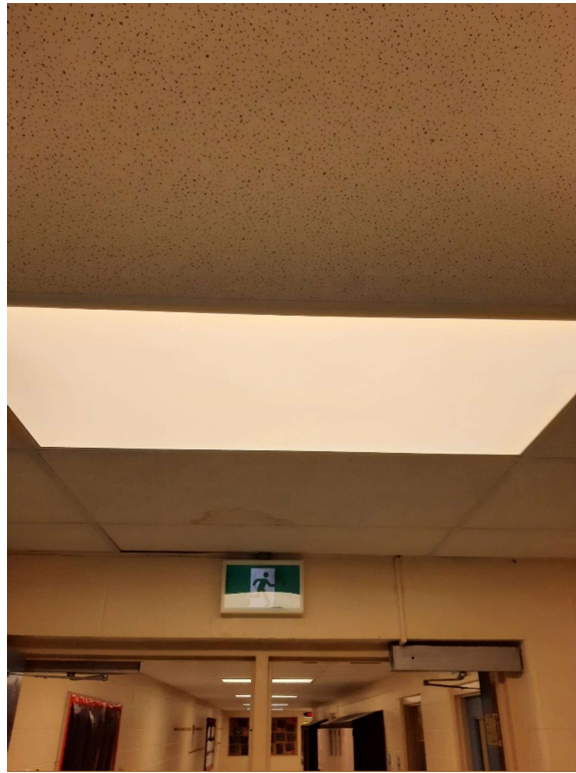
Photograph No. 6 – The 2'x4' random pinhole ceiling tiles observed in the second floor corridor have a manufacturing date of 06/17/23 and are not considered asbestos-containing.



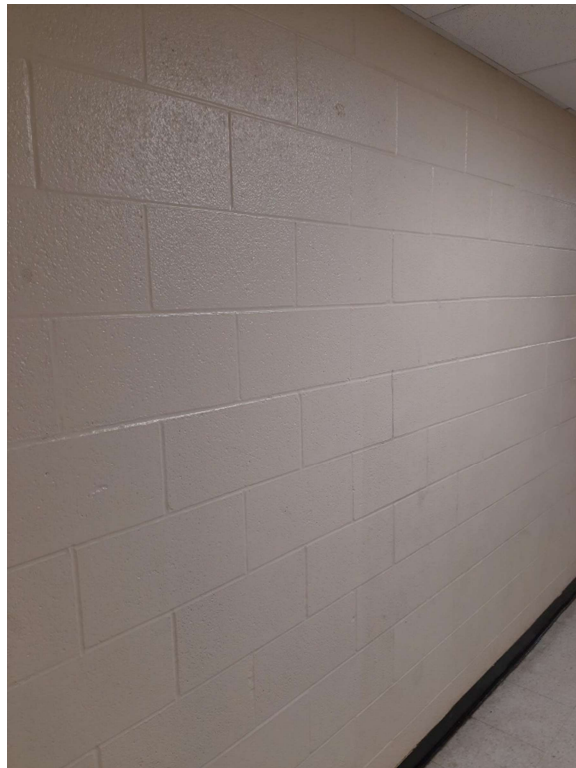
Photograph No. 7 – Non-asbestos fiberglass pipe insulation was observed above the drop ceiling in the second floor corridor



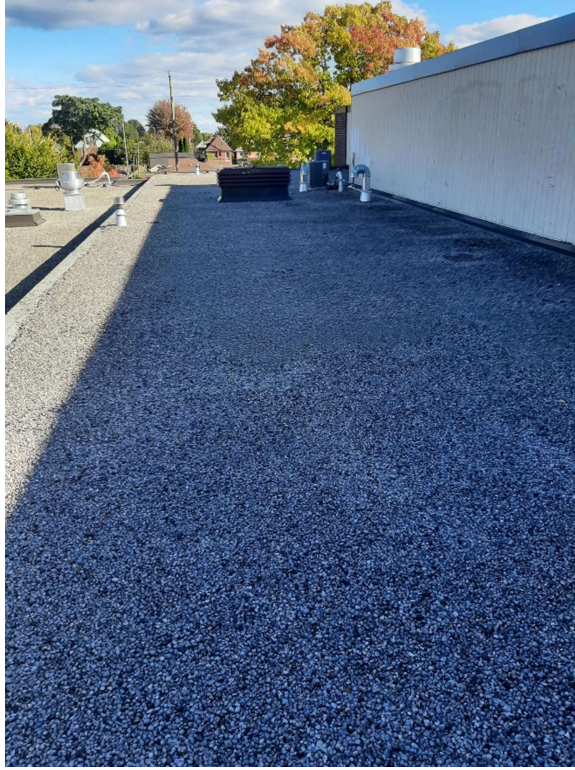
Photograph No. 8 – Mercury containing thermostats were observed in the second floor corridor.



Photograph No. 9 – Mercury containing fluorescent light tubes were observed throughout the interior of the Subject Areas. Potentially concealed PCB light ballasts may be present but could not be confirmed at the time of inspection.



Photograph No. 10 – The off-white paint in the second floor corridor was sampled (LP03) and is low level lead-containing.



Photograph No. 10 – The roofing system was inspected and sampled on roof section A. The roof membrane, intermediate tar layer, and vapour barrier were sampled. All layers are non-asbestos.