

PROJECT SPECIFICATIONS

HWDSB YORKVIEW ELEMENTARY SCHOOL GYM RENOVATION

86 Cameron Ave, Dundas, ON, L9H 1P8

For

Hamilton-Wentworth District School Board

20 Education Court

Hamilton, Ontario

HWDSB No: 2026-138-P02211

JFA Project: 2518

April 10, 2026

Jason Fung Architect Inc.

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

647 948 9176 www.jasonfung.ca

1 GENERAL

1.1 OWNER

- .1 Owner for the Project is:
Hamilton-Wentworth District School Board
20 Education Court
Hamilton, Ontario
L9A 0B9

1.2 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)
PINCHIN LTD.
151 York Blvd Suite 200
Hamilton, ON, L8R 3M2
905 577 6206
 - .3 Electrical Engineer
YMSD CONSULTING
226 Pacific Ave.
Toronto, ON M6P 2P5
416 763 2144
 - .4 Structural Engineer
CONTACT ENGINEERING
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Toronto ON, M5V 1M9
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END OF SECTION

1 GENERAL

1.1 SECTION LIST

DIVISION 00 – INTRODUCTORY INFORMATION	
SECTION	TITLE
00 00 00	Cover Page
00 01 03	Project Directory
00 01 10	Table of Contents
DIVISION 01 – GENERAL CONDITIONS	
SECTION	TITLE
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 43 00	Quality Assurance
01 45 00	Quality Control
01 56 00	Temporary Barriers and Enclosures
01 61 00	Common Product Requirements
01 71 00	Examination and Preparation
01 73 00	Execution
01 74 00	Cleaning
01 74 19	Waste Management and Disposal
01 77 00	Closeout Procedures
01 78 00	Closeout Submittals
DIVISION 02 – EXISTING CONDITIONS	
SECTION	TITLE
02 22 10	Existing Building Condition Assessments
02 41 19	Selective Demolition
02 82 00	Hazardous Materials – General Provisions
02 82 00.01	Asbestos Abatement – Type 1 (Low Risk) Procedures
02 82 00.02	Asbestos Abatement – Type 2 (Moderate Risk) Procedures
02 82 00.04	Asbestos Abatement – Glove Bag
02 83 10	Lead Abatement – Class 1 Precautions
02 83 11	Lead Abatement – Class 2 Precautions

DIVISION 03 – CONCRETE

SECTION	TITLE	
03 10 00	Concrete Formwork and Accessories	<i>see also Drawing S1.01</i>
03 20 00	Concrete Reinforcing	<i>see also Drawing S1.01</i>
03 30 00	Cast-in-Place Concrete	<i>see also Drawing S1.01</i>
03 35 00	Concrete Finishing	

DIVISION 04 – MASONRY

SECTION	TITLE	
04 05 00	Common Work Results for Masonry	
04 05 13	Masonry Mortaring and Grouting	
04 05 19	Masonry Anchorage and Reinforcing	
04 05 23	Masonry Accessories	
04 20 00	Unit Masonry	

DIVISION 05 – METAL

SECTION	TITLE	
05 12 00	Structural Steel Framing	<i>see also Drawing S1.01</i>
05 40 00	Cold Formed Metal Framing	<i>see also Drawing S1.01</i>
05 50 00	Metal Fabrication	
05 52 13	Pipe and Tube Railings	

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

SECTION	TITLE	
06 10 00	Rough Carpentry	<i>see also Drawing S1.01</i>
06 20 00	Finish Carpentry	
06 24 00	High Pressure Decorative Laminate	
06 47 00	Plastic Laminate Finishing	

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION	TITLE	
07 21 00	Thermal Insulation	
07 26 00	Vapour Retarders	
07 27 00	Air Barriers	
07 62 00	Sheet Metal Flashing and Trim	
07 84 00	Firestopping	
07 92 00	Joint Sealants	

DIVISION 08 – DOORS AND WINDOWS

SECTION	TITLE	
08 11 13	Hollow Metal Doors and Frames	
08 51 13	Aluminum Windows	

08 71 00	Door Hardware
08 80 00	Glazing
08 90 00	Louvres and Vents

DIVISION 09 – FINISHES

SECTION	TITLE
09 21 16	Gypsum Board Assemblies
09 22 00	Supports for Plaster and Gypsum Board
09 22 16	Non-Structural Metal Framing
09 65 00	Resilient Flooring and Accessories
09 65 66	Resilient Athletic Flooring
09 91 23	Interior Painting

DIVISION 10 – SPECIALTIES

SECTION	TITLE
10 11 13	Chalkboards, Whiteboards, and Tackboards

DIVISION 11 – EQUIPMENT

SECTION	TITLE
11 52 13	Projection Screens
11 61 43	Stage Curtain
11 63 00	Gymnasium Equipment

DIVISION 12 – FURNISHINGS

SECTION	TITLE
12 24 13	Roller Window Shades

DIVISION 14 – CONVEYING EQUIPMENT

SECTION	TITLE
14 42 16	Vertical Wheelchair Lifts

DIVISION 26 – ELECTRICAL

SECTION	TITLE
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

DIVISION 28 – FIRE DETECTION AND ALARM

SECTION	TITLE
28 46 00	Fire Detection and Alarm Systems

1.2 APPENDIX

- .1 Appendix A, Hazardous Building Materials Assessment (Preconstruction)
Pinchin Ltd.
February 5, 2026
Pinchin File: 0352293.018

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises interior renovation of the existing gym at Yorkview Elementary School, 86 Cameron Ave, Dundas, ON L9H 1P8 , and further identified in the Contract Documents.

1.3 CONTRACT METHOD

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

1.4 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 (GANTT) Chart.

1.5 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.

1.6 FUTURE WORK

- .1 Not Used.

1.7 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.

1.8 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.

1.9 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.
 - .4 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.

1.11 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.

1.12 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).

1.13 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.

1.14 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.

1.15 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Refer to RFT Document.

1.2 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.

1.3 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.

1.4 SECURITY

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

1.5 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.

END OF SECTION

1 GENERAL

1.1 REFERENCE STANDARDS

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

1.2 CASH ALLOWANCES

- .1 Refer to CCDC 2, GC 4.1 and Supplementary Conditions.
- .2 Include in Contract Price specified Cash Allowances.
- .3 Cash Allowances, unless otherwise specified, cover net cost to Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage, installation and other authorized expenses incurred in performing Work.
- .4 Contract Price, and not Cash Allowance, includes Contractor's overhead and profit in connection with such Cash Allowance
- .5 Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.
- .6 Where costs under a Cash Allowance exceed amount of allowance, Contractor will be compensated for excess incurred and substantiated plus allowance for overhead and profit as set out in Contract Documents.
- .7 Include progress payments on accounts of work authorized under Cash Allowances in Consultant's monthly certificate for payment.
- .8 Prepare schedule jointly with Consultant, HWDSB and Contractor to show when items called for under Cash Allowances must be authorized by HWDSB for ordering purposes so that progress of Work will not be delayed.
- .9 Amount of each Cash Allowance includes:
 - .1 Costs to Provide the specified Products, including supply, installation, and related costs, excluding Value Added Taxes.
 - .2 Subcontractor's and sub-Subcontractor's overheads and profits related to cash allowance.

1.3 CONTINGENCY ALLOWANCE

- .1 Refer to CCDC 2, GC 4.2 and Supplementary Conditions.
- .2 Do not include in Contract Price, additional contingency allowances for products, installation, overhead or profit.
- .3 Expenditures under contingency allowance will be authorized in accordance with procedures provided in CCDC 2, GC 6.1 – Changes, GC 6.2 –Change Order, GC 6.3 – Change Directive, and Supplementary Conditions.

END OF SECTION

1 GENERAL

1.1 REFERENCE STANDARDS

- .1 HWDSB RFT Document.

1.2 APPLICATIONS FOR PROGRESS PAYMENT

- .1 Refer to CCDC 2 and HWDSB RFT 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.

1.3 SCHEDULE OF VALUES

- .1 Refer to CCDC 2 and HWDSB RFT 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.

1.4 PROGRESS PAYMENT

- .1 Refer to CCDC 2 and HWDSB RFT 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.

1.5 SUBSTANTIAL PERFORMANCE OF WORK

- .1 Refer to CCDC 2 and HWDSB RFT 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.

1.6 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK

- .1 Refer to CCDC 2 and HWDSB RFT 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.

1.7 FINAL PAYMENT

- .1 Refer to CCDC 2 and HWDSB RFT 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

1.2 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.

1.3 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.

1.4 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

1.2 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 Milestone: significant event in project, usually completion of major deliverable.
- .7 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.
- .8 Project Planning, Monitoring and Control System: overall system operated by HWDSB to enable monitoring of project work in relation to established milestones.

1.3 REQUIREMENTS

- .1 Ensure Project 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.

1.4 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 for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to HWDSB within 10 working days of Award of Contract.

1.5 PROJECT MILESTONES

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

1.6 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule.
- .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
- .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.

1.7 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.

1.8 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 HWDSB RFT Document.

1.2 REFERENCE STANDARDS

- .1 Not Used.

1.3 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.

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Refer to CCDC 2 GC 3.8 and HWDSB RFT 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 to 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.

1.5 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.

1.6 MOCK-UPS

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

1.7 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.

1.8 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, review RFT Document for submission of necessary certificates

and transcripts.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 Refer to Hazardous Building Materials Assessment (Preconstruction) report prepared by PINCHIN LTD. before proceeding with demolition and renovation Work.

1.2 RELATED REQUIREMENTS

- .1 Section 02 82 00 – Asbestos Abatement.

1.3 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.

1.4 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.

1.5 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.

1.6 SAFETY ASSESSMENT

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

1.7 MEETINGS

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

1.8 REGULATORY REQUIREMENTS

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

1.9 PROJECT/SITE CONDITIONS

1.10 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.

1.11 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.

1.12 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.

1.13 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.

1.14 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.

1.15 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.

1.16 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.

1.17 BLASTING

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

1.18 POWDER ACTUATED DEVICES

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

1.19 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.

END OF SECTION

1 GENERAL

1.1 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.

1.2 RELATED REQUIREMENTS

- .1 Section 02 22 10 – Existing Conditions Assessment

1.3 DEFINITIONS

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

1.4 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.

1.5 CODES

- .1 Building Code: Perform Work in accordance with the Ontario Building Code 2024 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.

1.6 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

2.1 EASEMENTS AND NOTICES

- .1 Not Used.

2.2 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.
 - .2 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.
 - .3 Contractor shall display building permit and other permits in a conspicuous location at the Place of the Work.
- .2 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

1.2 DEFINITIONS

- .1 Mock-up: A full-size physical example that demonstrates materials, finishes, interrelationship of materials and assemblies, aesthetic effects, and execution. A mock-up may demonstrate coordination of multiple Subcontractors' work. A mock-up establishes a standard by which the Work will be judged. Mock-ups are not samples.
- .2 Quality Assurance: Procedures for preventing defects and deficiencies before and during execution of the Work.
- .3 Quality Audit: Systematic and independent examination to determine whether quality requirements have been fulfilled as planned. A quality audit will examine processes, products and services to determine if they have been implemented effectively to achieve their specified objective.

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM E329: Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
- .2 International Organization for Standardization (ISO):
 - .1 ISO 9001: Quality Management Systems – Requirements

1.4 SECTION INCLUDES

- .1 This Section describes administrative and procedural requirements for proactive Contractor activities to assure the quality of construction before and during execution of the Work.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Contractor is responsible for self-performed testing and inspections and submittal of test reports to HWDSB and JASON FUNG ARCHITECT INC.
- .2 HWDSB will employ and pay for quality audit services performed through third-party observation and testing to validate the Contractor's performance of the Work.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit a detailed testing and inspections schedule to HWDSB and JASON FUNG ARCHITECT INC. in accordance with the Contractor's Quality Management System.
- .3 Submit certificates for products, processes, and systems for approval by HWDSB and JASON FUNG ARCHITECT INC.
- .4 Submit formal testing and inspections reports per ASTM E329 to HWDSB and JASON FUNG ARCHITECT INC.
- .5 Submit one digital copy and one hardcopy of each quality assurance inspection and test report to HWDSB and JASON FUNG ARCHITECT INC., except where a technical specification Section indicates otherwise.
- .6 Submit mill test certificates as required in technical specification Sections and as indicated on Drawings.

1.7 QUALIFICATIONS

- .1 Manufacturers' Qualifications:

- .1 Specializes in manufacturing the products specified in the technical Section of the Project's construction specification.
- .2 Minimum 3 years documented experience with a record of successful performance
- .2 Suppliers' Qualifications:
 - .1 Authorized to distribute manufacturer's products
 - .2 Has capacity to supply required products without delaying the Project
- .3 Fabricators' Qualifications:
 - .1 Experienced in producing products required for this Project
 - .2 Successful record of in-service performance
 - .3 Sufficient production capacity to fabricate required products without delaying the Project
- .4 Installer Qualifications:
 - .1 Firm or individual experienced in design and installation, application, and erection of materials to the extent required for this Project
 - .2 Successful record of in-service performance
- .5 Testing and Inspecting Agency Qualifications:
 - .1 Accredited organizations by the Standards Council of Canada for testing and inspection
 - .2 Capable of reliably performing testing of building products and inspections of construction activities in accordance with ISO 9001 and ASTM E329.
- .6 Licensed Professionals Qualifications:
 - .1 Individual registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.

1.8 CERTIFICATIONS

- .1 Ensure that certification of products, processes, and systems includes physical and examination testing as specified in ASTM E329 and ISO 9001 to confirm compliance with Specifications requirements.

1.9 COORDINATION

- .1 Coordinate and schedule tests and inspections with accredited testing and inspection agencies as indicated in Contract Documents and in accordance with ASTM E329 requirements.

1.10 SITE SAMPLES

- .1 Obtain HWDSB and JASON FUNG ARCHITECT INC.'s acceptance to proceed with the sampling process.
 - .1 Testing agency is responsible for obtaining representative samples of those materials required to be tested and evaluated as directed by HWDSB and JASON FUNG ARCHITECT INC. in accordance with the Contractual Documents.
- .2 Ensure testing agency performs sampling in accordance with ASTM E329.
 - .1 When sampling collection is required by testing agency, ensure proper protection, handling and storing of samples.
- .3 Testing agency to document procedures and appropriate techniques to select samples.
- .4 Record details of environmental conditions present during the sampling, such as rain or freezing weather that may affect testing of sample or interpretation of test results

1.11 MOCK-UPS

- .1 Mock-ups can be used as a reference for assessing quality of workmanship and site-applied finishes

as requested in the project's Contract Documents.

- .2 Obtain HWDSB and JASON FUNG ARCHITECT INC.'s acceptance of mock-ups installation before beginning to install those portions of the Work represented by the mock-up.
- .3 Assemble mock-ups at the Place of the Work in locations acceptable to HWDSB and JASON FUNG ARCHITECT INC. or where location is indicated in the technical specification Section.
- .4 Schedule mock-ups ready for HWDSB and JASON FUNG ARCHITECT INC.'s review and in orderly sequence, to avoid delays in Work.
 - .1 Failure to prepare mock-ups in ample time is not considered sufficient reason to request an extension of Contract Time. Claims for extension of Contract Time by reason of such default will not be considered.
- .5 If requested, HWDSB and JASON FUNG ARCHITECT INC. will assist in scheduling dates for construction of mock-ups.
- .6 Construct mock-ups using materials, finishes, colours, and methods proposed for the completed Work. Mock-ups to demonstrate proposed workmanship and range of aesthetic appearance.
- .7 Where a mock-up represents or affects multiple specification Sections, coordinate activities of these Subcontractors to ensure mock-ups are complete.
- .8 Modify or replace mock-ups when unacceptable to HWDSB and JASON FUNG ARCHITECT INC..
- .9 Maintain acceptable mock-ups in an undisturbed condition as a standard for judging the completed Work.
- .10 Mock-ups may remain as part of Work, unless indicated otherwise in a technical specification Section.

END OF SECTION

1 GENERAL

1.1 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.

1.2 RELATED REQUIREMENTS

1.3 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.

1.4 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.

1.5 SOURCE QUALITY CONTROL PROCEDURES

1.6 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.

1.7 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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

1.2 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA-O121, Douglas Fir Plywood.

1.3 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 the Contractor, 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.

1.4 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.

1.5 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.

1.6 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.

1.7 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.

1.8 ACCESS TO SITE

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

1.9 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.

1.10 FIRE ROUTES

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

1.11 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.

1.12 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.

1.13 WASTE MANAGEMENT AND DISPOSAL

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

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, related requirements, reference standards, quality, availability, storage, handling and protection, transportation, manufacturer's instructions, quality of work, coordination, concealment, remedial work, location of fixtures, fastenings (including equipment), protection of work in progress and existing utilities

1.2 REFERENCE STANDARDS

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

1.3 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with HWDSB and JASON FUNG ARCHITECT INC. based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.4 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify HWDSB and JASON FUNG ARCHITECT INC. of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify HWDSB and JASON FUNG ARCHITECT INC. at commencement of Work and should it subsequently appear that Work may be delayed for such reason, HWDSB and JASON FUNG ARCHITECT INC. reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.5 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden

platforms and cover with waterproof tarpaulins during inclement weather.

- .6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of HWDSB and JASON FUNG ARCHITECT INC..
- .9 Touch-up damaged factory finished surfaces to HWDSB and JASON FUNG ARCHITECT INC. satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.6 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by HWDSB. Unload, handle and store such products.

1.7 MANUFACTURER'S INSTRUCTION

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify HWDSB and JASON FUNG ARCHITECT INC. in writing, of conflicts between specifications and manufacturer's instructions, so that HWDSB and JASON FUNG ARCHITECT INC. will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes HWDSB and JASON FUNG ARCHITECT INC. to require removal and re-installation at no increase in Contract Price or Contract Time.

1.8 QUALITY OF WORK

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify HWDSB and JASON FUNG ARCHITECT INC. if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. HWDSB and JASON FUNG ARCHITECT INC. reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with HWDSB and JASON FUNG ARCHITECT INC., whose decision is final.

1.9 COORDINATION

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.10 CONCEALMENT

- .1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- .2 Before installation HWDSB and JASON FUNG ARCHITECT INC. if there is interference. Install as directed by HWDSB and JASON FUNG ARCHITECT INC..

1.11 REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to

neither damage nor put at risk any portion of Work.

1.12 LOCATION OF FIXTURES

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
- .2 Inform HWDSB and JASON FUNG ARCHITECT INC. of conflicting installation. Install as directed.

1.13 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.14 FASTENINGS – EQUIPMENT

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.15 PROTECTION OF WORK IN PROGRESS

- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Consultant.

1.16 EXISTING UTILITIES

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, building occupants, and pedestrian and vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

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

1.2 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.

1.3 CLOSEOUT SUBMITTALS

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

1.4 QUALIFICATION ASSURANCE

- .1 Not Used.

2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

3 EXECUTION

3.1 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.

3.2 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

1.2 SECTION INCLUDES

- .1 Common requirements for installing, applying, and erecting products. Includes procedures and submittals for cutting and patching to existing conditions, and required repairs arising from tests and destructive inspections.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit proof of anchor and fastener load carrying capacity for a work result, when requested.
- .3 Submit written request before cutting or altering to existing conditions which may affect the following:
 - .1 Structural integrity of existing elements: Submit structural details and calculations performed by a professional structural engineer registered or licensed in Ontario, Canada. Include evidence of unsatisfactory structural integrity of the elements according HWDSB.
 - .2 Integrity of weather-exposed and moisture-resistant elements
 - .3 Efficiency, maintenance, safety, or accessibility of operational elements
 - .4 Visual qualities of sight-exposed elements.
 - .5 Work of HWDSB and other Contractors
- .4 Submit a request for cutting or altering which includes:
 - .1 Identification of the Project; and
 - .2 Location and description of affected existing conditions including changes to structural elements, function of elements, and visual appearance of existing elements; and the location and identification of utilities that will be temporarily out of service during cutting and patching activities.
- .5 Submit site plan drawings indicating relative location of various services and equipment upon the request of HWDSB
- .6 Submit a work plan including:
 - .1 A statement why cutting or altering is unavoidable and describe alternatives to cutting and patching if available;
 - .2 A description of proposed work and proposed Products;
 - .3 The effect of cutting or altering on work by Owner or other contractors;
 - .4 Written acknowledgement by other contractors affected by cutting or altering, if applicable;
 - .5 Proposed date(s) and time(s) work will be executed.

1.4 QUALIFICATIONS

- .1 Licensed Professionals: Engage a structural engineer licensed at the Place of the Work, to submit details and calculations when altering existing structural elements.

2 PRODUCTS

2.1 MATERIALS

- .1 Patching Materials: If possible, use the same materials found in the existing conditions, except in fire-resistance rated materials and assemblies.

- .2 Materials Visible from the Floor Area: Use materials that visually match existing adjacent surfaces, and match existing functional performance.

3 EXECUTION

3.1 COMMON INSTALLATION/APPLICATION/ERECTION REQUIREMENTS

- .1 Fit several parts together, to integrate with other Work.
- .2 Remove and replace defective and non-conforming Work.
- .3 Unless otherwise indicated in specifications, install, or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .4 Notify HWDSB in writing, of conflicts between specifications and manufacturer's instructions, so that HWDSB will establish course of action.
- .5 Improper installation or erection of products, due to failure in complying with these requirements, authorizes HWDSB to require removal and re-installation at no increase in Contract Price or Contract Time.
- .6 Provide openings in non-structural elements for penetrations of mechanical and electrical work.
- .7 Conceal pipes, ducts and wiring in floor, wall, partition, and ceiling assemblies in finished areas, except where indicated otherwise.
- .8 In addition to the manufacturer's recommendations for safety, access, accessibility, and maintenance, locate equipment, fixtures, and distribution systems where it shall provide minimal interference and shall maximize on usable space.
 - .1 Location of equipment, fixtures, and outlets indicated on Drawings and specifications are approximate.
 - .2 Notify HWDSB of impending installation and obtain approval for actual locations.

3.2 BRACING AND ANCHORING

- .1 Anchors and Fasteners: Unless otherwise indicated elsewhere:
 - .1 Provide any necessary anchors and fasteners to fasten each component securely for its intended purpose. Allow for building movement, including from thermal expansion and contraction of materials and assemblies;
 - .2 Prevent electrolytic reaction between dissimilar metals and materials;
 - .3 Provide hot-dip galvanized or stainless steel anchors and fasteners for securing exterior work;
 - .4 Locate anchors and fasteners within individual load limit or shear capacity. Ensure anchors and fasteners are permanently secured;
 - .5 Where exposed to view, evenly distribute anchors and fasteners in a single area; and
 - .6 Where exposed to view, provide metal anchors, fasteners, and related accessories with the same texture, colour, and finish as adjacent materials.
- .2 Non-Conforming Work: Anchors and fasteners installed which cause substrate cracks or spalling is not acceptable.

3.3 CUTTING AND PATCHING

- .1 Proceed with cutting and patching after the review and acceptance by the HWDSB of all submittals.
- .2 Perform cutting, fitting, and patching to complete Work in accordance with related technical specification Sections.
- .3 Use special techniques to avoid damaging existing conditions that will remain, and which will result

in proper surfaces to receive patching and finishing.

- .4 Employ original installer to perform cutting and patching for weather-exposed elements, moisture-resistant elements, and surfaces exposed to view.
- .5 Cut rigid materials using masonry saw, core drill, or other tool recommended by the product manufacturer or applicable industry association. Pneumatic or impact tools are not allowed on masonry work without the approval of HWDSB.
- .6 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .7 Refinish surfaces to match adjacent finishes. Refinish continuous surfaces to nearest intersection (e.g., edges of partition). Refinish assemblies by refinishing entire unit. Provide entire surface with uniform finish, colour, and texture.

3.4 ADJUSTING

- .1 Remove and replace patching that is visually unsatisfactory to HWDSB and JASON FUNG ARCHITECT INC.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 02 80 00 – Hazardous Materials.

1.2 REFERENCE STANDARDS

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

1.3 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.

1.4 FINAL CLEANING

- .1 Refer to CCDC 2 and RFT Document.
- .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.

1.5 WASTE MANAGEMENT AND DISPOSAL

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

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This Section includes requirements for management of construction waste and disposal, which forms the Contractor's commitment to reduce and divert waste materials from landfill and includes the following:
 - .1 Preparation of a Draft Construction Waste Management Plan that will be used to track the success of the Construction Waste Management Plan against actual waste diversion from landfill.
 - .2 Preparation of a Construction Waste Management Plan that provides guidance on a logical progression of tasks and procedures to be followed in a pollution prevention program to reduce or eliminate the generation of waste, the loss of natural resources, and process emissions through source reduction, reuse, recycling, and reclamation.
- .2 Owner has established that this Project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors be employed by the Contractor.

1.2 RELATED REQUIREMENTS

1.3 DEFINITIONS

- .1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.
- .2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, re-modeling, repair and demolition operations.
- .3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity, or reactivity.
- .4 Non-hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.
- .5 Non-toxic: Not poisonous to humans either immediately or after a long period of exposure.
- .6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- .7 Recycle: To remove a waste material from the Project site to another site for remanufacture into a new product for reuse by others.
- .8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.
- .9 Return: To give back reusable items or unused products to vendors for credit.
- .10 Reuse: To reuse a construction waste material in some manner on the Project site.
- .11 Salvage: To remove a waste material from the Project site to another site for resale or reuse by others.
- .12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.
- .13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- .14 Toxic: Poisonous to humans either immediately or after a long period of exposure.
- .15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- .16 Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing:

- .1 Solvents in paints and other coatings;
- .2 Wood preservatives; strippers and household cleaners;
- .3 Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.
- .4 When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.
- .17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.
- .18 Construction Waste Management Plan: A project related plan for the collection, transportation, and disposal of the waste generated at the construction site; the purpose of the plan is to ultimately reduce the amount of material being landfilled.

1.4 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM E1609 01, Standard Guide for Development and Implementation of a Pollution Prevention Program – Note, the standard was withdrawn in 2010, however contains relevant information to aid Contractor with preparation of waste diversion plans.
- .2 Recycling Certification Institute (RCI)
 - .1 RCI Certification Construction and Demolition Materials Recycling

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the Project, and ensure that requirements of the Construction Waste Management Plan are followed.
- .2 Preconstruction Meeting: Arrange a pre-construction meeting in accordance with Section 01 31 19 - Project Meetings before starting any Work of the Contract attended by the Owner, Contractor, and affected Subcontractor's to discuss the Contractor's Construction Waste Management Plan and to develop mutual understanding of the requirements for a consistent policy towards waste reduction and recycling.

1.6 QUALITY ASSURANCE

- .1 Resources for Development of Construction Waste Management Report (CWM Report): The following sources may be useful in developing the Draft Construction Waste Management Plan:
 - .1 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.
 - .2 Waste-to-Energy Systems: Investigate local waste-to-energy incentives where systems for diverting materials from landfill for reuse or recycling are not available.
- .2 Certifications: Provide proof of the following during the course of the Work:
 - .1 Compliance Certification: Provide proof that recycling center is third party verified and is listed as a Certified Facility through the registration and certification requirements of the Recycling Certification Institute.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Storage Requirements: Implement a recycling/reuse program that includes separate collection of waste materials as appropriate to the Project waste and the available recycling and reuse programs in the Project area.
- .2 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill does not get mixed in with recycled materials:
 - .1 Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.

- .2 Arrange for collection by or delivery to the appropriate recycling or reuse facility.
- .3 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 HWDSB RFT Document.

1.2 REFERENCE STANDARDS

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

1.3 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.
 - .1 Refer to CCDC 2 and HWDSB RFT Documents for requirements to determine 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.

1.4 FINAL CLEANING

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 HWDSB RFT Document.

1.2 REFERENCE STANDARDS

- .1 Not Used.

1.3 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.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures. Refer to the HWDSB RFT 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.

1.5 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 PDF 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.
- .6 Text: manufacturer's printed data, or typewritten data.
- .7 Drawings: Provide PDF copy.
 - .1 Size: 24x36 in., ARCH D, flattened, B&W.

1.6 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.

1.7 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.

1.8 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.

1.9 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.

1.10 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.

1.11 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.

1.12 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.

1.13 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.

1.14 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Not Used.

1.2 ABBREVIATIONS AND ACRONYMS

- .1 Not Used.

1.3 DEFINITIONS

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

1.4 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM E631, Standard Terminology of Building Constructions
 - .2 ASTM E2018, 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)

1.5 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.

1.6 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.

1.7 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.

1.8 QUALIFICATIONS

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

1.10 SITE INFORMATION

- .1 Site located at Yorkview Elementary School, 86 Cameron Ave, Dundas, Ontario, L9H 1P8, 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

2.1 Not Used

- .1 Not Used.

3 EXECUTION

3.1 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.

3.2 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.

3.3 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

1 GENERAL

1.1 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.
- .2 Refer to Hazardous Building Materials Assessment (Preconstruction) prepared by PINCHIN LTD. before proceeding with demolition and renovation Work.

1.2 RELATED REQUIREMENTS

- .1 Section 02 82 00 – Asbestos Abatement.

1.3 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.

1.4 REFERENCE STANDARDS

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

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Coordinate work of this Section with:
 - .1 Hazardous Building Materials Assessment (Preconstruction) prepared by PINCHIN LTD.
 - .2 Section 26 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.

1.6 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.
- .4 Submit soft copies of the following, when required by the authority having jurisdiction:
 - .1 Reviewed shop drawings;
 - .2 Reviewed demolition procedures.

1.7 QUALITY ASSURANCE

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

1.8 SITE CONDITIONS

- .1 Hazardous Materials are listed in HBMA report completed by PINCHIN LTD.. 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

2.1 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.

2.2 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

3.1 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.

3.2 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.

3.3 DEMOLITION AND REMOVAL REQUIREMENTS

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

3.4 DEMOLITION

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

3.5 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.

3.6 REMOVE AND SALVAGE

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

3.7 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 and Related Work

- .1 Read this Section in conjunction with all drawings and all other Sections so as to comply with the requirements of the General Conditions of the Contract.
- .2 Related work specified elsewhere:
 - .1 Section 02 82 00.01 Asbestos Abatement – Type 1 Procedures
 - .2 Section 02 82 00.02 Asbestos Abatement – Type 2 Procedures
 - .3 Section 02 82 00.04 Asbestos Abatement – Type 2 Glove Bag Method
 - .4 Section 02 83 10 Lead Abatement – Class 1 Procedures
 - .5 Section 02 83 11 Lead Abatement – Class 2 Procedures
- .3 Site Conditions identifies all known hazardous building materials within the Project Area. The information provided is for general reference only. It is recommended each contractor confirm existing conditions on site prior to tender close.
 - .1 The specification fulfils the requirements of Section 30 of the Ontario Occupational Health and Safety Act.
 - .2 The specification fulfils the requirements of the Section 10 of Ontario Regulation 278/05.
- .4 The Outline of Work identifies the location, condition and quantities of hazardous building materials to be removed as part of this project.
 - .1 It is the intent that work prescribed this Section will result in the removal of all hazardous materials as outlined and the decontamination of all surfaces or materials which may have been or become contaminated by hazardous materials either during or prior to work of this Contract.

1.2 Site Conditions

- .1 Refer to the report entitled “Hazardous building Materials Assessment (Preconstruction), Gym Renovation Project, Yorkview Elementary School, 86 Cameron Drive, Hamilton, Ontario”, dated February 5, 2026, prepared by Pinchin Ltd., file number 352293.018.

1.3 Outline of Work

- .1 Coordinate the following items with the Owner’s Project Manager and the Construction Manager, which are to be included in the abatement contractor’s scope of work, including but not limited to: electrical isolations, GFI connection, water connections, HVAC and exhaust ventilation system isolation, bin placement, schedule, disconnects, etc.

- .2 Refer to the Contract Drawings for the extent of construction work and the Work Areas.
- .3 Install Hoarding Walls between Abatement Work Areas and Occupied Areas as required.
- .4 Using Type 1 procedures prescribed in the Section identified in Related Work, remove and dispose of non-asbestos vinyl floor tiles with asbestos-containing mastic in Gym 113 (Location 1032).
- .5 Using Type 2 procedures, with full enclosure, prescribed in the Section identified in Related Work, remove and dispose of asbestos-containing vinyl floor tile mastic using a grinding machine equipped with an efficient HEPA filtered dust collection device in Gym 113 (Location 1032).
 - .1 Remove mastic to bare concrete. Chemical strippers are not allowed.
- .6 Using Type 2 procedures, with full enclosure, prescribed in the Section identified in Related Work, remove and dispose of the following using power tools equipped with an efficient HEPA filtered dust collection device in Gym 113 (Location 1032) and Stage 113B (Location 1033):
 - .1 Transite wall/column panels, transite ceiling tiles, light fixtures, grids, supports, hangers, fibreglass insulation on top of tiles, and all items affixed to transite ceiling tiles where scheduled to be removed.
 - .1 Turn over items removed to owner as required.
 - .2 Items not scheduled for removal and attached to the transite ceilings, are to be disconnected, supported and protected during work.
 - .3 Clean all surfaces above the ceilings.
- .7 Using Glove Bag procedures prescribed in the Section identified in Related Work, remove and dispose of presumed asbestos-containing pipe insulation if present above transite ceiling tiles (include for 25 fittings and 150 linear feet of pipe insulation on straight sections).
 - .1 If for reasons of pipe geometry or access, Glove Bag procedures cannot be used, remove and dispose of asbestos-containing insulations as per Section 02 82 11 for less than 1 square meter, or following Type 3 procedures in accordance with Ontario Regulation 278/05 for greater than 1 square meter.
- .8 Follow lead procedures prescribed in the Section identified in Related Work to remove railings with lead-containing paint and where structural reinforcement may be required.
- .9 Follow mercury procedures when removing all light fixtures and fluorescent light tubes. Place all light fixtures into containers to avoid breakage.
- .10 Refer to Specification Sections identified in the Related Work for specified personnel protective measures for the safe handling, removal, clean-up, enclosure, or repair of hazardous materials in each phase or work area.
- .11 Protect surfaces, building fabrics and items remaining within the Abatement Work Area.

- .12 Without disturbing hazardous materials, perform removals where required, prior to abatement work.
 - .1 Maximize waste diversion by use of resale of building materials, or recycling.
- .13 Isolate the Abatement Work Area from adjoining Occupied and Non-Occupied Areas whether present at an interior or exterior location.
- .14 Maintain emergency and fire exits from Abatement Work Area, or establish alternative exits satisfactory to Provincial Fire Marshall and local authorities having jurisdiction. Maintain extra routes from occupied areas. Place emergency exit signs at locations to clearly mark exit route. Seal emergency exit doors so as not to impede use of door during emergency evacuation.
- .15 Remove, clean, store and replace at completion of work, non-operating mechanical and electrical equipment, ducts, building components, materials or items removed to accommodate asbestos removal.
- .16 Remove and dispose of as appropriate waste, building components, materials and items contaminated by hazardous materials that cannot be effectively cleaned.
- .17 Encapsulate remaining hazardous materials at locations where removal is deemed impractical by the Abatement Consultant.
- .18 Encapsulation will not be permitted where removal of building materials or structures scheduled for demolition will facilitate access to the asbestos materials in question.
- .19 Final clean work area to remove visible signs of asbestos and other hazardous materials, other debris or settled dust.
- .20 Apply lock-down agent to exposed surfaces throughout the work area and to surfaces from which any hazardous materials have been removed.
 - .1 Do not apply lock-down to materials which would be damaged by its application.
- .21 Unless otherwise specified, the handling, removal, clean-up or repair of hazardous materials or surfaces contaminated with hazardous materials is to be performed following wet removal techniques.

1.4 Schedule

- .1 Provide necessary manpower, supervision, equipment and materials to maintain and complete the project on schedule.
- .2 Work Hours:
 - .1 Coordinate all work, scheduling and phasing with the Owner.
 - .2 Duration for which HVAC systems may remain shutdown to accommodate quiet hours work will vary in accordance with outside weather conditions and internal

demand. Duration of quiet hours work will have to be scheduled accordingly and in consultation with the Abatement Consultant and Owner.

- .3 Provide 48 hours written notice to the Abatement Consultant of any request to work outside normal working hours. Obtain written approval before proceeding.

1.5 Definitions

- .1 Abatement Consultant: Owner's Representative providing inspection and air monitoring.
- .2 Abatement Contractor: Contractor or sub-contractor performing work of this section.
- .3 Abatement Work Area: Area where work takes place which will, or may, disturb hazardous materials.
- .4 Amended Water: Water with wetting agent added for the purpose of reducing surface tension to allow thorough wetting of materials.
- .5 Asbestos: Any of the fibrous silicates defined in Regulation 278/05 including: actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite.
- .6 Asbestos-Containing Material (ACM): Material identified under Site Conditions including any debris, overspray, fallen material and settled dust.
- .7 Authorized Visitors: Building Owner, Abatement Consultant, or designated representative, and persons representing regulatory agencies.
- .8 Competent Worker: A worker who is qualified because of knowledge, training and experience to perform the work, is familiar with Regulation 278/05 and the Occupational Health and Safety Act and has knowledge of the potential or actual danger to health and safety in the work.
- .9 Contaminated Waste: Material identified under Site Conditions, including fallen material, settled dust, other debris and materials or equipment deemed to be contaminated by the Abatement Consultant.
- .10 Curtained Doorway: Doorway consisting of two (2) overlapping flaps of rip-proof polyethylene arranged to permit ingress and egress from one room to another while permitting minimal air movement between rooms.
- .11 DOP Test: A testing method used to determine the integrity of the Negative Pressure unit or vacuum using a Dispersed Oil Particulate (DOP) or Poly Alpha Olefin (PAO) HEPA filter leak test. This test is to be conducted on site where units are to be installed. Refer to the Environmental Abatement Council of Canada (EACC) DOP/PAO Testing Guideline 2013 or ANSI/ASME N510-2007.
- .12 Fitting: Individual segments or pieces of a mechanical service line which may include but is not limited to the hangers, tees, elbows, joints, valves, unions, etc.
- .13 Friable Material: Material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered.

- .14 HEPA: High Efficiency Particulate Aerosol filter that is at least 99.97 percent efficient in collecting a 0.3 micrometre aerosol.
- .15 Lead-Containing: The Ontario Ministry of Labour (MOL) has not established a lower limit for concentrations of lead in paint, below which precautions do not need to be considered during construction projects. Pinchin follows the recommendations of the Environmental Abatement Council of Canada (EACC) Lead Guideline for Construction, Renovation, Maintenance or Repair. The Guideline suggests that 0.1% (1,000 ppm) lead in paint represents a de minimis concentration of lead in paint for construction hygiene purposes, that is a concentration below which the lead content is not the limiting hazard in any disturbance of leaded paint for non-aggressive disturbance of painted finishes, (hand powered demolition, chipping, scraping, light sanding, etc.).
- .16 Lead Waste: Waste generated from removal of lead-containing materials, or the substrate and paint finish where left intact.
- .17 Mercury Waste: Equipment, materials or items containing mercury or contaminated with mercury.
- .18 Milestone Inspection: Inspection of the Abatement Work Area at a defined point in the abatement operation.
- .19 Negative Pressure: A reduced pressure within the Abatement Work Area (> 0.02 inches of water column) established by extracting air directly from Abatement Work Area and discharging it to exterior of building.
- .20 Non-Friable Material: Material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
- .21 Occupied Area: Any area of the building or adjoining space outside the Abatement Work Area.
- .22 Personnel: All Contractor's employees, sub-contractors employees, supervisors.
- .23 PCM: Phase Contrast Microscopy.
- .24 Remove: Remove means remove and dispose of (as applicable type of waste) unless followed by other instruction (e.g. remove and turn over to Owner).
- .25 TEM: Transmission Electron Microscopy.

1.6 Regulations and Guidelines

- .1 Comply with Federal, Provincial, and local requirements, provided that in any case of conflict among those requirements or with these Specifications, the more stringent requirements shall apply. Work shall be performed under regulations in effect at the time work is performed.
- .2 Where regulations are not present, follow accepted industry standards and applicable Guideline documents.

- .3 Regulations and Guidelines include but are not limited to the following:
 - .1 Ministry of Labour Occupational Health and Safety Act Regulations for Construction Projects including Revised Statutes of Ontario 1990, Chapter 0.1 and Ontario Regulation 278/05.
 - .2 Ministry of the Environment and Climate Change Regulation for the disposal of waste, including R.R.O. 1990, Reg. 347 as amended.
 - .3 PCB Regulations, SOR 2008-273 and R.R.O. 1990, Reg 362.
 - .4 Regulation 490/09 Designated Substances.
 - .5 Environmental Abatement Council of Canada (EACC), Lead Guideline For Construction, Renovation, Maintenance or Repair, February 2025.
 - .6 Ministry of Labour, Guideline, Silica on Construction Projects, 2011.

1.7 Quality Assurance

- .1 Removal and handling of hazardous materials is to be performed by persons trained in the methods, procedures and industry practices for Abatement.
- .2 Ensure work proceeds to schedule, meeting all requirements of this Specification.
- .3 Complete work so that at no time airborne dust, visible debris, or water runoff contaminate areas outside the Abatement Work Area.
- .4 Any contamination of surrounding area (indicated by visual inspection or air monitoring) shall necessitate the clean-up of affected area, and in the same manner applicable to an Abatement Work Area at no cost to the Owner.
- .5 All work involving electrical, mechanical, carpentry, glazing, etc., shall be performed by licensed persons experienced and qualified for the work required.

1.8 Supervision

- .1 Provide on site for each work shift, a Shift Superintendent(s), who has authority regarding all aspects related to manpower, equipment and production.
- .2 At all times during work, the Shift Superintendent(s) must be on site. Failure to comply with this requirement will result in a stoppage of all work, at no cost to the Owner.
- .3 Replace supervisory personnel, with approved replacements, within three (3) working days of a written request from the Owner. Owner reserves the right to request replacement of supervisory personnel without explanation.
- .4 Do not replace supervisory personnel without written approval from the Owner.

1.9 Instruction and Training

- .1 Instruction and training must be provided by a competent person.
- .2 All workers completing Type 1, 2 or 3 asbestos abatement must be trained in compliance with Section 19 of O.Reg. 278/05.
 - .1 For Type 3 asbestos abatement, workers must be trained and certified per Section 20 of O.Reg. 278/05.

1.10 Notification

- .1 Before commencing work, notify orally and in writing, an inspector at the office of the Ontario Ministry of Labour nearest the project site, where required.
- .2 Inform all trades on site of the presence and location of hazardous materials identified in the Contract documents.
- .3 Notify the Owner or Owner's Representative, the Joint Occupational Health and Safety Committee and the Provincial Ministry of Labour, if suspected asbestos-containing materials not identified in the contract documents are discovered during the course of the work. Stop work in these areas immediately.
- .4 Notify Sanitary Landfill site as per O.Reg. 347/90 as amended.

1.11 Submittals

- .1 Submit prior to starting work:
 - .1 Provincial Workers' Compensation Board Clearance Certificate.
 - .2 Insurance certificates.
 - .3 Copy of Company Health and Safety Policy and applicable programs.
 - .4 Ministry of Labour Notice of Project form.
 - .5 Copy of Certificate of Approval for disposal of hazardous materials waste and location of landfill.
 - .6 Pre-removal damage survey of the Abatement Work Area(s), waste transport routes, and bin storage areas
- .2 Submit the following information regarding personnel prior to starting work:
 - .1 Proof in the form of a certificate that supervisory personnel have attended a training course on asbestos removal or are certified as supervisors under the Ministry of Training, Colleges and Universities course 253S.
 - .2 Written statement that personnel have had instruction on hazards of exposure to hazardous materials identified within this scope, the use of respirator, protective clothing, worker and waste decontamination procedures, and all aspects of work procedures and protective measures.

- .3 WHMIS training certificates for all personnel.
- .4 Certificate proving that each worker on site has been fit tested for the respirator appropriate for the work being performed.
- .5 Proof of training for the following site specific hazards or conditions identified:
 - .1 Working at Heights
- .3 Elevated Work Platform. Submit the following information regarding HEPA filtered devices prior to construction of enclosure or asbestos abatement:
 - .1 Performance data on HEPA filtered vacuums including DOP tests no more than 3 months old.
 - .2 Performance data on negative air units including DOP tests which must be no more than 3 months old if the unit is vented outdoors or which must be performed on site immediately prior to initial usage and when HEPA filters are changed if the unit is vented indoors.
 - .3 DOP tests to be performed by an independent testing company.
 - .1 DOP testing company is required to submit a detailed technical report of testing protocol, including Introduction, Methodology, Results, Conclusions, and Recommendations, including results of the Air-Aerosol Mixing Uniformity test as per ASME N510-1989 (1995).
 - .2 DOP testing company must also provide calibration certificates from an independent calibration firm or from the manufacturer of the testing equipment for both the aerosol photometer and the pressure gauge on the aerosol generator dated within 1 calendar year from the on-site testing date.
 - .3 DOP testing company must also provide the National Sanitation Foundation (NSF) certification name and number of the on-site technician performing the testing.
 - .4 Proof of calibration of DOP testing equipment.
- .4 Submit the following prior to isolating the work area:
 - .1 Safety Data Sheets for chemicals or material used in the course of the Abatement Project.
- .5 Submit the following upon completion of the work.
 - .1 Manifests, waybills, bills of lading etc. as applicable for each type of waste.

1.12 Inspection

- .1 From commencement of work until completion of clean-up operations, the Abatement Consultant is empowered by the Owner to inspect for compliance with the requirements of governing authorities, adherence to specified procedures and materials, and to inspect for final cleanliness and completion.

- .2 The Abatement Consultant is empowered by the Owner to order a shutdown of work when leakage of asbestos from the controlled work area has occurred or is likely to occur.
- .3 Any deviation from the requirements of the Specifications or governing authorities that is not approved in writing may result in a stoppage of work, at no cost to the Owner.
- .4 Additional labour or materials expended by the Contractor to rectify unsatisfactory conditions and to provide performance to the level specified shall be at no additional cost to the Owner.
- .5 Inspection and air monitoring performed as a result of Contractor's failure to perform satisfactorily regarding quality, safety, or schedule, shall be back-charged to the Contractor.
- .6 Facilitate inspection and provide access as necessary. Make good work disturbed by inspection and testing at no cost to the Owner.
- .7 Refer to the Sections identified in Related Work for specified milestone inspections which are to take place at defined points throughout the abatement operation specific to each phase or work area.
- .8 Provide 24 hours written notice to the Abatement Consultant of any request for scheduling of milestone inspections or transportation of waste through Occupied Areas.
- .9 The following Milestone Inspections may take place, at the Owner's cost, as outlined in each related specification section:
 - .1 Milestone Inspection - Clean Site Preparation
 - .1 Inspection of preparations and set-up prior to contaminated work in the Abatement Work Area.
 - .2 Milestone Inspection – Bulk Removal Inspection
 - .1 Inspection during asbestos removal, monitoring removal methods, site deficiencies, performing occupied air monitoring, etc.
 - .3 Milestone Inspection - Visual Clearance
 - .1 Inspection of Abatement Work Area after completion of all abatement, but prior to application of lock-down agents or dismantling of enclosure.
- .10 Refer to the Sections identified in Related Work for specified milestone inspections which are to take place at defined points throughout the abatement operation specific to each phase or work area.
- .11 Do not proceed with next phase of work until written approval of each milestone is received from the Abatement Consultant.

1.13 Air Monitoring - Asbestos

- .1 Air monitoring will be performed using Phase Contrast Microscopy (PCM) following the National Institute for Occupational Safety and Health Method 7400.

- .2 Co-operate in the collection of air samples, including providing workers to wear sample pumps for up to full-shift periods. Contractor will be responsible for the cost of testing equipment repairs or resampling resulting from the actions of the Contractor's forces.
- .3 Results of PCM samples at or exceeding 0.05 fibres per cubic centimeter of air (fibre/cc) or greater, outside an Abatement Work Area, or from within the Abatement Work Area during or following Glove Bag Work, will indicate asbestos contamination of these areas. Respond as follows:
 - .1 Suspend work within the adjoining Abatement Work Area until written authorization to resume work has been received from the Abatement Consultant.
 - .2 Isolate and clean area in the same manner applicable to the Abatement Work Area.
 - .3 Maintain work area isolation, and repeat clean-up operations until visual inspection and air monitoring results are at a level equal to that specified.
 - .4 At the discretion of the Abatement Consultant provide additional negative air units at locations specified in response to elevated fibre levels being detected in the Clean Change Room or Occupied Areas.
- .4 Results of PCM samples at or greater than 0.01 fibres per cubic centimeter of air (fibre/cc), collected within the Abatement Work Area enclosure after the site has passed a visual inspection, and an acceptable coat of lock-down agent has been applied, will indicate asbestos contamination of these areas. Respond as follows:
 - .1 Maintain work area isolation and re-clean entire work area. Then apply another acceptable coat of lock-down agent to exposed surfaces throughout the work area.
 - .2 Repeat above measures until visually inspected and air monitoring results are at a level equal to that specified
 - .3 Alternate to items above, the Asbestos Abatement Contractor can pay for analysis of PCM samples by Transmission Electron Microscopy (TEM) at NVLAP accredited laboratory.
 - .1 Enclosure to remain sealed, with negative pressure maintained, and subject to required daily inspections until TEM results are received.
- .5 Additional labour or materials expended by the Contractor to rectify unsatisfactory conditions and to provide performance to the level specified shall be at no additional cost to the Owner.
- .6 Cost of additional inspection and sampling performed as a result of elevated fibre levels in areas outside the Abatement Work Area or from within the work area following completion of work, will be back-charged to the Contractor.

1.14 Worker Protection

- .1 Instruct workers before allowing entry to the Abatement Work Area. Instruction shall include training in use of respirators, dress, showering, entry and exiting from an Abatement Work Area, and all other aspects of work procedures and protective measures.
- .2 Workers shall not eat, drink, chew gum or tobacco, vape or smoke in the Abatement Work Area.
- .3 Workers shall be fully protected at all times when possibility of disturbance of hazardous materials exists.
- .4 Provide soap, towels and facilities for washing of hands and face, which shall be used by all personnel when leaving the Abatement Work Area.
- .5 Respiratory Protection
 - .1 Refer to each particular Section of the Specification for specified type of respiratory equipment specific to each phase or work area.
 - .2 Respirators shall be:
 - .1 Certified by the National Institute of Occupational Safety and Health (NIOSH) or other testing agency acceptable to the Ministry of Labour.
 - .2 Fitted so that there is an effective seal between the respirator and the worker's face. Ensure that no person required to enter an Abatement Work Area has facial hair which affects the seal between respirator and face.
 - .3 Assigned to a worker for their exclusive use.
 - .4 Maintained in accordance with manufacturer's specifications.
 - .5 Cleaned, disinfected and inspected by a competent person after use on each shift, or more often if required.
 - .6 Repaired or have damaged or deteriorated parts replaced.
 - .7 Stored in a clean and sanitary location.
 - .8 Provided with new filters as necessary, according to manufacturer's instructions.
 - .9 Worn by personnel who have been fit checked by qualitative or quantitative fit-testing.
 - .10 Instruction on proper use of respirators must be provided by a competent person as defined by the Occupational Health and Safety Act.
 - .3 Provide protective clothing, to all personnel which:
 - .1 Is made of a material that does not readily retain nor permit penetration of asbestos fibres or lead/silica dust.
 - .2 Consists of head covering and full body covering that fits snugly at the ankles, wrists and neck.
 - .3 Once coveralls are worn, treat and dispose of as contaminated waste.
 - .4 Is replaced or repaired if torn or ripped.
 - .4 Use hard hats, safety footwear and other protective equipment and apparel required by applicable construction safety regulations.

1.15 Visitor Protection

- .1 Provide clean protective clothing and equipment to Authorized Visitors.
- .2 Instruct Authorized Visitors in the use of protective clothing and Abatement Work Area entry and exit procedures.
- .3 Authorized visitors are required to be fit tested on respirators, prior to entering Abatement Work Area.
 - .1 Respirator worn must be compliant with Section 13 and Table 2 of O.Reg. 278/05.

1.16 Signage

- .1 Asbestos Abatement Signs: Post signs at access points to the Abatement Work Area, stating at minimum, the following:
 - .1 There is an asbestos dust hazard.
 - .2 Access to the work area is restricted to persons wearing protective clothing and equipment.
- .2 Lead Abatement Signs: Post signs at access points to the Abatement Work Area, stating at minimum, the following:
 - .1 There is a lead dust, fume or mist hazard.
 - .2 Access to the work area is restricted to authorized persons.
 - .3 Respirators must be worn in the work area.
- .3 Vehicles, Bins and Asbestos Waste Containers: Post signs on both sides of every vehicle used for the transportation of asbestos waste and on every asbestos waste container. Signs must display thereon in large, easily legible letters that contrast in colour with the background the word “CAUTION” in letters not less than ten centimetres in height and the words:
 - .1 CONTAINS ASBESTOS FIBRES
 - .2 Avoid Creating Dust and Spillage
 - .3 Asbestos May be Harmful To Your Health
 - .4 Wear Approved Protective Equipment.
- .4 Place placards in accordance with Transportation of Dangerous Goods Act.

1.17 Waste and Material Handling

- .1 Waste bins must be placed on grade or in receiving.

- .2 All bins for hazardous materials must be covered and locked when waste transfer is not being performed.
- .3 Ensure redundant non-ACM, rubble, debris, etc. removed during contaminated work are treated, packaged, transported and disposed of as appropriate waste.
- .4 Clean, wash and apply Post Removal Sealant to metal waste prior to removal from Abatement Work Area. Recycle metals.
- .5 Clean, wash and apply Post Removal Sealant to non-porous materials prior to disposal as clean waste. Obtain prior written approval from the Abatement Consultant for each individual type of material.
- .6 Clean and wash equipment prior to removal from Abatement Work Area if removed prior to completion.
- .7 Place all equipment, tools and unused materials that cannot be cleaned in Abatement Waste Containers.
- .8 As work progresses, and at regular intervals, transport the sealed and labelled waste containers from the Abatement Work Area to waste bin.
- .9 Place items in bins according to waste classification. Place asbestos waste, metals, non-asbestos waste, etc. in separate bins.
- .10 Removal of waste containers and decontaminated tools and materials from the Abatement Work Area shall be performed as follows:
 - .1 Remove any visible contamination from the surface of non-porous or cleanable waste being removed from the Abatement Work Area. If the item can be cleaned, remove it from the site as clean waste.
 - .2 Place waste or item in Waste Container and seal closed.
 - .3 Wet wipe outside of Waste Container.
 - .4 Within Decontamination Facility, Transfer Room or at the perimeter of the Abatement Work Area, place in second Waste Container. Seal closed.
 - .5 Remove waste containers and transport to appropriate bin.
- .11 Transport waste and materials via the predetermined routes and exits. Arrange waste transfer route with Owner. Use a closed, covered cart to transport through Occupied Areas.
- .12 Provide workers transporting waste with means to access full personal protective equipment and all tools required to properly clean up spilled material in the case of a rupture of a Waste Container.
- .13 Pick-up and drop off of garbage bin shall be at pre-approved times, and must not interfere with the Owners operations.

- .14 Transport hazardous waste to landfill or waste transfer station licensed by the provincial Ministry of the Environment.
- .15 Cooperate with the provincial Ministry of the Environment inspectors and immediately carry out instructions for remedial work at dump to maintain environment, at no additional cost to the Owner.

1.18 Re-establishment of Objects and Systems

- .1 Re-establish objects and items relocated by the Contractor's workforce to facilitate work.
- .2 Re-establish electrical, communication, HVAC and other services previously disconnected or otherwise isolated to accommodate work by this Section.
- .3 Make good at completion of work, all damage not identified in pre-removal survey.

PART 2 PRODUCTS AND FACILITIES

2.1 Materials and Equipment

- .1 Refer to the Sections identified in Related Work for specified materials, equipment or facilities specific to each phase or work area.
- .2 Materials and equipment must be in good condition and free of debris and fibrous materials. Disposable items must be of new materials only.
- .3 Airless Sprayer: AC powered pressure washer that allows wetting agent to mix with water, uses no air or compressed air, and has a nozzle to regulate power and pressure.
- .4 Amended Water: Water with wetting agent added for purpose of reducing surface tension to allow thorough wetting of materials.
- .5 Asbestos Waste Container: A container acceptable to disposal site, Ministry of the Environment, and Ministry of Labour, comprised of the following:
 - .1 Dust tight.
 - .2 Suitable for the type of waste.
 - .3 Impervious to asbestos.
 - .4 Identified as asbestos waste.
- .6 Discharge Ducting: Polyethylene Tubing. Reinforced with wire. Diameter to equal negative pressure machine discharge. Not to be longer than required, or so long that negative pressure is compromised.
- .7 Ground Fault Panel: Electrical panel as follows:
 - .1 Ground fault circuit interrupters of sufficient capacity to power temporary electrical equipment and lights in Asbestos Work Area.

- .2 Interrupters to have a 5 mA ground fault protection.
- .3 Necessary accessories including main switch disconnect, ground fault interrupter lights, test switch to ensure unit is working, and reset switch.
- .4 Openings sealed to prevent moisture or dust penetration.
- .5 Inspected by the Electrical Safety Authority.
- .6 Panel uses CSA approved parts and been constructed, inspected and installed by a licensed electrician.
- .7 Provide one Ground Fault Panel for each 5,000 square feet (500 square metres) of Abatement Work Area.
- .8 HEPA Filtered Negative Pressure Machine: Portable air handling system which extracts air directly from the Abatement Work Area and discharges the air to the exterior of the building. Equipped as follows:
 - .1 Prefilter and HEPA filter. Air must pass HEPA filter before discharge.
 - .2 Pressure differential gauge to monitor filter loading.
 - .3 Auto shut off and warning system for HEPA filter failure.
 - .4 Separate hold down clamps to retain HEPA filter in place during change of prefilter.
- .9 HEPA Vacuum: Vacuum with necessary fittings, tools and attachments. Discharged air must pass through a HEPA filter.
- .10 Hose: Leak-proof, minimum bursting strength of 500 PSI or greater if required, abrasion resistant covering, reinforcing, and machined-brass couplings. Maintained and tested. Hose to be temperature resistant if it is to carry domestic hot water.
- .11 Lead Waste Container: An impermeable container acceptable to disposal site and Ministry of the Environment, that is:
 - .1 Dust tight.
 - .2 Suitable for the type of waste.
 - .3 Evaluated for leachable lead content, and disposed of in accordance with applicable regulations.
 - .1 Where lead waste exceeds 5.0 mg/L of lead in the TCLP analysis, label as lead waste and dispose of as leachate toxic hazardous waste.
 - .2 Where lead waste is below 5.0 mg/L of lead in the TCLP analysis, disposed of as construction waste.
- .12 OSB: Oriented Strand Board.

- .13 Polyethylene Sheeting: 6 mil (0.15 mm) minimum thickness unless otherwise specified, in sheet size to minimize joints.: 6 mil (0.15 mm) minimum thickness unless otherwise specified, in sheet size to minimize joints.
- .14 Post Removal Sealant (or Lockdown): Sealant that when applied to surfaces serves the function of trapping residual asbestos fibres or other dust. Product must have flame spread and smoke development ratings both less than 50. Product shall leave no stain when dry. Post Removal Sealant shall be compatible with replacement insulation or fireproofing where required and capable of withstanding service temperature of substrate. Apply to manufacturer's instructions.
- .15 Protective Clothing: Disposable coveralls complete with head covering and full body covering that fits snugly at the ankles, wrists and neck.
- .16 Rip-Proof Polyethylene Sheeting: 8 mil (0.20 mm) fabric made up from 5 mil (0.13 mm) weave and two (2) layers of 1.5 mil (0.05 mm) poly laminate or approved equal. In sheet size to minimize on-site seams and overlaps.
- .17 Sprayer: Garden type portable manual sprayer or water hose with spray attachment if suitable.
- .18 Tape: Duct tape or tape suitable for sealing polyethylene to surfaces under both dry and wet conditions in the presence of Amended Water.
- .19 Wetting Agent: Non-sudsing surfactant added to water to reduce surface tension and increase wetting ability.

PART 3 EXECUTION

- .1 Refer to the Sections identified in Related Work for specified procedures for work area preparation, maintenance, site dismantlement, application of lock-down agent and all other procedures for the safe handling, removal and clean-up of hazardous materials specific to each phase or work area.

END OF SECTION

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PART 1 GENERAL

1.1 General and Related Work

- .1 Read this Section in conjunction with all drawings and all other Sections so as to comply with the requirements of the General Conditions of the Contract.
- .2 Requirements specified elsewhere:
 - .1 Section 02 81 00 Hazardous Materials – General Provisions

1.2 Outline of Work

- .1 Refer to Section 02 81 00 Hazardous Materials – General Provisions for the Outline of Work.
- .2 The intent of this Section is to provide safe work practices and procedures to govern the handling, removal, clean-up and disposal of asbestos-containing materials following Type 1 or Low Risk procedures, and Pinchin and Owner specific requirements.

1.3 Personal Protection

- .1 Protect all personnel at all times when possibility of disturbance of ACM exists.
 - .1 Provide non-powered half-face respirators with P100 high efficiency (HEPA) cartridge filters when requested by personnel.
 - .2 When requested by personnel, provide protective clothing.
- .2 Provide protective clothing, to all personnel entering the Abatement Work Area.
- .3 Wear hard hats, safety shoes and other personal protective equipment required by applicable construction safety regulations.

1.4 Inspections

- .1 Refer to Section 02 81 00 – General Provisions.
- .2 The following Milestone Inspections are to be scheduled:
 - .1 Milestone Inspection - Clean Site Preparation
 - .2 Milestone Inspection – Bulk Removal Inspection
 - .3 Milestone Inspection - Visual Clearance

PART 2 PRODUCTS AND FACILITIES

- .1 Refer to Section 02 81 00.

PART 3 EXECUTION

3.1 Site Preparation

- .1 Remove stored or non-fixed items from the Abatement Work Area including but not limited to equipment, furniture, waste etc. Store in area provided by Owner.
- .2 Moving of equipment, tools, supplies, and stored materials that can be performed without disturbing ACM will be performed by others.
- .3 Remove visible dust and friable material from all surfaces in the work area including those to be worked on, using HEPA Vacuums or wet wiping.
- .4 Install one layer of polyethylene sheeting on walls, floors, finishes, millwork, electrical equipment, equipment and furnishings remaining in the Abatement Work Area.

- .5 Install polyethylene sheeting on openings in walls and floors (as required) and seal.
- .6 Install signage in clearly visible locations and in sufficient numbers to adequately warn of an asbestos dust hazard.
- .7 Isolate, at panel, and disconnect existing power supply to Abatement Work Area. Power supply to remaining areas of building must not be disrupted during work of this section.
 - .1 Lock-out/tag-out power at electrical panels.
 - .2 Mark/tag any items within or passing through the Abatement Work Area that are to remain live including but not limited to cable, conduit, wire, fixtures, equipment panels, etc.
- .8 Provide power from ground fault interrupt circuits.
- .9 Shut down HVAC systems serving the Abatement Work Area.
 - .1 Install polyethylene sheeting over openings in ducts and diffusers and seal.
 - .2 HVAC to remaining areas of building must not be disrupted during work of this section.
 - .3 System shall remain inoperative until completion of work, unless ducts can be effectively capped.
 - .4 Perform work at scheduled times after shutting down HVAC systems affecting the Abatement Work Area.
- .10 Provide amended water for wetting ACM, and adequate method of wetting (garden sprayers, airless sprayers, etc).
- .11 Without disturbing asbestos-containing materials, remove and dispose of non-hazardous materials as clean waste prior to asbestos removal work, where possible.

3.2 Maintenance of Abatement Work Area

- .1 Inspect polyethylene sheeting and ensure it is effectively sealed and taped. Repair damage and remedy defects immediately.
- .2 Inspect electrical panels and ensure locks and tags are on panels prior to entering the Abatement Work Area.
- .3 Maintain Abatement Work Area in tidy condition.
- .4 Remove any standing water on polyethylene/floor at the end of every shift.
- .5 Turn off water supply to any hoses and reduce pressure in hose, prior to leaving the Abatement Work Area at end of shift.

3.3 Asbestos Removal - General

- .1 Do not use powered tools or non-hand held tools.
- .2 Do not use compressed air to clean or remove dust or debris.
- .3 Do not break, cut, drill, abrade, grind, sand or vibrate ACM if it cannot be wetted. Type 2 procedures would be required if the material cannot be wetted due to hazard or damage.
- .4 Wet ACM prior to work and keep ACM wet throughout the removal process.
- .5 Frequently and at regular intervals during the work, clean up dust and waste using HEPA vacuums and/or wet sweeping or mopping.
- .6 Frequently and at regular intervals, place all waste in asbestos waste containers.

- .7 Immediately upon completion of work, clean area with HEPA vacuum and/or wet sweeping or mopping.

3.4 Asbestos Removal - Vinyl Asbestos Tile

- .1 Wedge a heavy duty scraper in seam of two adjoining tiles and gradually force edge of one tile up and away from floor. Do not break off pieces of tile, but continue to force balance of tile up.
- .2 Place tile, without breaking into smaller pieces, into Asbestos Waste Container.
- .3 Force scraper through tightly adhered areas by striking scraper handle with a hammer.
- .4 Heat tile thoroughly with a hot air gun until heat penetrates through tile and softens adhesive in areas where scraper will not remove tile.
- .5 Deposit asbestos waste disposal bag.
- .6 HEPA vacuum floor on completion of work in area.

3.5 Abatement Work Area Dismantling

- .1 Wash or HEPA vacuum equipment and tools used in contaminated Abatement Work Area to remove all asbestos contamination, or place in Asbestos Waste Containers prior to being removed from Abatement Work Area.
- .2 Place tools and equipment used in contaminated work site but not cleaned in polyethylene bags prior to removal from Abatement Work Area.
- .3 Clean polyethylene sheeting and drop sheets which with HEPA vacuum or wet cleaning methods at completion of work.
- .4 Wet drop sheets and polyethylene sheeting.
- .5 Carefully roll polyethylene sheeting and drop sheets toward the centre. As polyethylene is rolled away, immediately remove visible debris beneath with a HEPA vacuum.
- .6 Remove remaining polyethylene sheeting and tape.
- .7 Place polyethylene sheeting, drop sheets, tape, disposal clothing and other contaminated waste in asbestos waste containers, wet wipe and place in second asbestos waste container.

3.6 Waste and Material Handling

- .1 Refer to Section 02 81 00.

END OF SECTION

PART 1 GENERAL

1.1 General and Related Work

- .1 Read this Section in conjunction with all drawings and all other Sections so as to comply with the requirements of the General Conditions of the Contract.
- .2 Requirements specified elsewhere:
 - .1 Section 02 81 00 Hazardous Materials – General Provisions

1.2 Outline of Work

- .1 Refer to Section 02 81 00 Hazardous Materials – General Provisions for the Outline of Work.
- .2 The intent of this Section is to provide safe work practices and procedures to govern the handling, removal, clean-up and disposal of asbestos-containing materials following Type 2 or Moderate Risk procedures, and Pinchin and Owner specific requirements.

1.3 Personal Protection

- .1 Protect all personnel at all times when possibility of disturbance of ACM exists.
- .2 Provide the following minimum respiratory protection to all personnel:
 - .1 Full face respirators with P100 high efficiency (HEPA) cartridge filters, for:
 - .1 Removal of all or part of a ceiling if asbestos is likely lying on the surface.
 - .2 Use of a HEPA filtered power tool on non-friable ACM if the material is not wetted.
 - .2 Non-powered half-face respirators with P100 high efficiency (HEPA) cartridge filters.
- .3 Provide protective clothing, to all personnel entering the Abatement Work Area.
- .4 Wear hard hats, safety shoes and other personal protective equipment required by applicable construction safety regulations.

1.4 Inspections

- .1 Refer to Section 02 81 00 – General Provisions.
- .2 The following Milestone Inspections are to be scheduled:
 - .1 Milestone Inspection - Clean Site Preparation
 - .2 Milestone Inspection – Bulk Removal Inspection
 - .3 Milestone Inspection - Visual Clearance

PART 2 PRODUCTS AND FACILITIES

- .1 Refer to Section 02 81 00.

2.2 Hoarding Walls

- .1 Type A Hoarding Wall: One layer of rip-proof polyethylene sheeting installed floor to ceiling, secured with telescopic poles, clips, or other suitable methods.

2.3 Transfer Room

- .1 Transfer Room to be generally 2000 mm x 2000 mm x 2200 mm high. Increase size

accordingly to accommodate number of workers.

- .2 Install walls as follows:
 - .1 Install 38 x 89 mm wood framing at 610 mm o/c with continuous top and sill plates.
 - .2 Install one layer rip-proof polyethylene sheeting on interior walls of Transfer Room.
- .3 Install one layer of rip-proof polyethylene sheeting over two layers of 6 mil polyethylene sheeting beneath entire Transfer Room.
- .4 Install one layer rip-proof polyethylene sheeting over roof.
- .5 Turn 600 mm of polyethylene down the sides over polyethylene on the perimeter walls.
- .6 Install a fire extinguisher, mount to wall.

2.4 Curtained Doorways

- .1 Construct as follows:
 - .1 Install two flap doors, full width and height of door opening at all doors to Abatement Work Area and both ends of Transfer Room.
 - .2 Construct each flap door of two layers of polyethylene sheeting with all edges reinforced with tape. Use wood strapping to securely fasten flap doors to head and alternate jambs.
 - .3 Install weights attached to bottom edge of each door flap.
 - .4 Provide direction arrows on flaps to indicate opening.

PART 3 EXECUTION

3.1 Site Preparation - General

- .1 Remove stored or non-fixed items from the Abatement Work Area including but not limited to equipment, furniture, waste etc. Store in area provided by Owner.
- .2 Moving of equipment, tools, supplies, and stored materials that can be performed without disturbing ACM will be performed by others.
- .3 Remove visible dust and friable material from all surfaces in the work area including those to be worked on, using HEPA Vacuums or wet wiping.
- .4 Isolate, at panel, and disconnect existing power supply to Abatement Work Area. Power supply to remaining areas of building must not be disrupted during work of this section.
 - .1 Lock-out/tag-out power at electrical panels.
 - .2 Mark/tag any items within or passing through the Abatement Work Area that are to remain live including but not limited to cable, conduit, wire, fixtures, equipment panels, etc.
- .5 Provide power from ground fault interrupt circuits.
- .6 Shut down HVAC systems serving the Abatement Work Area.
 - .1 Install polyethylene sheeting over openings in ducts and diffusers and seal.
 - .2 HVAC to remaining areas of building must not be disrupted during work of this section.
 - .3 System shall remain inoperative until completion of work, unless ducts can be effectively capped.

- .4 Perform work at scheduled times after shutting down HVAC systems affecting the Abatement Work Area.

- .7 Provide amended water for wetting ACM, and adequate method of wetting (garden sprayers, airless sprayers, etc).

3.2 Site Preparation –Enclosure Required

- .1 Install polyethylene enclosure complete with Windows at Abatement Work Areas for the following work:
 - .1 Removal of friable asbestos-containing materials (less than 1 square metre).
 - .2 Removal of a false ceiling (or part of) where asbestos-containing material is presumed or known to be present on the surface.
- .2 Install Transfer Room where duration of work is to last longer than one 8 hour shift.
- .3 Seal openings in floor using tape, polyethylene, etc. Floor openings are to be sealed independently prior to installation of floor polyethylene.
- .4 Install polyethylene sheeting on floors of Abatement Work Area. Use sufficient layers to provide adequate protection for carpeting and equipment.
 - .1 Minimum requirement over carpet is one layer of 6 mil polyethylene under one layer of rip-proof polyethylene.
 - .2 Cover floors first so that polyethylene on walls is overlapped by at least 305 mm.
- .5 Construct Type A Hoarding Walls between Abatement Work Area perimeter and occupied areas.
- .6 Install polyethylene sheeting at openings in walls (as required) and seal.
- .7 Install 6 mil polyethylene sheeting on walls within the Abatement Work Area., including existing walls that make up, or are within, the Abatement Work Area.
- .8 Provide a completely sealed polyethylene top for free standing enclosures.
- .9 Extend to underside of ceiling system, enclosures for access into ceilings. Enclosure may be supported from the ceiling system if ceiling can support the polyethylene.
- .10 Install Curtained Doorways.
- .11 Install one layer of 6 mil polyethylene sheeting so as to protect all equipment and finishes in the Abatement Work Area that may be damaged. Items to remain include but are not limited to:
 - .1 Millwork.
 - .2 Doors.
 - .3 Bulkheads.
 - .4 Plumbing fixtures.
 - .5 Electrical Equipment.
 - .6 Mechanical Equipment.
- .12 Install temporary lighting in enclosure to a level that will provide for safe and efficient use of work area - minimum 550 LUX.
- .13 Establish negative pressure in Abatement Work Areas as follows:
 - .1 Provide sufficient HEPA filtered negative pressure machines to exchange a volume of air equivalent to that of the Abatement Work Area a minimum of

- every 20 minutes.
- .2 Provide additional HEPA filtered negative pressure machines as required to ensure air flow from Occupied Area into Abatement Work Area.
- .3 Arrange negative air units to maximize the distance between units and decontamination facilities.
- .4 Provide weighted flaps in perimeter Hoarding Walls as necessary to provide make-up air.
- .5 Operate HEPA filtered negative pressure machines continuously from first disturbance of ACM until completion of dismantling.
- .6 Replace prefilters to maintain specified flow rate.
- .7 Replace HEPA filter as required to maintain flow rate and integrity of unit.
- .8 Discharge HEPA filtered negative air machines as follows:
 - .1 To building exterior.
 - .1 Remove existing glazing where necessary and replace with a 19 mm plywood panel.
 - .2 Install panel securely in window frame so that it cannot be pushed into the building and make weather-tight with caulking.
 - .3 For each negative pressure unit, provide a 300 mm diameter, screened, duct opening through panel.
 - .4 Direct discharge away from building access points.
 - .5 Reinstall glazing to match existing upon completion of work.
 - .2 Into Occupied Areas as required.
 - .1 Install and make airtight all negative air discharge ducting.
 - .2 Use metal reinforced polyethylene discharge ducting in locations where the ducting must be protected from damage or collapse.
- .14 Place required tools to complete the abatement with the Abatement Work Area.
- .15 Install Signage in clearly visible locations and in sufficient numbers to adequately warn of an asbestos dust hazard.

3.3 Asbestos Removal - General

- .1 Do not use compressed air to clean or remove dust or debris.
- .2 Frequently and at regular intervals during the work, clean up dust and waste using HEPA vacuums and/or wet sweeping or mopping.
- .3 Frequently and at regular intervals, place all waste in asbestos waste containers.
- .4 Immediately upon completion of work, clean area with HEPA vacuum and/or wet sweeping or mopping.

3.4 Asbestos Removal – Thermal Systems Insulation (less than 1 Square Metre)

- .1 Construct an enclosure around Abatement Work Area and use the procedures described above under *Site Preparation –Enclosure Required*.
- .2 Adequately wet exterior of the ACM with amended water to suppress dust.
- .3 Remove asbestos-containing mechanical insulations in layers, maintaining all exposed surfaces of insulation in a wet condition.
- .4 Remove wetted ACM directly into waste containers. Do not allow ACM to fall to the

floor of the Abatement Work Area.

- .5 Clean all surfaces from which ACM has been removed with scouring pads, vacuuming or wet-sponging to remove all visible material after completion of removal of ACM.
- .6 Remove visible dust and debris.
- .7 Seal exposed ends of asbestos-containing insulation to remain, with canvas and lagging.
- .8 HEPA vacuum or wet clean entire Abatement Work Area, including any surfaces not covered with polyethylene sheeting. Any materials removed to access ACM that are to be re-used, and any abatement equipment, must be wet cleaned or HEPA vacuumed prior to completion.
- .9 Apply Post Removal Sealant to all surfaces within the Abatement Work Area including those from which ACM has been removed.

3.5 Asbestos Removal - Transite ceiling tiles with HEPA Filtered Power Tools

- .1 Use the procedures described above under *Site Preparation –No Enclosure Required*.
- .2 Wet all material to be disturbed.
- .3 Turn on HEPA vacuum. Vacuum to remain operation throughout work.
- .4 Place removed ACM directly into an asbestos waste container.
- .5 If power tool can disconnect from HEPA vacuum, remove tool, and HEPA vacuum tool and bit, blade, etc, and shrouds.
- .6 Wet clean or HEPA vacuum the entire Abatement Work Area, including surfaces not covered with polyethylene sheeting. Any materials or equipment removed to access ACM that are to be reused, must be wet cleaned or vacuumed prior to reinstatement.

3.6 Asbestos Removal - Flooring Mastic with HEPA Filtered Power Tools and Machines

- .1 Use the procedures described above under *Site Preparation – Enclosure Required*.
- .2 Wet all material to be disturbed.
- .3 Turn on power tool/machine and HEPA dust collection device. HEPA dust collection device to remain operational throughout work.
- .4 Use the power tool/machine to remove all ACM.
- .5 Place removed ACM directly into an asbestos waste container.
- .6 Wet clean or HEPA vacuum the entire Abatement Work Area, including surfaces not covered with polyethylene sheeting. Any materials or equipment removed to access ACM that are to be reused, must be wet cleaned or vacuumed prior to reinstatement.

3.7 Application of Post Removal Sealant

- .1 Apply one coat of Post Removal Sealant with an airless sprayer, in accordance with Manufacturer's Instructions, to cover all surfaces on all items in the Abatement Work Area, including but not limited to polyethylene, ACM substrate, structural steel, and surfaces scheduled for demolition.
- .2 Do not apply post removal sealant to materials that will be damaged by its application.

3.8 Abatement Work Area Dismantling

- .1 Wash or HEPA vacuum equipment and tools used in contaminated Abatement Work Area to remove all asbestos contamination, or place in Asbestos Waste Containers prior

- to being removed from Abatement Work Area.
- .2 Place tools and equipment used in contaminated work site but not cleaned in polyethylene bags prior to removal from Abatement Work Area.
- .3 Clean polyethylene sheeting and drop sheets which with HEPA vacuum or wet cleaning methods at completion of work.
- .4 Wet drop sheets and polyethylene sheeting.
- .5 Carefully roll polyethylene sheeting and drop sheets toward the centre of enclosure. As polyethylene is rolled away, immediately remove visible debris beneath with a HEPA vacuum.
- .6 Remove remaining polyethylene sheeting and tape, and dispose of as asbestos waste.
- .7 Place polyethylene sheeting, drop sheets, tape, disposal clothing and other contaminated waste in asbestos waste containers, wet wipe and place in second asbestos waste container.
- .8 Remove remaining site isolation, seals, tape, etc.
- .9 Remove Transfer Room.
- .10 Remove seals, tape, Signage etc.
- .11 Immediately upon shutting down negative air units, seal air inlet grill and exhaust vent with polyethylene and tape.
- .12 Seal openings in HEPA vacuums.
- .13 Remove and dispose of the pre-filters from HEPA filtered negative pressure machines as asbestos waste.
- .14 Remove HEPA filtered negative pressure machines and discharge ducting or HEPA vacuums.
- .15 Remove temporary lights.
- .16 Remove ground fault panels.
- .17 Place contaminated materials including polyethylene sheeting, drop sheets, seals, tape, disposable coveralls, and other contaminated waste in asbestos waste containers.

3.9 Waste and Material Handling

- .1 Refer to Section 02 81 00.

3.10 Re-Establishment of Items

- .1 Upon completion of work:
 - .1 Move items that were removed from Abatement Work Area prior to work, back into same location within Abatement Work Area.
 - .2 Clean, mop and vacuum Abatement Work Area Decontamination Facilities.
 - .3 Enable building air handling systems.

END OF SECTION

PART 1 GENERAL

1.1 General and Related Work

- .1 Read this Section in conjunction with all drawings and all other Sections so as to comply with the requirements of the General Conditions of the Contract.
- .2 Requirements specified elsewhere:
 - .1 Section 02 81 00 Hazardous Materials – General Provisions

1.2 Outline of Work

- .1 Refer to Section 02 81 00 Hazardous Materials – General Provisions for the Outline of Work.
- .2 The intent of this Section is to provide safe work practices and procedures to govern the handling, removal, clean-up and disposal of asbestos-containing materials following Glove Bag procedures, and Pinchin and Owner specific requirements.
- .3 If for reasons of pipe temperature, geometry or access, Glove Bag procedures cannot be used, remove and dispose of asbestos-containing insulations following Type 2 procedures outlined in Section 02 82 00.02 for less than 1 square meter, or following Type 3 procedures outlined in O.Reg. 278/05 for quantities greater than 1 square meter.

1.3 Personal Protection

- .1 Protect all personnel at all times when possibility of disturbance of ACM exists.
- .2 Provide the following minimum respiratory protection to all personnel:
 - .1 Non-powered half-face respirators with P100 high efficiency (HEPA) cartridge filters.
- .3 Provide protective clothing, to all personnel entering the Abatement Work Area.
- .4 Wear hard hats, safety shoes and other personal protective equipment required by applicable construction safety regulations.

1.4 Inspections

- .1 Refer to Section 02 81 00 – General Provisions.
- .2 The following Milestone Inspections are to be scheduled:
 - .1 Milestone Inspection - Clean Site Preparation
 - .2 Milestone Inspection – Bulk Removal Inspection
 - .3 Milestone Inspection - Visual Clearance

PART 2 PRODUCTS AND FACILITIES

2.1 Materials and Equipment

- .1 Refer to Section 02 81 00.
- .2 Glove Bag: Prefabricated bag which provides a completely sealed envelope surrounding a given section of piping to permit the removal of asbestos-containing insulation from within the bag while maintaining the integrity of the bag and preventing the spread of airborne asbestos fibres. The glove bag shall be equipped with,
 - .1 sleeves and gloves that are permanently sealed to the body of the bag to allow the worker to access and deal with the insulation and maintain a sealed enclosure

- throughout the work period,
 - .2 valves or openings to allow insertion of a vacuum hose and the nozzle of a water sprayer while maintaining the seal to the pipe, duct or similar structure,
 - .3 a tool pouch with a drain,
 - .4 a seamless bottom and a means of sealing off the lower portion of the bag, and
 - .5 a high strength double throw zipper and removable straps, if the bag is to be moved during the removal operation.
- .3 Securing Straps: For some types of Glove Bag, reusable nylon straps at least 25mm wide with metal tightening buckle for sealing ends of bags around pipe and/or insulation.

PART 3 EXECUTION

3.1 Site Preparation - General

- .1 Remove to the extent necessary to access piping, stored or non-fixed items from the Abatement Work Area including but not limited to equipment, furniture, waste etc. Store in area provided by Owner.
- .2 Moving of equipment, tools, supplies, and stored materials that can be performed without disturbing ACM will be performed by others.
- .3 Shut down HVAC systems serving the Abatement Work Area.
 - .1 Install polyethylene sheeting over openings in ducts and at diffusers and seal.
 - .2 HVAC to remaining areas of building must not be disrupted during work of this section.
 - .3 System shall remain inoperative until completion of work, unless ducts can be effectively capped.
 - .4 Perform work at scheduled times after shutting down HVAC systems affecting the Abatement Work Area.
- .4 Install caution tape around work area where existing walls are not present.
- .5 Install Signage in clearly visible locations and in sufficient numbers to adequately warn of an asbestos dust hazard.
- .6 Remove visible dust and friable material from all surfaces in the work area including those to be worked on, using HEPA Vacuums or wet wiping.
- .7 Cover walls, floors, finishes, millwork, equipment and furnishings below the pipe to be worked on in the Abatement Work Area with polyethylene sheets before disturbing ACM. Drop sheets shall extend a minimum of 1,800 mm from pipe.
- .8 Use existing lighting or install temporary lighting to a level that will provide for safe and efficient use of work area - minimum 550 LUX.
- .9 Provide Amended Water for wetting ACM, in garden sprayers. Provide one garden sprayer for each worker.
- .10 Do not used compressed air to clean or remove and dust or debris when completing work of this section.
- .11 Place HEPA Vacuum in Abatement Work Area for each worker.
- .12 Place required tools to complete the abatement within the Abatement Work Area.
- .13 Post Notice of Project, where required by O.Reg. 278/05.

3.2 Maintenance of Abatement Work Area

- .1 Maintain Abatement Work Area in tidy condition.

3.3 Glove Bag Removal

- .1 Do not use Glove Bags on hot pipes that may damage Glove Bag. Refer to manufacturer's limitations.
- .2 Prior to use of Glove Bag on damaged orunjacketed insulation:
 - .1 Spray any areas of damaged insulation jacketing with mist of Amended Water.
 - .2 Tape over damaged insulation to provide temporary repair.
 - .3 Mist areas of insulation with no jacketing and wrap with polyethylene sheeting and seal with tape.
- .3 Place any tools necessary to remove insulation in tool pouch built into Glove Bag.
- .4 Inspect the Glove Bag for damage and defects immediately before it is attached to the pipe or duct.
 - .1 If damage or defects are observed, dispose of Glove Bag.
- .5 Install Glove Bag as per manufacturer's instructions.
- .6 Remove metal jacketing or banding carefully. Do not damage the Glove Bag.
- .7 Remove insulation from pipe as per manufacturer's directions.
 - .1 Volume and weight of insulation must not exceed capacity of the Glove Bag or supports.
 - .2 Arrange insulation in the Glove Bag to maximize use of the Glove Bag.
- .8 Only glove bags designed to be moved may be re-used on other sections of pipe or moved down same section of pipe (e.g. Safe-T-Strip).
- .9 At regular intervals during its use, if damage or defects are observed during the use of the Glove Bag, which cannot be readily repaired with tape and not affect the integrity or strength of the glove bag.
 - .1 Discontinue use of Glove Bag.
 - .2 Wash inner surface of Glove Bag.
 - .3 Wet insulation.
 - .4 Pull an Asbestos Waste Container over Glove Bag before removing from pipe.
 - .5 Remove Glove Bag and Asbestos Waste Container, seal with tape.
 - .6 Place in a second Asbestos Waste Container and seal with tape.
 - .7 Clean immediate area with a HEPA Vacuum prior to resuming work.
- .10 If bag is to be moved along pipe for use on adjacent section of insulation:
 - .1 Wash inner surface of Glove Bag.
 - .2 Wash tools and place tools in pouch.
 - .3 Wet surface of insulation in lower section of bag and any exposed end of asbestos insulation remaining on pipe with Amended Water.
 - .4 Insert nozzle of HEPA filtered vacuum cleaner into bag through valve and evacuate air from bag.

- .5 Seal closure strip.
- .6 Loosen securing straps to maintain a loose seal of Glove Bag to insulation or pipe.
- .7 Use double throw zipper as necessary to pass hangers.
- .8 Tighten straps once bag is in new position and continue insulation removal until Glove Bag is full, work is completed on the pipe or an obstruction prevents further movement of the bag.
- .11 If bag is to be removed from a pipe for use on a new section of pipe, perform the following:
 - .1 Wash inner surface of Glove Bag.
 - .2 Wash tools and place tools in pouch.
 - .3 Wet surface of insulation in lower section of bag and any exposed end of asbestos insulation remaining on pipe with Amended Water.
 - .4 Insert nozzle of HEPA filtered vacuum cleaner into bag through valve and evacuate air from bag.
 - .5 Seal valve cover on valve Glove Bags.
 - .6 Seal closure strip.
 - .7 Wash top section of Glove Bag and tool pouch thoroughly.
 - .8 Undo securing straps, unfasten zipper and carefully move bag to new section of pipe.
- .12 To remove bag after completion of insulation removal operation:
 - .1 Wash inner surface of Glove Bag.
 - .2 Wash and place all tools in one hand (glove), pull hand out inverted, twist to create a separate pouch, tape inverted hand at two separate locations 25 mm apart so as to seal pouch.
 - .1 Remove inverted hand and tools by cutting between the two tape seals.
 - .2 Place inverted hand pouch and tools into the next clean Glove Bag to be used or into a water bucket, open pouch underwater and clean tools.
 - .3 Wet surface of insulation in lower section of bag and any exposed end of asbestos insulation remaining on pipe with Amended Water.
 - .4 Insert nozzle of HEPA filtered vacuum cleaner into bag through valve and evacuate air from bag.
 - .5 Seal valve cover on valve Glove Bags.
 - .6 Seal closure strip if equipped with one. Twist bag at tapered point and secure with tape.
 - .7 Pull an Asbestos Waste Container over Glove Bag before removing from pipe.
 - .1 Undo straps and unzipper, or cut upper portion of single-use Glove Bag.
 - .2 Seal Asbestos Waste Container with tape.
 - .8 Ensure pipe is clean of all residue after removal of Glove Bag. If necessary, after removal of each section of asbestos, vacuum all surfaces of pipe, using HEPA vacuum or wipe with wet cloth.
- .13 Seal all surfaces of freshly-exposed pipe with Post Removal Sealer.
- .14 Cover exposed ends of any remaining asbestos insulation with canvas and lagging using Type 2 Procedures.

3.4 Clean-Up and Dismantling

- .1 Clean and remove from Abatement Work Area:
 - .1 Equipment and tools.
 - .2 Temporary lighting if used.
 - .3 Polyethylene seals from HVAC systems.
- .2 Place polyethylene sheeting, drop sheets, seals, tape, clothing and other contaminated waste in asbestos waste containers, wet wipe and place in second asbestos waste container.
- .3 Clean Abatement Work Area with HEPA vacuums or wet wiping/mopping.
- .4 Seal openings in HEPA vacuums.
- .5 Proceed with the dismantlement of all barricades, etc. following receipt of authorization to proceed from the Asbestos Abatement Consultant.
- .6 Remove barricades, fencing, caution tape, signs, etc.

3.5 Waste and Material Handling

- .1 Refer to Section 02 81 00.

3.6 Re-Establishment of Items

- .1 Upon completion of work:
 - .1 Move all items that were removed from Abatement Work Area prior to work, back into same location within Abatement Work Area.
 - .2 Remove tags and locks from electrical panels and re-energize equipment and items.
 - .3 Enable building air handling systems.
 - .4 Clean and vacuum Abatement Work Area.

END OF SECTION

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PART 1 GENERAL

- .1 Read this Section in conjunction with all drawings and all other Sections so as to comply with the requirements of the General Conditions of the Contract.
- .2 Requirements specified elsewhere:
 - .1 Section 02 81 00 Hazardous Materials – General Provisions

1.2 Outline of Work

- .1 Refer to Section 02 81 00 Hazardous Materials – General Provisions for the Outline of Work.
- .2 The intent of this Section is to provide safe work practices and procedures to govern the handling, removal, clean-up and disposal of lead-containing materials following Class 1 or Low Risk procedures, and Pinchin and Owner specific requirements.
- .3 Comply with requirements of this Section when performing following Work:
 - .1 Removal of lead-containing surface coatings with a chemical gel, stripper or paste.
 - .2 Removal of materials coated with lead-containing surface coatings, using non-powered hand tools, where the materials remains primarily intact, and is not crumbled, pulverized or powdered.

1.3 Instruction and Training

- .1 Provide instruction and training to all workers including the following:
 - .1 Hazards of lead.
 - .2 Use, care and disposal of protective equipment (including but not limited to respirators and filters) and clothing that would be used and worn during abatement work, including:
 - .1 Limitations of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Proper fitting of equipment.
 - .4 Disinfecting and cleaning of equipment.
 - .3 Personal hygiene to be observed when performing the work.
 - .4 The measures and procedures prescribed by this section including decontamination of the worker.
 - .5 Instruction and training must be provided by a competent person.

1.4 Personal Protection

- .1 Provide non-powered half-face respirators with P100 high efficiency cartridge filters when requested by personnel.
- .2 Provide protective clothing, when requested by personnel, entering the Abatement Work Area, including:
 - .1 Disposable protective clothing that does not readily retain or permit skin contamination, consisting of full body covering including head covering with snug fitting cuffs at wrists, ankles, and neck.

- .3 Provide protective clothing, to all personnel entering the Abatement Work Area, including:
 - .1 Dust impermeable gloves appropriate for the work being completed.
- .4 Wear hard hats, safety shoes and other personal protective equipment required by applicable construction safety regulations.
- .5 Lead-specific soaps and hygiene indicators are recommended to be provided for shower and hand-wash stations.

1.5 Inspections

- .1 Refer to Section 02 81 00 – General Provisions.
- .2 The following Milestone Inspections are to be scheduled:
 - .1 Milestone Inspection - Clean Site Preparation
 - .2 Milestone Inspection – Bulk Removal Inspection
 - .3 Milestone Inspection - Visual Clearance

PART 2 PRODUCTS AND FACILITIES

- .1 Refer to Section 02 81 00.

2.2 Hoarding Walls

- .1 Type A Hoarding Wall: One layer of rip-proof polyethylene sheeting installed floor to ceiling, secured with telescopic poles, clips, or other suitable methods.

2.3 Curtained Doorways

- .1 Construct as follows:
 - .1 Install two flap doors, full width and height of door opening at all doors to Abatement Work Area and both ends of Transfer Room.
 - .2 Construct each flap door of two layers of polyethylene sheeting with all edges reinforced with tape. Use wood strapping to securely fasten flap doors to head and alternate jambs.
 - .3 Install weights attached to bottom edge of each door flap.
 - .4 Provide direction arrows on flaps to indicate opening.

PART 3 EXECUTION

3.1 Site Preparation - General

- .1 Provide washing facilities consisting of a wash basin, clean water, soap and towels.
 - .1 Workers are to use washing facilities each time leaving the Abatement Work Area.
- .2 Stored or non-fixed items, including but not limited to equipment, furniture, waste etc., shall be removed from the Abatement Work Area prior to abatement work.
- .3 Isolate, at panel, and disconnect existing power supply to Abatement Work Area. Power supply to remaining areas of building must not be disrupted during work of this section.
 - .1 Lock-out/tag-out power at electrical panels.

- .2 Mark/tag any items within or passing through the Abatement Work Area that are to remain live including but not limited to cable, conduit, wire, fixtures, equipment panels, etc.
- .4 Shut down HVAC systems serving the Abatement Work Area.
 - .1 Install polyethylene sheeting over openings in ducts and diffusers and seal.
 - .2 HVAC to remaining areas of building must not be disrupted during work of this section.
 - .3 System shall remain inoperative until completion of work, unless ducts can be effectively capped.
 - .4 Perform work at scheduled times after shutting down HVAC systems affecting the Abatement Work Area.
- .5 Remove visible dust from all surfaces in the work area including those to be worked on, using HEPA Vacuums or wet wiping.
- .6 Provide amended water for wetting materials, and adequate method of wetting (garden sprayers, airless sprayers, etc.).
- .7 Provide electrical power and shut off for operation of powered tools and equipment. Provide ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard.
 - .1 Ensure safe installation of electrical lines and equipment.
- .8 Do not use compressed air to clean or remove dust or debris.
- .9 Frequently and at regular intervals during the work, clean up dust and waste using HEPA vacuums and/or wet sweeping or mopping.
- .10 Frequently and at regular intervals, place all waste in waste containers.
- .11 Immediately upon completion of work, clean area with HEPA vacuum and/or wet sweeping or mopping.

3.2 Site Preparation – No Enclosure Required

- .1 Isolate Abatement Work Area with barrier tape.
- .2 Protect floor surfaces covered from wall to wall with polyethylene sheets.
- .3 Maintain Abatement Work Area in tidy condition.
- .4 Remove waste and debris frequently.
- .5 Remove standing water on polyethylene/floor at the end of every shift.
- .6 Turn off water supply to hoses and reduce pressure in hose, prior to leaving the Abatement Work Area at end of shift.

3.3 Lead-Containing Paint Abatement

- .1 Removal methods minimizing dust generation should be used wherever possible.
 - .1 Wet methods are to be used to reduce dust generation.
 - .2 Wetting agents should be used where possible.

- .3 Wet methods are not to be used if it creates a hazard or cause damage to equipment or to project.
- .2 Provide drop sheets below all lead operations that may produce dust, chips or debris containing lead.
- .3 Waste water from cleaning or removal operations must be contained, for treatment or disposal.
- .4 Remove lead-containing paint in small sections and pack as it is being removed in sealable lead waste containers.
- .5 Follow manufacturer's instructions for all use of chemical gels, strippers and pastes.
 - .1 Ensure agent neutralizers, were required, are applied.
 - .2 Do not use chemical gels, strippers or pastes on surfaces where they are scheduled to be repainted, and the material affect the new paint application.
- .6 After completion of stripping work, wire brush and wet sponge surface from which lead based paint has been removed to remove visible material. During this work keep surfaces wet.
- .7 After wire brushing and wet sponging to remove visible lead-containing paint, wet clean entire work area, and equipment used in process.
 - .1 Compressed air or dry sweeping not be used to clean up lead-containing dust or waste.
 - .2 Ensure all waste is cleaned and packaged.
- .8 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to staging area. Clean external surfaces thoroughly again by wet sponging. Wash containers thoroughly pending removal to outside.

3.4 Waste Management and Disposal

- .1 Per Section 02 81 00.

3.5 Final Cleaning

- .1 Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum visible lead containing particles observed during cleanup, immediately, using HEPA vacuum.
- .2 Place polyethylene sheets, tape, cleaning material, clothing, and contaminated waste in plastic bags and sealed labelled waste containers for transport.
- .3 Conduct final check to ensure no dust or debris remains on surfaces as result of dismantling operations.

END OF SECTION

PART 1 GENERAL

- .1 Read this Section in conjunction with all drawings and all other Sections so as to comply with the requirements of the General Conditions of the Contract.
- .2 Requirements specified elsewhere:
 - .1 Section 02 81 00 Hazardous Materials – General Provisions

1.2 Outline of Work

- .1 Refer to Section 02 81 00 Hazardous Materials – General Provisions for the Outline of Work.
- .2 The intent of this Section is to provide safe work practices and procedures to govern the handling, removal, clean-up and disposal of lead-containing materials following Class 2 or Moderate Risk procedures, and Pinchin and Owner specific requirements.
- .3 Comply with requirements of this Section when performing following Work:
 - .1 Removal of lead-containing paint using power tools with an effective dust collection system equipped with HEPA filter.
 - .2 Welding, torching or high temperature cutting of lead-containing surface coatings or materials indoors, with use of an effective fume collector or smoke eater.

1.3 Instruction and Training

- .1 Provide instruction and training to all workers including the following:
 - .1 Hazards of lead.
 - .2 Use, care and disposal of protective equipment (including but not limited to respirators and filters) and clothing that would be used and worn during abatement work, including:
 - .1 Limitations of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Proper fitting of equipment.
 - .4 Disinfecting and cleaning of equipment.
 - .3 Personal hygiene to be observed when performing the work.
 - .4 The measures and procedures prescribed by this section including decontamination of the worker.
 - .5 Instruction and training must be provided by a competent person.

1.4 Personal Protection

- .1 Provide the following respiratory protection to all personnel, at minimum:
 - .1 Non-powered half-face respirators with P100 high efficiency cartridge filters.
- .2 Provide protective clothing, to all personnel entering the Abatement Work Area, including:
 - .1 Dust impermeable gloves appropriate for the work being completed.

- .2 Disposable protective clothing that does not readily retain or permit skin contamination, consisting of full body covering including head covering with snug fitting cuffs at wrists, ankles, and neck.
- .3 Provide protective clothing, to all personnel entering the Abatement Work Area.
- .4 Wear hard hats, safety shoes and other personal protective equipment required by applicable construction safety regulations.
- .5 Lead-specific soaps and hygiene indicators are recommended to be provided for hand-wash stations.

1.5 Inspections

- .1 Refer to Section 02 81 00 – General Provisions.
- .2 The following Milestone Inspections are to be scheduled:
 - .1 Milestone Inspection - Clean Site Preparation
 - .2 Milestone Inspection – Bulk Removal Inspection
 - .3 Milestone Inspection - Visual Clearance

PART 2 PRODUCTS AND FACILITIES

- .1 Refer to Section 02 81 00.

2.2 Hoarding Walls

- .1 Type A Hoarding Wall: One layer of rip-proof polyethylene sheeting installed floor to ceiling, secured with telescopic poles, clips, or other suitable methods.

2.3 Transfer Room

- .1 Transfer Room to be generally 2000 mm x 2000 mm x 2200 mm high. Increase size accordingly to accommodate number of workers.
- .2 Install walls as follows:
 - .1 Install 38 x 89 mm wood framing at 610 mm o/c with continuous top and sill plates.
 - .2 Install one layer rip-proof polyethylene sheeting on interior walls of Transfer Room.
- .3 Install one layer of rip-proof polyethylene sheeting over two layers of 6 mil polyethylene sheeting beneath entire Transfer Room.
- .4 Install one layer rip-proof polyethylene sheeting over roof.
- .5 Turn 600 mm of polyethylene down the sides over polyethylene on the perimeter walls.
- .6 Install a fire extinguisher, mount to wall.

2.4 Curtained Doorways

- .1 Construct as follows:
 - .1 Install two flap doors, full width and height of door opening at all doors to Abatement Work Area and both ends of Transfer Room.
 - .2 Construct each flap door of two layers of polyethylene sheeting with all edges reinforced with tape. Use wood strapping to securely fasten flap doors to head

and alternate jambs.

- .3 Install weights attached to bottom edge of each door flap.
- .4 Provide direction arrows on flaps to indicate opening.

PART 3 EXECUTION

3.1 Site Preparation - General

- .1 Provide washing facilities consisting of a wash basin, clean water, soap and towels.
 - .1 Workers are to use washing facilities each time leaving the Abatement Work Area.
- .2 Stored or non-fixed items, including but not limited to equipment, furniture, waste etc., shall be removed from the Abatement Work Area prior to abatement work.
- .3 Isolate, at panel, and disconnect existing power supply to Abatement Work Area. Power supply to remaining areas of building must not be disrupted during work of this section.
 - .1 Lock-out/tag-out power at electrical panels.
 - .2 Mark/tag any items within or passing through the Abatement Work Area that are to remain live including but not limited to cable, conduit, wire, fixtures, equipment panels, etc.
- .4 Shut down HVAC systems serving the Abatement Work Area.
 - .1 Install polyethylene sheeting over openings in ducts and diffusers and seal.
 - .2 HVAC to remaining areas of building must not be disrupted during work of this section.
 - .3 System shall remain inoperative until completion of work, unless ducts can be effectively capped.
 - .4 Perform work at scheduled times after shutting down HVAC systems affecting the Abatement Work Area.
- .5 Remove visible dust from all surfaces in the work area including those to be worked on, using HEPA Vacuums or wet wiping.
- .6 Provide amended water for wetting materials, and adequate method of wetting (garden sprayers, airless sprayers, etc.).
- .7 Provide electrical power and shut off for operation of powered tools and equipment. Provide ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard.
 - .1 Ensure safe installation of electrical lines and equipment.
- .8 Do not use compressed air to clean or remove dust or debris.
- .9 Frequently and at regular intervals during the work, clean up dust and waste using HEPA vacuums and/or wet sweeping or mopping.
- .10 Frequently and at regular intervals, place all waste in waste containers.
- .11 Immediately upon completion of work, clean area with HEPA vacuum and/or wet sweeping or mopping.

3.2 Site Preparation – No Enclosure Required

- .1 Cover materials to remain in the Abatement Work Area with polyethylene sheeting before disturbing lead-containing materials to control the spread of dust.
- .2 Install caution tape around work area where existing walls are not present.
- .3 Install temporary lighting in enclosure to a level that will provide for safe and efficient use of work area - minimum 550 LUX.
- .4 Place HEPA vacuum in Abatement Work Area.
- .5 Place required tools to complete the abatement within the Abatement Work Area.
- .6 Install Signage in clearly visible locations and in sufficient numbers to adequately warn of a lead dust hazard.

3.3 Maintenance of Abatement Work Area

- .1 Inspect polyethylene sheeting and ensure it is effectively sealed and taped. Repair damage and remedy defects immediately.
- .2 Inspect electrical panels and ensure locks and tags are on panels prior to entering the Abatement Work Area.
- .3 Inspect HEPA filtered negative pressure machines including discharge ducting at the beginning and end of each working period. Inspection must be performed by competent person.
- .4 Maintain Abatement Work Area in tidy condition.
- .5 Remove standing water on polyethylene/floor at the end of every shift.
- .6 Turn off water supply to any hoses and reduce pressure in hose, prior to leaving the Abatement Work Area at end of shift.

3.4 Lead Abatement

- .1 Use the procedures described above under *Site Preparation – No Enclosure Required*.
 - .1 Removal of lead-containing paint using power tools with an effective dust collection system equipped with HEPA filter.
 - .2 Welding, torching or high temperature cutting of lead-containing surface coatings or materials indoors, with use of an effective fume collector or smoke eater.
- .2 Provide washing facilities consisting of a wash basin, clean water, soap and towels.
 - .1 Workers are to use washing facilities each time leaving the Abatement Work Area.
- .3 Removal methods minimizing dust generation should be used wherever possible.
 - .1 Wet methods are to be used to reduce dust generation.
 - .1 Wetting agents should be used where possible.
 - .2 Wet method not be used if it creates a hazard or cause damage to equipment or to project.
- .4 Provide drop sheets below all lead operations that may produce dust, chips or debris containing lead.
- .5 Waste water from cleaning or removal operations must be contained, for treatment or disposal.

- .6 Remove lead-containing paint in small sections and pack as it is being removed in sealable waste containers.
- .7 Waste generated should be maintained wet until cleaned and packaged.
- .8 After completion of stripping work, wire brush and wet sponge surface from which lead based paint has been removed to remove visible material. During this work keep surfaces wet.
- .9 After wire brushing and wet sponging to remove visible lead containing paint, wet clean entire work area, and equipment used in process.
 - .1 Compressed air or dry sweeping not be used to clean up lead-containing dust or waste.
 - .2 Ensure all waste is cleaned and packaged.
- .10 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to staging area. Clean external surfaces thoroughly again by wet sponging. Wash containers thoroughly pending removal to outside. Ensure containers are removed by workers who have entered from uncontaminated areas dressed in clean coveralls.

3.5 Waste Management and Disposal

- .1 Per Section 02 82 00.

3.6 Final Cleaning

- .1 Following specified cleaning procedures proceed with final cleanup.
- .2 Remove polyethylene sheet by rolling it away from walls to centre of work area. Clean visible lead containing particles observed during cleanup, immediately, using HEPA vacuum.
- .3 Place polyethylene sheets, tape, cleaning material, clothing, and contaminated waste in plastic bags and seal. Dispose of in accordance with waste materials generated.
- .4 Clean Work areas and Transfer Room, where present.
- .5 Remove sealed waste containers and equipment used in Work and remove from work areas at appropriate time in cleaning sequence.
- .6 Conduct final check to ensure no dust or debris remain on surfaces as result of dismantling operations.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and installation of formwork and related accessories required to complete all concrete formwork and accessories as shown on Drawings, as specified herein, and as required by the job conditions.

1.2 RELATED REQUIREMENTS

- .1 Section 03 20 00 – Concrete Reinforcing
- .2 Section 03 30 00 – Cast-in-Place Concrete
- .3 Section 05 50 00 – Metal Fabrications
- .4 Section 07 92 00 – Joint Sealants

1.2 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 CSA O86, Engineering design in wood
 - .3 CSA O121, Douglas fir plywood
 - .4 CSA O151, Canadian softwood plywood
 - .5 CSA O153, Poplar plywood
 - .6 CSA O325, Construction sheathing
 - .7 CSA S269.1, Falsework and formwork
- .2 ULC Standards (ULC):
 - .1 CAN/ULC-S701.1:20, Standard for Thermal Insulation, Polystyrene Boards

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate with Section 03 20 00 – Concrete Reinforcing
 - .2 Coordinate with Section 03 30 00 – Cast-in-Place Concrete
 - .3 Coordinate with Section 05 50 00 – Metal Fabrications for items embedded or cast into concrete.
- .2 Pre-Installation Meetings: Conduct a meeting in accordance with Section 01 31 19 - Project Meetings attended by Contractor, HWDSB, and JASON FUNG ARCHITECT INC.:
 - .1 Verify Project requirements.
 - .2 Review delivery, storage and handling requirements.
 - .3 Review installation and substrate conditions.
 - .4 Coordinate with other Subcontractors.
 - .5 Review manufacturer's instructions and warranty requirements.

1.4 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 proprietary materials, including product characteristics.

- .2 Submit WHMIS Safety Data Sheet (SDS).
- .3 Shop Drawings for formwork:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
 - .2 Prepare shop drawings in accordance with CSA S269.1 for formwork and falsework.
 - .3 Indicate formwork design data, permissible rate of concrete placement, and temperature of concrete in formwork.

1.5 QUALITY ASSURANCE

- .1 Perform in accordance with Section 01 43 00 - Quality Assurance.
- .2 Retain a professional engineer registered or licensed in the Province of Ontario, Canada with experience in formwork and falsework design of comparable complexity and scope to this project to perform the following services as part of work of this Section:
 - .1 Design of formwork and falsework.
 - .2 Review, stamp, and sign fabrication and erection shop drawings, design calculations and amendments.
 - .3 Conduct on-site inspections. Prepare and submit inspection reports verifying this part of work is in accordance with Contract Documents and reviewed Shop Drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Storage and Handling Requirements: Maintain formwork liners for architectural concrete without defects or damages that could affect concrete appearance or cause staining.

2 PRODUCTS

2.1 MATERIALS

- .1 Formwork Materials:
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA O121, CSA O86, and CSA O153.
 - .2 For concrete with special architectural features, use formwork materials to CSA A23.1/A23.2.
 - .3 Rigid insulation board: To CAN/ULC-S701.1.
- .2 Pan Forms: Steel, reinforced plastic, or aluminum free of bends, dents, and residual concrete with a high potential for reuse.
- .3 Form Ties:
 - .1 For concrete not designated 'Architectural': Removable or snap-off metal ties, fixed or adjustable length, and free of devices leaving holes larger than 25 mm in diameter in concrete surface.
- .4 Form Release Agent: Proprietary, non-volatile material that will not stain concrete or hinder the application of subsequent coatings, treatments, or flooring materials to the concrete surface, low VOC.
- .5 Sealant: To Section 07 92 00 – Joint Sealants.

3 EXECUTION

3.1 PREPARATION

- .1 Before placing concrete, clean formwork in accordance with CSA A23.1/A23.2.

3.2 FABRICATION AND ERECTION

- .1 Verify lines, levels, and centres before proceeding with formwork/falsework. Confirm that dimensions match the Drawings.
- .3 Fabricate and erect falsework in accordance with CSA S269.1.
- .4 Do not place shores and mud sills on frozen ground.
- .5 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .6 Fabricate and erect formwork in accordance with CSA S269.1 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA A23.1/A23.2.
- .7 Align form joints and make watertight.
 - .1 Minimize the number of form joints used.
- .8 Locate horizontal form joints for exposed columns 2400 mm above finished floor elevation.
- .9 Use 25 mm chamfer strips on external corners and 25 mm fillets at interior corners and joints, unless otherwise indicated on Drawings.
- .10 Form chases, slots, openings, drips, recesses, and expansion and control joints as indicated.
- .11 Build in anchors, sleeves, and other inserts required to accommodate work specified in other Sections.
 - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

3.3 REMOVAL AND RESHORING

- .1 Leave formwork in place after placing concrete for a minimum:
 - .1 2 days for walls, sides of beams, columns, footings and abutments.
 - .2 5 days for beam soffits, slabs, decks and other structural members, or 3 days when replaced immediately with adequate shoring to standard specified for falsework.
- .2 Remove formwork when concrete has reached 75% of its 28-day design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .4 Space reshoring in each principal direction at not more than 3000 mm apart.
- .5 Reuse formwork and falsework subject to requirements of CSA A23.1/A23.2.

3.4 SITE QUALITY CONTROL

- .1 Site inspections:
 - .1 Professional engineer responsible for signing and stamping shop drawings to conduct on-site inspections and prepare and submit inspection reports verifying this part of the work is in accordance with Contract Documents and reviewed shop drawings.

3.5 CLEANING

- .1 Cleaning: Perform in accordance with Section 01 74 00 - Cleaning.
- .2 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

- .1 Once a form can no longer be used, deposit in an on-site recycling bin

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and installation of concrete reinforcing materials, fabrication and placement.

1.2 RELATED REQUIREMENTS

- .1 Section 03 30 00 – Cast-in-Place Concrete

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - .2 ASTM A143/A143M, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
 - .3 ASTM A641/A641M, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
 - .4 ASTM A767/A767M, Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
 - .5 ASTM A775/A775M, Standard Specification for Epoxy-Coated Steel Reinforcing Bars
 - .6 ASTM A884/A884M, Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
 - .7 ASTM A1064/A1064M, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- .2 CSA Group (CSA):
 - .1 CSA A23.1/CSA A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
 - .2 CSA A283, Qualification Code for Concrete Testing Laboratories
 - .3 CSA A23.3, Design of Concrete Structures
 - .4 CSA G30.18, Carbon Steel Bars for Concrete Reinforcement
 - .5 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .6 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction
- .3 Reinforcing Steel Institute of Canada (RSIC):
 - .1 RSIC, Manual of Standard Practice

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate with Section 03 30 00 – Cast-in-Place Concrete
- .2 Pre-Installation Meetings: Conduct a meeting in accordance with Section 01 31 19 - Project Meetings attended by Contractor, HWDSB, and JASON FUNG ARCHITECT INC.:
 - .1 Verify Project requirements.
 - .2 Review reinforcing testing report.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions if available, product literature and data sheets for

- proprietary materials used in concrete reinforcement. Include product characteristics, performance criteria, physical sizes, finishes, and limitations.
- .2 Submit WHMIS Safety Data Sheet (SDS).
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
 - .2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.
 - .3 Indicate placing of reinforcement and:
 - .1 Bar bending details.
 - .2 Quantities of reinforcement.
 - .3 Sizes, spacing, locations of reinforcement and mechanical splices if approved by JASON FUNG ARCHITECT INC. with identifying code marks to permit correct placement without reference to structural drawings.
 - .4 Indicate sizes, spacing and locations of chairs, spacers and hangers.
 - .4 Detail lap lengths and bar development lengths to CSA A23.3.
 - .5 Indicate position and size of openings in slabs and walls. Coordinate with the different trades requiring openings.
 - .6 Indicate the concrete cover dimension to the reinforcement.
- .4 Certificates:
 - .1 When requested] submit epoxy coating applicator certificate.
- .6 Test and Evaluation Reports:
 - .1 When requested, submit certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks before beginning reinforcing work.
- .7 Source Quality Control Submittals:
 - .1 When requested, submit, in writing, proposed source of reinforcement material.

1.6 QUALITY ASSURANCE

- .1 Perform in accordance with Section 01 43 00 - Quality Assurance.
- .2 Retain a professional engineer registered or licensed in the Province of Ontario, Canada with experience in concrete reinforcing design of comparable complexity and scope to this project to perform the following services as part of work of this Section:
 - .1 Design of concrete reinforcement.
 - .2 Review, stamp, and sign shop drawings, design calculations and amendments.
 - .3 Conduct on-site inspections. Prepare and submit inspection reports verifying this part of work is in accordance with Contract Documents and reviewed Shop Drawings.
- .3 Testing Laboratory to be certified to CSA A283.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Package bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
 - .1 Package and deliver epoxy-coated bars in accordance with ASTM A775A/A775M.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

- .2 Protect epoxy- and paint-coated portions of reinforcement bars with covering during transportation and handling.

2 PRODUCTS

2.1 MATERIALS

- .1 Substitute different sized bars only if permitted in writing by JASON FUNG ARCHITECT INC.
- .2 Reinforcing Steel: Billet steel, deformed bars to CSA G30.18, unless otherwise indicated.
- .3 Reinforcing Steel: Weldable low alloy steel deformed bars to CSA G30.18.
- .4 Cold-drawn annealed steel wire ties: To [ASTM A1064/A1064M.
- .5 Welded steel wire fabric:
 - .1 Deformed in accordance with ASTM A1064/A1064M, fabricated from steel wire into flat sheets; sizes as indicated on Drawings.
 - .2 Finish:
 - .1 Galvanized: Hot dip galvanized after fabrication having Class A coating in accordance with ASTM A641/A641M.
 - .2 Epoxy Coated: Epoxy coated after welding in accordance with ASTM A884/A884M, Class A coated <175 µm, Type 1 intended for use in concrete or masonry, colour contrasting with rust.
- .6 Epoxy Coating of non-prestressed reinforcement: To ASTM A775/A775M.
- .7 Galvanizing of non-prestressed reinforcement: To ASTM A123/A123M coating Grade 85, minimum zinc coating to ASTM A767/A767M.
 - .1 Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.
 - .2 If chromate treatment is carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.
 - .1 Maintain temperature of solution at a minimum of 32°C and immerse galvanized steels for a minimum of 20 seconds.
 - .3 If galvanizing steel at ambient temperature, add a 0.5% to 1% concentration of sulphuric acid as a bonding agent.
 - .1 There are no temperature requirements for the aqueous solution.
 - .4 Chromate solution of equal effectiveness manufactured for this purpose may replace aqueous solution.
 - .1 Submit product description as described in ACTION AND INFORMATIONAL SUBMITTALS in Part 1 of this Section.
- .8 Chairs, bolsters, bar supports, spacers: To CSA A23.1/A23.2.
- .9 Tie wire: 1.5 mm diameter annealed wire, except epoxy coated for epoxy-coated rebar.
- .11 Mechanical splices: Subject to approval from JASON FUNG ARCHITECT INC.
- .12 Plain round bars: To CSA G40.20/G40.21.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain HWDSB and JASON FUNG ARCHITECT INC.'s written approval for locations of reinforcement splices other than those shown on Contract Drawings and shop drawings.
- .3 Upon approval from HWDSB and JASON FUNG ARCHITECT INC., weld reinforcement in

accordance with CSA W186.

3 EXECUTION

3.1 PREPARATION

- .1 Galvanizing to include chromate treatment.
 - .1 Duration of treatment: 1 hour per 25 mm of bar diameter.
 - .2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

3.2 SITE BENDING

- .1 Do not bend or weld reinforcement on site except where indicated or when authorized by JASON FUNG ARCHITECT INC..
 - .1 If site bending is authorized, bend reinforcement without heat, applying slow and steady pressure.
 - .2 Replace reinforcement bars that develop cracks or splits.

3.3 PLACING REINFORCEMENT

- .1 Cutting or puncturing vapour retarder is not permitted. Repair damage and reseal vapour retarder before placing concrete.
- .2 Place reinforcing steel as indicated on placing drawings and in accordance with CSA A23.1/A23.2.
- .3 Use plain round bars as slip dowels in concrete.
 - .1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.
 - .2 After paint has dried, apply thick even film of mineral lubricating grease.
- .4 Before placing concrete, obtain JASON FUNG ARCHITECT INC.'s approval of reinforcing material and placement.
- .5 Maintain minimum concrete cover to reinforcement during concrete placement.

3.4 SITE TOUCH UP

- .1 Touch-up reinforcing steel where damaged and at cut ends of epoxy-coated reinforcing with compatible epoxy paint and galvanized reinforcing to ASTM A780].

3.5 SITE QUALITY CONTROL

- .1 Site tests: Conduct tests on the following in accordance with Section 01 45 00 - Quality Control and submit report as described in ACTION AND INFORMATIONAL SUBMITTALS in Part 1 of this Section:
 - .1 Epoxy coating.
 - .2 Reinforcing steel and welded wire fabric.
- .2 Site inspections:
 - .1 Professional engineer responsible for signing and stamping shop drawings to conduct on-site inspections and prepare and submit inspection reports verifying this part of the work is in accordance with Contract Documents and reviewed shop drawings.

3.6 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: Perform 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

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and installation of cast-in-place concrete including formwork and reinforcing steel. This includes the following:
 - .1 Structural concrete elements indicated on Drawings.
 - .2 Build-in anchors, slots, sleeves etc. supplied and/or required by other trades.
 - .3 Other work specified herein.

1.2 RELATED REQUIREMENTS

- .1 Section 03 10 00 – Concrete Forming and Accessories
- .2 Section 03 20 00 – Concrete Reinforcing
- .3 Section 04 05 00 – Common Work Results for Masonry
- .4 Section 07 26 00 – Vapour Retarders

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM C171, Standard Specification for Sheet Materials for Curing Concrete
 - .2 ASTM C260/C260M, Standard Specification for Air-Entraining Admixtures for Concrete
 - .3 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - .4 ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete
 - .5 ASTM C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
 - .6 ASTM C1017, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
 - .7 ASTM C1059/C1059M, Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete
 - .8 ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
 - .9 ASTM D624, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
 - .10 ASTM D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
 - .11 ASTM D1752, Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
- .2 CSA Group (CSA):
 - .1 CSA A23.1 /A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
 - .2 CSA A283, Qualification Code for Concrete Testing Laboratories
 - .3 CSA A3000, Cementitious Materials Compendium

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate sequencing and installation of underslab waterproofing and underslab plastic sheet vapour retarder membrane with Section 07 26 00 - Vapour Retarders.
- .2 Pre-Installation Meetings: Conduct a meeting in accordance with Section 01 31 19 - Project

Meetings attended by Contractor, HWDSB, and JASON FUNG ARCHITECT INC.:

- .1 Verify Project requirements.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions if available, product literature and data sheets for proprietary materials used in cast-in-place concrete and additives. Include product characteristics, performance criteria, physical sizes, finishes, and limitations.
 - .2 Submit WHMIS Safety Data Sheet (SDS).
- .3 Site Quality Control Submittals:
 - .1 Submit testing and inspection results and reports for review by HWDSB and JASON FUNG ARCHITECT INC. and do not proceed without written approval when deviations from mix design or parameters are found.
 - .2 Concrete pours: Submit accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in SITE QUALITY CONTROL in Part 3 of this Section.
 - .3 Concrete hauling time: Submit deviations exceeding the maximum allowable time of 120 minutes for concrete delivered to site of Work and discharged after batching for review by HWDSB and JASON FUNG ARCHITECT INC.

1.6 QUALITY ASSURANCE

- .1 Perform in accordance with Section 01 43 00 - Quality Assurance.
- .2 Submit a valid and recognized certificate from the plant delivering the concrete a minimum of four weeks before starting concrete work for approval by HWDSB and JASON FUNG ARCHITECT INC.
 - .1 Submit test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture meet specified requirements.
- .3 Submit proposed quality control procedures a minimum four weeks before starting concrete work, for review by HWDSB and JASON FUNG ARCHITECT INC..
- .4 Quality Control Plan: Submit written report to HWDSB and JASON FUNG ARCHITECT INC. verifying compliance that cast-in-place concrete meets performance requirements of concrete as established in PRODUCTS in Part 2 of this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements:
 - .1 Concrete hauling time: Deliver to site of Work and discharge within a maximum of 120 minutes after batching.
 - .2 Modifying maximum time limit before receiving written agreement from HWDSB and JASON FUNG ARCHITECT INC. and concrete producer as described in CSA A23.1/CSA A23.2 is prohibited.
 - .3 Submit deviations for review by HWDSB and JASON FUNG ARCHITECT INC.

1.8 SITE CONDITIONS

- .1 Placing concrete during rain or weather events that could damage concrete is prohibited.
- .2 Protect newly placed concrete from rain or weather events in accordance with CSA A23.1/CSA A23.2
- .3 Cold weather protection:

- .1 Maintain protection equipment in readiness on Site.
- .2 Use protection equipment when ambient temperature is below 5°C, or when temperature may fall below 5°C before concrete has cured.
- .3 Placing concrete upon or against surface at temperature below 5°C is prohibited.
- .4 Hot weather protection:
 - .1 Protect concrete from direct sunlight when ambient temperature is above 27°C.
 - .2 Prevent forms from getting too hot before concrete is placed. Apply accepted methods of cooling that will not negatively affect concrete.
- .5 Protect concrete from drying

2 PRODUCTS

2.1 MATERIALS

- .1 Concrete Materials: Ready mix, controlled concrete shall be used throughout. Conform to CAN/CSA-A23.1 for methods on measuring materials, batching, mixing, and delivery, except where specified otherwise.
- .2 Portland Cement: Normal to CAN/CSA-A5.
- .3 Hydraulic Cement: to CAN/CSA A3000/A3001.
- .4 Aggregates: To CAN/CSA A23.1/CSA A23.2.
- .5 Admixtures:
 - .1 Air entraining admixture: To ASTM C260/C260M.
 - .2 Chemical admixture: To ASTM C494/C494M and ASTM C1017/C1017M. JASON FUNG ARCHITECT INC. to approve accelerating or set retarding admixtures during cold and hot weather placing.
 - .3 Water reducing admixture: To ASTM C494.
- .6 Shrinkage Compensating Grout: Premixed compound consisting of aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/CSA A23.2.

2.2 MIXES

- .1 Design mix in accordance with CAN/CSA-A23.1/CSA-A23.2, Alternative (1). Design the mix such that concrete will be homogeneous uniformly, workable readily placeable into the corners and angles of forms and around reinforcement, but without permitting materials to segregate or excessive free water to collect on the surface.
 - .1 Compressive Strength at 28 days: 35 MPa
 - .2 Class of Exposure: To CAN/CSA-A23.1, Table 1 & 2
 - .3 Maximum Water/Cement Ratio: Maximum of 0.65 conforming to CAN/CSA-A23.1, Table 1 & 2.
 - .4 Provide concrete with an average slump of 80 mm ± 20 mm.
 - .5 Air Content: To CAN/CSA-A23.1, Table 4 according to class of exposure.
 - .6 Maximum and Minimum Mass of Air Dry Concrete: For normal mass concrete, 2400 kg/m³ maximum, and 2250 kg/m³ minimum. For variance from specified requirements, request approval from consultant.

3 EXECUTION

3.1 PREPARATION

- .1 Obtain HWDSB and JASON FUNG ARCHITECT INC. written approval before placing concrete, providing a minimum 24 hours notice before placing concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 – Concrete Reinforcing.
- .3 During concreting operations:
 - .1 Development of cold joints not allowed
 - .2 Ensure concrete delivery and handling facilitate placing with minimum amount of re-handling, and without damage to existing structure or work.
- .4 Pumping of concrete permitted only after approval of equipment and mix.
- .5 Disturbing reinforcement and inserts during concrete placement is prohibited.
- .6 Before placing of concrete obtain Consultant's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .7 Protect previous work from staining.
- .8 Clean and remove stains before application for concrete finishes.
- .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, workability, air content, temperature and test samples taken.
- .10 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
 - .1 Place steel dowels and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
- .11 Do not place load upon new concrete until authorized HWDSB and JASON FUNG ARCHITECT INC..

3.2 INSTALLATION/APPLICATION

- .1 Do cast-in-place concrete work in accordance with CSA A23.1/CSA A23.2.
- .2 Sleeves and inserts:
 - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by HWDSB and JASON FUNG ARCHITECT INC.
 - .2 Where approved by Consultant, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
 - .3 Sleeves and openings greater than 100 x 100 mm that are not indicated in the reviewed shop drawings must be approved by HWDSB and JASON FUNG ARCHITECT INC.
 - .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Consultant before placing concrete.
 - .5 Confirm locations and sizes of sleeves and openings shown on drawings.
 - .6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .3 Installation - Anchor bolts:
 - .1 Set anchor bolts to templates in coordination with appropriate Subcontractor before placing concrete.
 - .2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Consultant.
 - .1 Formed holes: Minimum 100-mm diameter.
 - .2 Drilled holes: to manufacturers' recommendations.
 - .3 Protect anchor bolt holes from water accumulation, and snow and ice build-ups.

- .4 Set bolts and fill holes with epoxy grout.
- .5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers taking into consideration ambient temperature at time of erection.
- .4 Installation - Drainage holes and weep holes:
 - .1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.
 - .2 Install weep hole tubes and drains as indicated on Drawings.
- .5 Installation - Dovetail anchor slots: In accordance with Section 04 05 00 - Common Work Results for Masonry.
 - .1 Install continuous vertical anchor slot to forms where masonry abuts concrete wall or columns.
- .6 Installation - Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.
- .7 Finishing and curing:
 - .1 Finish concrete to CSA A23.1/CSA A23.2.
 - .2 Use procedures as noted in CSA A23.1/CSA A23.2 to remove excess bleed water. Ensure surface is not damaged.
 - .3 Cure concrete in accordance with CSA A23.1/CSA A23.2. If required, use curing compounds compatible with applied finish on concrete surfaces. Use sheet materials in accordance with ASTM C171 for curing concrete floor slabs.
 - .4 Finish concrete floor to CSA A23.1/CSA A23.2.
- .8 Installation - Waterstops:
 - .1 Install waterstops to provide continuous water seal.
 - .2 Do not distort or pierce waterstop in way as to hamper performance.
 - .3 Do not displace reinforcement when installing waterstops.
 - .4 Use equipment to manufacturer's requirements to site splice waterstops.
 - .5 Tie waterstops rigidly in place.
 - .6 Use only straight heat sealed butt joints on site.
 - .7 Use factory welded corners and intersections unless otherwise approved by JASON FUNG ARCHITECT INC..
- .10 Installation - Joint fillers:
 - .1 Provide filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by JASON FUNG ARCHITECT INC..
 - .2 When more than one piece required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
 - .3 Locate and form isolation, construction, and expansion joints as indicated.
 - .4 Install joint filler.
 - .5 Use 12-mm-thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to finished slab surface unless otherwise indicated.
- .11 Installation - Damp-proof membrane:
 - .1 Install damp-proof membrane under concrete slabs-on-grade inside building.
 - .2 Lap damp-proof membrane a minimum 150 mm at joints and seal.
 - .3 Seal punctures in damp-proof membrane before placing concrete.
 - .4 Use patching material a minimum 150 mm larger than puncture and seal.

3.3 TOLERANCES

- .1 Concrete surface tolerance to CSA A23.1/CSA A23.2.

3.4 SITE QUALITY CONTROL

- .1 Site tests: Conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in ACTION AND INFORMATIONAL SUBMITTALS in Part 1 of this Section.
 - .1 Concrete pours
 - .2 Slump
 - .3 Air content
 - .4 Compressive strength at 7 and 28 days
 - .5 Air and concrete temperature
- .2 Inspection and testing of concrete and concrete materials carried out by testing laboratory designated by HWDSB and JASON FUNG ARCHITECT INC. to CSA A23.1/CSA A23.2.
 - .1 Ensure testing laboratory certified to CSA A283.
- .3 Distribute test results for discussion at pre-pouring concrete meeting between testing laboratory and HWDSB and JASON FUNG ARCHITECT INC..
- .4 HWDSB will pay for costs of tests.
- .6 Non-Destructive Methods for Testing Concrete: To CSA A23.1/CSA A23.2.

3.6 CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Provide appropriate area on Project site where concrete trucks can be safely washed.
- .2 Waste Management: Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Divert unused concrete materials from landfill to local facility.
 - .2 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site.
 - .3 Disposal of unused admixtures and additive materials, concrete, concrete washwater, or cleaning materials and residues into sewer systems, into lakes, streams, onto ground or in other locations that pose a health or environmental hazard is prohibited.
 - .4 Prevent admixtures and additive materials from entering drinking water supplies or streams.
 - .5 Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and installation of concrete curing agents and colour additives, Various other types of concrete finishing could be included.

1.2 RELATED REQUIREMENTS

- .1 Section 03 30 00 – Cast-in-Place Concrete
- .2 Section 09 65 00 – Resilient Flooring and Accessories
- .3 Section 09 65 66 – Resilient Athletic Flooring

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - .2 ASTM C979/C979M, Standard Specification for Pigments for Integrally Colored Concrete
- .2 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-25.20, Surface Sealer for Floors
- .3 CSA Group (CSA):
 - .1 CSA A23.1 /A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
- .4 South Coast Air Quality Management District (SCAQMD), California State:
 - .1 SCAQMD Rule 1113, Architectural Coatings

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate with Section 03 30 00 – Cast-in-Place Concrete for wet curing.
- .2 Pre-Installation Meetings: Conduct a meeting in accordance with Section 01 31 19 - Project Meetings attended by Contractor, HWDSB, and JASON FUNG ARCHITECT INC.:
 - .1 Verify Project requirements.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's product literature and data sheets for concrete finishing products. Include product characteristics, performance criteria, physical sizes, finishes, and limitations.
 - .2 Submit WHMIS Safety Data Sheet (SDS).
- .3 Manufacturer's Instructions: Submit application instructions for each concrete floor treatment.
- .4 Qualification Statements: Submit written declaration that concrete floor finishing products used on this Project are compatible with subsequently installed finish flooring products and adhesives.

1.6 QUALITY ASSURANCE

- .1 Perform in accordance with Section 01 43 00 - Quality Assurance.
- .2 Submit proposed quality control procedures a minimum four weeks before starting concrete finishing work, for review by HWDSB and JASON FUNG ARCHITECT INC..

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Packaging Waste Management: Remove packaging materials for reuse in accordance with Section 01 74 19 - Waste Management and Disposal.

1.8 SITE CONDITIONS

- .1 Temporary lighting: Minimum 1200 W light source, placed 2.5 m above floor surface for each 40 m² of floor being treated.
- .2 Make work area watertight and protected against rain and detrimental weather conditions.
- .3 Temperature: Maintain a minimum 10C ambient temperature for seven days before installation and a minimum 48 hours after completion of work. Maintain relative humidity at a maximum 40% during both periods.
- .4 Moisture: Ensure concrete substrate is within moisture limits prescribed by manufacturer.
- .5 Ventilation:
 - .1 Coordinate with Owner for operation of existing building ventilation system during application of concrete floor finish. Ventilate area of work as recommended by concrete floor finish manufacturer with temporary supply and exhaust fans.
 - .2 Provide continuous ventilation during and after application of finish.

2 PRODUCTS

2.1 MATERIALS

- .1 Curing Compounds:
 - .1 To ASTM C309, waterborne, wax-free, penetrating, non-film forming, dries clear, and does not prevent adhesion with subsequently applied coatings, treatments, or other floor finishes.
 - .2 Waterborne, membrane-forming curing membrane: To ASTM C309, Type 1 Clear, Class B.

3 EXECUTION

3.1 EXAMINATION

- .1 Verify that concrete slabs are ready to receive work and elevations as indicated on Drawings.

3.2 APPLICATION

- .1 Finish concrete floor slab surfaces to CSA A23.1/CSA A23.2, Table 21.

3.6 PROTECTION

- .1 Protect finished surfaces in accordance with manufacturer's recommendations.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 04 05 13 – Masonry Mortaring and Grouting
- .2 Section 04 05 19 – Masonry Anchorage and Reinforcing
- .3 Section 04 05 23 – Masonry Accessories
- .4 Section 04 21 13 – Brick Masonry
- .5 Section 07 84 00 – Firestopping
- .6 Section 07 92 00 – Joint Sealants

1.2 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

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate with Section 04 05 13 – Masonry Mortaring and Grouting
 - .2 Coordinate with Section 04 05 19 – Masonry Anchorage and Reinforcing
 - .3 Coordinate with Section 07 84 00 – Firestopping for through penetration firestopping systems
 - .4 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

1.4 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.

1.5 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).

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with 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.

1.7 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.

1.8 WARRANTY

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

2 PRODUCTS

2.1 MATERIALS

- .1 Masonry materials are specified in the following Sections:
 - .1 Section 04 05 13 – Masonry Mortaring and Grouting
 - .2 Section 04 21 13 – Brick Masonry
 - .3 Section 07 92 00 – Joint Sealants

3 EXECUTION

3.1 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.

3.2 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.

3.3 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:
 - .1 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..

3.4 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.

3.5 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

1 GENERAL

1.1 RELATED REQUIREMENTS

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

1.2 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.

1.3 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).
- .3 Manufacturers' Instructions: submit manufacturer's installation instructions.

1.4 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.

1.5 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.

1.6 SITE CONDITIONS

- .1 Ambient Conditions: maintain materials and surrounding air temperature to:
 - .1 Minimum 5 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

2.1 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, Type N 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.

2.2 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.

2.3 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.

2.4 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.

2.5 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.

2.6 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

2.7 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.

2.8 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

3.1 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..

3.2 PREPARATION

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

3.3 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.

3.4 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.

3.5 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.

3.6 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.

3.7 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.

3.8 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 splashings 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.

3.9 PROTECTION

- .1 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

- .1 Not used.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 04 05 00 – Common Work Results for Masonry
- .2 Section 04 05 13 – Masonry Mortaring and Grouting
- .3 Section 04 05 23 – Masonry Accessories
- .4 Section 04 20 00 – Unit Masonry

1.2 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-A370, Connectors for Masonry
 - .4 CAN/CSA-A371, Masonry Construction for Buildings
 - .5 CSA G30.18, Carbon Steel Bars for Concrete Reinforcement
 - .6 CSA S304, Design of Masonry Structures
 - .7 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction
- .2 Reinforcing Steel Institute of Canada (RSIC):
 - .1 Reinforcing Steel Manual of Standard Practice

1.3 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 anchorage and reinforcing materials 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 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada
 - .2 Submit drawings detailing bar bending details, anchorage details, lists and placement drawings.
 - .3 On placement drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.
- .4 Manufacturers' Instructions: submit manufacturer's installation instructions.

1.4 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.

1.5 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 anchorage and reinforcing materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.6 SITE MEASUREMENTS

- .1 Make site measurements necessary to ensure proper fits of members

2 PRODUCTS

2.1 MATERIALS

- .1 Bar reinforcement: Steel to CAN/CSA-A371 and CSA G30.18.
- .2 Connectors: to CAN/CSA-A370 and CSA S304.1.
- .3 Corrosion Protection: to CSA S304.1 and CAN/CSA-A370.
- .4 Fasteners: installed post-construction:
 - .1 Screw Shields and Plugs: size and type to suit application, locate where indicated.
 - .2 Bolts and Screws: size and type to suit application, locate where indicated.
 - .3 Nails: case-hardened cut or spiral nails, size and type to suit fastening application.
 - .4 Powder-Driven Fasteners: pin styles and lengths to suit fastening application in accordance with manufacturers use, load and hold recommendations.
 - .5 Adhesives: epoxies, mastics and contact cements for fastening applications, use in accordance with manufacturers' recommendations.
- .5 Ties: hot dip galvanized to CAN/CSA-A370 Table 5.2, steel finish.
- .6 Anchors: to CAN/CSA-A370.
- .7 Conventional Bolts:
 - .1 Bolts: to ASTM A36
 - .2 Plate anchors: steel to ASTM A36, weld square of circular steel plate perpendicular to axis of steel bar threaded on opposite end.
 - .3 Through bolt rods: to ASTM A307 threaded rod or threaded ASTM A36 bar stock.

2.2 FABRICATION

- .1 Fabricate reinforcing in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by Reinforcing Steel Institute of Canada.
- .2 Fabricate connectors in accordance with CAN/CSA-A370.
- .3 Obtain HWDSB and JASON FUNG ARCHITECT INC. approval for locations of reinforcement splices other than shown on placing drawings.
- .4 Upon approval of HWDSB and JASON FUNG ARCHITECT INC., weld reinforcement in accordance with CSA W186.
- .5 Ship reinforcement and connectors, clearly identified in accordance with drawings.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for anchorage and reinforcing materials 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..

3.2 PREPARATION

- .1 Direct and coordinate placement of metal anchors for masonry supplied to other Sections.

3.3 INSTALLATION

- .1 Supply and install masonry connectors and reinforcement in accordance with CAN/CSA-A370, CAN/CSA-A371, CSA A23.1/A23.2 and CSA S304.1 unless indicated otherwise.

3.4 BONDING AND TYING

- .1 Bond walls of two or more wythes using connectors in accordance with CSA S304.1, CAN/CSA-A371 and as indicated.
- .2 Tie masonry veneer to backing in accordance with National Building Code of Canada (NBC), CSA S304.1, CAN/CSA-A371 and as indicated.
- .3 Install unit, adjustable, single wythe and multiple wythe joint reinforcement where indicated and in accordance with CAN/CSA-A370 and CAN/CSA-A371.
 - .1 Bond walls of two or more wythes using connectors in accordance with CAN/CSA-A371 and as indicated.
 - .2 Install horizontal joint reinforcement 400 mm on centre.
 - .3 Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 400 mm each side of opening.
 - .4 Place joint reinforcement continuous in first and second joint below top of walls.
 - .5 Lap joint reinforcement ends minimum 150 mm.
 - .6 Connect stack bonded unit joint corners and intersections with strap anchor 400 mm on centre.

3.5 GROUTING

- .1 Grout masonry in accordance with CSA S304.1, CAN/CSA-A371 and CAN/CSA-A179 and as indicated.

3.6 ANCHORS

- .1 Supply and install metal anchors in accordance with CAN/CSA-A370 and CAN/CSA-A371.

3.7 LATERAL SUPPORT AND ANCHORAGE

- .1 Supply and install lateral support and anchorage in accordance with CSA S304.1 and as indicated.

3.8 MOVEMENT JOINTS

- .1 Reinforcement not continuous across movement joints unless otherwise indicated.

3.9 FIELD BENDING

- .1 Do not field bend reinforcement and connectors except where indicated or authorized by Consultant.
- .2 When field bending authorized, bend without heat, applying slow and steady pressure.

3.10 SITE QUALITY CONTROL

- .1 Site inspections in accordance with Section 04 05 00 - Common Work Results for Masonry.

3.11 FIELD TOUCH-UP

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

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 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 04 05 00 - Common Work Results for Masonry
- .2 Section 04 05 13 – Masonry Mortaring and Grouting
- .3 Section 04 05 19 – Masonry Anchorage and Reinforcing
- .4 Section 04 21 13 – Brick Masonry

1.2 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CAN/CSA-A371, Masonry Construction for Buildings.
- .2 South Coast Air Quality Management District (SCAQMD)
 - .1 SCAQMD Rule 1168, Adhesive and Sealant Applications.

1.3 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 accessories 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 on drawings:
 - .1 Flashing, installation details, sizes, spacing, location and quantities of fasteners.
- .4 Samples:
 - .1 Submit 2 samples of masonry accessories as follows:
 - .1 Materials: samples, illustrating colour and colour range. Include:
 - .1 Movement joint filler.
 - .2 Lap adhesive.
 - .3 Mechanical fasteners.
 - .4 Reglets.
 - .5 Brick vents.
 - .2 Moisture control material samples, illustrating colour and colour range, size, and shape. Include:
 - .1 Weep hole vents.
 - .2 Mortar Diverters.
 - .3 Grout screens.
 - .3 Flashing material samples, illustrating colour and colour range, size, shape, and profile. Include as specified:
 - .1 Sheet metal flashings.
 - .2 Composite flashings.
 - .3 Plastic and rubber flashings.

1.4 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 Manufacturer's Instructions: submit manufacturer's instructions as follows:
 - .1 Submit installation instructions for fillers, adhesives, reglets, brick vents, weeps, vents, diverters, screens, and flashings.

1.5 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 accessories from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.6 SITE MEASUREMENTS

- .1 Make site measurements necessary to ensure proper fits of members

2 PRODUCTS

2.1 MATERIALS

- .1 Movement joint filler: sealant and backer rod in accordance with Section 07 92 00
 - .1 Use low VOC products in compliance with SCAQMD Rule 1168.
 - .2 Full height of masonry unit, designed to keep weep holes open for passage of air and water, UV stabilized polypropylene.
- .2 Lap adhesive: recommended by masonry flashing manufacturer.
 - .1 Use low VOC products in compliance with SCAQMD Rule 1168.
- .3 Weep hole vents:
 - .1 Weep vents designed to keep weep hole open for passage of air and water, UV stabilized polypropylene.
 - .2 Size: Height of head joint x depth of masonry unit x thickness of mortar joint.
 - .3 Colour: Grey.
 - .4 Acceptable Product: Cell-Vent D/A 1006 by Dur-O-Wal
- .4 Mechanical fasteners: recommended by flashing manufacturer.

2.2 MOISTURE CONTROL

- .1 Weep hole vents: UV stabilized polypropylene.
 - .1 Size: Height of head joint x depth of masonry unit x thickness of mortar joint.
- .2 Cell Vents: UV stabilized polypropylene
 - .1 Size: Height of head joint x depth of masonry unit x thickness of mortar joint.

- .3 Colour: gray.
- .4 Mortar diverters: shaped and sized to suite cavity spaces.
- .5 Grout screens: 6 mm square monofilament screen fabricated from high-strength, non-corrosive polypropylene polymers to isolate flow of grout in designated areas.

2.3 FLASHINGS

- .1 Sheet metal flashing: Refer to Section 07 62 00.
- .2 Masonry through wall flashing:
 - .1 Sheet Membrane
 - .1 Acceptable products:
 - .1 Blueskin TWF by Hentry
 - .2 ExoAir TWF by Tremco.
 - .2 Primer: As per manufacturer's installation instructions.
 - .3 SBS rubberized asphalt compound integrally laminated to cross laminated polyethylene film.
 - .1 Overall thickness: 1 mm (40 mils).
 - .2 Film thickness: 0.204 mm (8 mils).
 - .3 Service temperature: -40 degrees C to 70 degrees C.

3 EXECUTION

3.1 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..

3.2 INSTALLATION: MATERIALS

- .1 Install continuous movement joint fillers in movement joints at locations indicated on drawings.
- .2 Lap adhesive: apply adhesive to flashing lap joints.
- .3 Mechanical fasteners: install fasteners to suit application and in accordance with manufacturer's written installation instructions.
- .4 Reglets: install reglets at locations indicated on drawings.

3.3 INSTALLATION: MOISTURE CONTROL

- .1 Install weep hole vents in vertical joints immediately over flashings, in exterior wythes of cavity wall and masonry veneer wall construction, at maximum horizontal spacing of 600 mm on centre.
- .2 Mortar diverters: install purpose made diverters in cavities where indicated and as directed, size and shape to suit purpose and function.
- .3 Grout screens: install purpose made screens in cavities where indicated and as directed, size and shape to suit purpose and function.

3.4 INSTALLATION: FLASHINGS

- .1 Build in flashings in masonry in accordance with CAN/CSA-A371
 - .1 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings, and at base of cavity wall and where cavity interrupted by horizontal members or supports and as shown on drawings. Install flashings under weep hole courses and as indicated.
 - .2 In cavity walls and veneered walls, carry flashings from front edge of exterior masonry, under outer wythe, then up backing minimum 150 mm, and as follows:
 - .1 For masonry backing embed or bond flashing 25 mm in joint.
 - .2 For concrete backing, insert or bond flashing into reglets.
 - .3 For wood frame backing, staple flashing to walls behind water resistive paper, and lap joints.
 - .4 For gypsum board and glass fibre faced sheathing backing, bond to wall using manufacturer's recommended adhesive.
 - .3 Lap joints 150 mm and seal with adhesive.
- .2 Form flashing (end dams) at lintels, sills and wall ends to prevent water from travelling horizontally past flashing ends.
- .3 Install vertical flashing where outer veneer returns at window or door jambs, to prevent contact of veneer with inner wall.

3.5 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 04 05 00 – Common Work Results for Masonry
- .2 Section 04 05 13 – Masonry Mortaring and Grouting
- .3 Section 04 05 19 – Masonry Anchorage and Reinforcing
- .4 Section 04 05 23 – Masonry Accessories

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM C73, Standard Specification for Calcium Silicate Brick (Sand-Lime Brick)
 - .2 ASTM C216, Standard Specification for, Facing Brick (Solid Masonry Units Made of Clay or Shale)
 - .3 ASTM E336, Standard Test Method for Measurement of Airborne Sound Attenuation Between Rooms in Buildings
- .2 CSA Group (CSA)
 - .1 CAN/CSA-A82, Fired Masonry Brick Made From Clay or Shale
 - .2 CAN/CSA-A165 Series-14, CSA Standards on Concrete Masonry Units
 - .3 CAN/CSA-A371, Masonry Construction for Buildings
- .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

1.3 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 all unit masonry products and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 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:

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 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 Do not double stack cubes of 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 unit masonry from nicks, scratches, and blemishes.
- .8 Replace defective or damaged materials with new.

2 PRODUCTS

2.1 MATERIALS

- .1 Concrete Block: to CAN/CSA-A165 Series (CAN/CSA-A165.1).
 - .1 Classification: S/15/A/M, 75% solid for all locations where structural members bear on concrete block.
 - .2 H/15/A/M, for all other block work.
 - .3 Fire Resistant Concrete Masonry Units: Manufactured in accordance with CSA A165
 - .1 2 Hour Fire Rating: H/15/C/O
 - .2 1 Hour Fire Rating: H/15/A/O
 - .4 Size: Modular imperial, or match existing where indicated on Drawings.
 - .5 Special shapes:
 - .1 Provide square units for exposed corners.
 - .2 Provide bullnose units for interior walls and partition corners.
 - .3 Provide purpose made shapes for lintels and bond beams.
 - .4 Provide additional special shapes required for project.
 - .5 Manufacture special shapes at same time and with the same batch as standard concrete block to be used.
- .2 Metric Brick: to CAN/CSA-A82. All brick to be manufactured from one continuous run to ensure minimum colour and texture variation
 - .1 Size: Modular, or match existing where indicated on Drawings.
 - .2 Colour and Texture: Match existing, to be confirmed by HWDSB and JASON FUNG ARCHITECT INC.
 - .3 Provide special sizes and shapes as shown on Drawings and as required including but not limited to, plain ends, halves, jambs, sash, lintel, bullnose, and other shapes. Special shapes shall be manufactured to shape, not cut.
 - .4 Notwithstanding the appearance requirements of the above mentioned CSA Standards, block shall be free from all surface indentations, surface cracks and other defects detrimental to the appearance of the finished surface. Blocks with visual defects shall be rejected for exposed areas but may be used for concealed or unfinished areas.
- .3 Reinforcement:
 - .1 Reinforcement in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .4 Connectors:

- .1 Connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .5 Flashings:
 - .1 Flashings in accordance with Section 04 05 23 - Masonry Accessories.
- .6 Mortar Mixes:
 - .1 Mortar and mortar mixes in accordance with Section 04 05 13 - Masonry Mortar and Grouting.
- .7 Grout Mixes:
 - .1 Grout and grout mixes in accordance with Section 04 05 13 - Masonry Mortar and Grouting.
- .8 Cleaning Compounds:
 - .1 Use low VOC products in compliance with SCAQMD Rule 1168.
 - .2 Compatible with substrate and acceptable to masonry manufacturer for use on products.
 - .3 Cleaning compounds compatible with brick masonry units and in accordance with manufacturer's written recommendations and instructions.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for anchorage and reinforcing materials 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..

3.2 PREPARATION

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

3.3 INSTALLATION

- .1 Construction to conform to CAN/CSA-A371.
- .2 Bond: stretcher, or match existing where indicated.
- .3 Jointing: concave where exposed or where paint or similar thin finish coating is specified.

3.4 REINFORCEMENT

- .1 Install reinforcing in accordance with Section 04 05 19 – Masonry Anchorage and Reinforcing.

3.5 CONNECTORS

- .1 Install connectors in accordance with Section 04 05 19 – Masonry Anchorage and Reinforcing.

3.6 FLASHINGS

- .1 Install flashings in accordance with Section 04 05 23 – Masonry Accessories.

3.7 MORTAR PLACEMENT

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

3.8 GROUT PLACEMENT

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

3.9 REPAIR/RESTORATION

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

3.10 SITE QUALITY CONTROL

- .1 Site inspections in accordance with Section 04 05 00 - Common Work Results for Masonry.

3.11 TOLERANCES

- .1 To CAN/CSA-A371.

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 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .3 Clean unglazed clay masonry: 10 m² area of mock up panel specified in Section 04 05 00 - Common Work Results for Masonry as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured, protect windows, sills, doors, trim and other work, and clean brick masonry as follows.
 - .1 Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.
 - .2 Scrub with solution of 25 ml trisodium phosphate and 25 ml household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.
 - .3 Repeat cleaning process as often as necessary to remove mortar and other stains.
 - .4 Use acid solution treatment for difficult to clean masonry as described in Technical Note No.20 by the Brick Industry Association.
- .4 Clean concrete brick masonry as work progresses.
 - .1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of brick and finally by brushing.
- .5 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .6 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.

3.11 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 09 91 23 – Interior Painting

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A36/A36M, Standard Specification for Carbon Structural Steel
 - .2 ASTM A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature or High-Pressure Service and Other Special Purpose Applications
 - .3 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
 - .4 ASTM A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
 - .5 ASTM A325M, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength
 - .6 ASTM A490M, Standard Specification for High-Strength Steel Structural Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-85.10, Protective Coatings for Metals
- .3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA)
 - .1 Handbook of the Canadian Institute of Steel Construction
 - .2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel
- .4 CSA Group (CSA)
 - .1 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .2 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles
 - .3 CAN/CSA-S16, Limit States Design of Steel Structures
 - .4 CAN/CSA-S136, North American Specifications for the Design of Cold Formed Steel Structural Members
 - .5 CSA W47.1, Certification of Companies for Fusion Welding of Steel
 - .6 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding
 - .7 CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings
 - .8 CSA W59, Welded Steel Construction (Metal Arc Welding)
- .5 The Master Painters Institute (MPI)
 - .1 MPI-INT 5.1, Structural Steel and Metal Fabrications
 - .2 MPI-EXT 5.1, Structural Steel and Metal Fabrications
- .6 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE) International
 - .1 NACE No. 3/SSPC SP-6, Commercial Blast Cleaning

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.

- .3 Erection Drawings:
 - .1 Submit erection drawings indicating details and information necessary for assembly and erection purposes including:
 - .1 Description of methods.
 - .2 Sequence of erection.
 - .3 Type of equipment used in erection.
 - .4 Temporary bracings.
- .4 Fabrication Drawings:
 - .1 Submit fabrication drawings showing designed assemblies, components and connections are stamped and signed by qualified professional engineer licensed in Ontario, Canada.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials in manufacturer's original, undamaged containers with identification labels intact.
- .3 Packaging Waste Management: Remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 – Waste Management and Disposal.

2 PRODUCTS

2.1 DESIGN REQUIREMENTS

- .1 Design details and connections in accordance with requirements of CAN/CSA-S16 and CAN/CSA-S136 with CSA-136.1 to resist forces, moments, shears and allow for movements indicated.
- .2 Shear Connections:
 - .1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.
 - .2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.
- .3 For composite construction select or design minimum end connection to resist reaction resulting from factored movement resistance as tabulated in the "Handbook of the Canadian Institute of Steel Construction" assuming 100% shear connection with depth of steel deck and/or slab shown on drawings.
- .4 Submit sketches and design calculations stamped and signed by qualified professional engineer licensed in Ontario, Canada for non standard connections.

2.2 MATERIALS

- .1 Structural Steel: To CSA-G40.20/G40.21 and/or CAN/CSA-S136.
- .2 Anchor Bolts: To CSA-G40.20/G40.21, Grade 300W and/or ASTM A36/A36M.
- .3 High strength anchor bolts: to ASTM A193/A193M.
- .4 Bolts, nuts and washers: to ASTM A307, ASTM A325, ASTM A325M, and ASTM A490/A490M.
- .5 Welding Materials: To CSA W48 Series, CSA W59 and certified by Canadian Welding Bureau.
- .6 Shop Paint Primer: To CISC/CPMA2-75 solvent reducible alkyd, red oxide.
- .7 Hot Dip Galvanizing: Galvanize steel, where indicated, to CAN/CSA-G164.

- .8 Shear Studs: To CSA W59, Appendix H

2.3 FABRICATION

- .1 Fabricate structural steel in accordance with CAN/CSA-S16, CAN/CSA-S136, and in accordance with approved shop drawings.
- .2 Install shear studs in accordance with CSA W59.
- .3 Continuously seal members by continuous welds or intermittent welds and plastic filler where indicated. Grind smooth.
- .4 Provide holes in top and bottom flanges as indicated. Weld threaded studs to top and bottom flanges for attachment of wood nailers.

2.4 SHOP PAINTING

- .1 Clean, prepare surfaces, and shop prime structural steel in accordance with CAN/CSA-S16, CAN/CSA-S136, MPI INT 5.1, EXT 5.1 except where members to be encased in concrete.
- .2 Clean members, remove loose mill scale, rust, oil, dirt and foreign matter. Prepare surface according to NACE No.3/SSPC-SP-6.
- .3 Apply one coat of primer in shop to steel surfaces to achieve minimum dry film thickness of 2-3 mils, except:
 - .1 Surfaces to be encased in concrete.
 - .2 Surfaces to receive site installed stud shear connections.
 - .3 Surfaces and edges to be site welded.
 - .4 Faying surfaces of slip-critical connections.
 - .5 Below grade surfaces in contact with soil.
- .4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5C.
- .5 Maintain dry condition and 5C minimum temperature until paint is thoroughly dry.
- .6 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

3 EXECUTION

3.1 GENERAL

- .1 Structural Steel Work: In accordance with CAN/CSA-S16 and CAN/CSA-S136.
- .2 Welding: in accordance with CSA W59.
- .3 Companies to be certified under Divisoin 1 or 2.1 of CSA W47.1 for fusion welding of steel structure and/or CSA W55.3 for resistance welding of structural components.

3.2 VERIFICATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for anchorage and reinforcing materials 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..

3.3 MARKING

- .1 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping. When steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection
- .2 Match marking: shop mark bearing assemblies and splices for fit and match.

3.4 ERECTION

- .1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16, CAN/CSA-S136, and in accordance with approved erection drawings.
- .2 Site cutting or altering structural members: to approval of HWDSB and JASON FUNG ARCHITECT INC..
- .3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.
- .4 Continuously seal members by continuous welds where indicated. Grind smooth.

3.4 REINFORCEMENT

- .1 Install reinforcing in accordance with Section 04 05 19 – Masonry Anchorage and Reinforcing.

3.5 SITE QUALITY CONTROL

- .1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by HWDSB.
- .2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by HWDSB and JASON FUNG ARCHITECT INC..
- .3 Test shear studs in accordance with CSA W59.

3.6 SITE PAINTING

- .1 Paint in accordance with Section 09 91 23 – Interior Painting.
 - .1 Touch-up damaged surfaces and surfaces without shop coat with primer to NACE No.3/SSPC-SP-6 except as specified otherwise. Apply in accordance: MPI Architectural Painting Specifications Manual.

3.12 CLEANING

- .1 Cleaning: in accordance with Section 01 74 00 - Cleaning.
- .2 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

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and installation of cold formed metal framing. This includes the following:
 - .1 Load-bearing wall cold-formed steel framing.
 - .2 Floor joist cold-formed steel framing
 - .3 Exterior non-load bearing cold-formed steel framing.
 - .4 Roof rafter cold-formed steel framing.
 - .5 Ceiling joist cold-formed steel framing.
 - .6 Soffit cold-formed steel framing.

1.2 RELATED REQUIREMENTS

- .1 Section 05 50 00 – Metal Fabrications
- .2 Section 09 22 16 – Non-Structural Metal Framing

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - .2 ASTM A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
 - .3 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .4 ASTM A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
 - .5 ASTM F3125/F3125M, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181, Ready—Mixed Organic Zinc—Rich Coating
- .3 CSA Group (CSA)
 - .1 CSA W47.1, Certification of Companies for Fusion Welding of Steel
 - .2 CSA W55.3, Certification of Companies for Resistance Welding of Steel and Aluminum
 - .3 CSA W59, Welded Steel Construction
 - .4 CSA S136, North American Specification for the Design of Cold-Formed Steel Structural Members
 - .5 CSA S304, Design of masonry structures
- .4 Canadian Sheet Steel Building Institute (CSSBI):
 - .1 CSSBI 51, Lightweight Steel Framing Design Manual with errata #1 and #2
 - .2 CSSBI Technical Bulletin Vol. 7, No. 2, Standard Thicknesses for Canadian Lightweight Steel Framing Applications
- .5 National Research Council of Canada (NRC):
 - .1 National Building Code of Canada (NBC)
- .6 The Master Painters Institute (MPI)
 - .1 MPI-INT 5.1, Structural Steel and Metal Fabrications

- .2 MPI-EXT 5.1, Structural Steel and Metal Fabrications
- .3 Architectural Painting Specification Manual
- .7 ULC Standards (ULC)
 - .1 CAN/ULC-S101, Standard Method of Fire Endurance Tests of Building Construction and Materials

1.4 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 structural metal stud framing. Include product characteristics, performance criteria, physical sizes, metallic coatings, and limitations.
 - .2 Submit Workplace Hazardous Materials Information System (WHMIS), Safety Data Sheets (SDS).
- .3 Shop Drawings:
 - .1 Submit shop drawings prepared by the delegated design engineer bearing their stamp and signature.
 - .2 Indicate design loads, member sizes, materials, design thickness exclusive of coatings, coating specifications, connection and bracing details, screw sizes and spacing, and anchors.
 - .3 Indicate member and connection locations, dimensions, openings, and connections related work.
 - .4 Include erection diagrams and critical installation procedures as required.
 - .5 Indicate welds with welding symbols as defined in CSA W59.
- .3 Samples:
 - .1 When requested, submit 300 mm lengths of samples of framing components for review.

1.5 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Welders: Companies certified to CSA W47.1 for fusion welding and CSA W55.3 for resistance welding.
 - .2 Licensed Professional: Delegated design engineer, licensed or registered professional engineer in Ontario, Canada.
- .2 Test Reports: When requested, submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .3 Certificates: When requested, submit manufacturer's product certificates certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements. Protect steel studs during transportation, site storage, and installation from corrosion and deformation.
- .2 Minimize outdoor exposure in coastal areas.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors in a clean and dry area, and in accordance with manufacturer's recommendations.
 - .2 If storing outdoors is unavoidable, loosely cover members above ground with non-plastic sheets with allowances to naturally ventilate. Slope materials to drain.

- .3 Carefully handle and protect galvanized materials to prevent damage to zinc coating. Isolate galvanized materials from bare steel, copper, brass, plaster, mortar, pressure preservative treated wood, and recently poured concrete.
- .4 Handle and lift prefabricated panels in a way that prevents permanent distortion to any member or collateral material.
- .5 Replace defective or damaged materials with new ones

2 PRODUCTS

2.1 DESIGN REQUIREMENTS

- .1 Retain a professional engineer to design the wind bearing steel stud wall systems.
- .2 Design systems based on Limit States Design principles using factored loads and resistances.
- .3 Loads and load factors in accordance with the NBC. For wind load calculations, base the reference velocity pressure (q) on a 1 in 50 probability of being exceeded in any one year.
- .4 Design in accordance with CSSBI 51 as modified by requirements of this Section including using editions of Reference Standards indicated in Part 1 of this Section.
- .5 Determine resistances and resistance factors in accordance with the NBC and CSA S136.
- .6 Conform to the requirements of fire rated assemblies indicated on Drawings which have been tested in accordance with CAN/ULC-S101.
- .7 Indicate dimensions of wall stud depth on Drawings. Design wall stud steel thicknesses as required by the Design Criteria. Use greater or lesser stud depths if approved by HWDSB and JASON FUNG ARCHITECT INC..
- .8 Space wall studs at a maximum of 406 mm on centre (o.c.), unless a smaller spacing distance on centre is required by the Design Criteria.
- .9 Conform to the design thicknesses in the following table for wall studs, unless a thicker dimension is required by the Design Criteria.

Wall Stud Depth	Minimum Base Steel Thickness Exclusive of Coating	Design Thickness Exclusive of Coating
92 mm	0.836 mm	0.879 mm
102 mm	0.836 mm	0.879 mm
152 mm	0.836 mm	0.879 mm
203 mm	1.087 mm	1.146 mm

- .10 The minimum thickness for the bridging channel shall be 1.087 mm, unless a thicker bridging channel design thickness is required by the Design Criteria.
- .11 The minimum thickness for clip angles shall be 1.367 mm, unless a thicker clip angle thickness is required by the Design Criteria.
- .12 Maximum flexural deflections under specified wind loads shall conform to the following:
 - .1 Wall studs supporting masonry veneer shall meet the requirements of CSA S304 with stud deflections limited to L/360.
 - .2 Wall studs supporting other finishes with stud deflections limited to L/360
- .13 Limit free play in structural metal stud framing connections perpendicular to the plane of the framing to +/- 0.5 mm relative to the building structure.

- .14 Design components and assemblies to accommodate specified erection tolerances of the building structure.
- .15 Design bridging to prevent member rotation and member translation perpendicular to the minor axis. Allow for secondary stress effects due to torsion between lines of bridging. Do not rely on collateral sheathing to help restrain member rotation and translation perpendicular to the minor axis. Design bridging at a maximum of 1524 mm o.c. Design spacing of bridging at equal intervals over the span length of the member. Closer spacings may be required to satisfy structural requirements.
- .16 Design anchorage and splice details for bridging.
- .17 Design for local loading due to anchorage of cladding and interior wall mounted fixtures where indicated on Drawings.
- .18 Design connections between wind bearing steel stud members with bolts, welding, or sheet metal screws.
- .19 Design head, sill, and jamb members and connections to frame openings larger than 100 mm in any dimension.
- .20 Design anchor top and bottom track to the building structure at a maximum spacing of 813 mm o.c. Closer spacings may be required to satisfy structural requirements.

2.2 MATERIALS

- .1 Steel: To CAN/CSA S136, fabricated from ASTM A653/A653M
 - .1 Zinc coated steel sheet: Quality to ASTM A653/A653M, with Z180 coating.

2.3 METAL FRAMING

- .1 Steel studs: To CSA S136, fabricated from metallic coated steel, depth as indicated.
 - .1 Minimum steel thickness: Meeting Design Criteria.
- .2 Steel Stud Designations: Colour code to CSSBI Technical Bulletin Vol.7, No. 2.
- .3 Stud tracks: Fabricated from same material and finish as steel studs, depth to suit.
 - .1 Bottom track: Single piece
 - .2 Top track: As indicated in structural drawings
- .4 Bridging: Meeting Design Criteria
- .5 Angle clips: Meeting Design Criteria
- .6 Tension straps and accessories: As indicated in shop drawings

2.4 ACCESSORIES

- .1 Welding Materials: To CSA W59 and certified by the Canadian Welding Bureau.
- .2 Welding Electrodes: Minimum 490 MPa tensile strength series.
- .3 Screws: Self-tapping sheet metal screws, minimum 0.008-mm thick zinc coating. Other coatings with equal or better protection will be considered. Cover Sheet metal screws with low profile heads with sheathing materials.
- .4 Concrete Anchors: Concrete expansion anchors or other suitable drilled type fasteners, minimum 0.008-mm-thick zinc coating. Other coatings with equal or better protection will be considered.
- .5 Bolts, nuts, washers: To ASTM A307 or ASTM F3125/F3125M. Hot-dipped galvanized to ASTM A123/A123M.
- .6 Touch-up Paint: Zinc-rich, to CAN/CGSB-1.181, MPI product #18, #19, or #20.

2.5 SOURCE QUALITY CONTROL

- .1 When requested, submit mill reports describing material properties.

3 EXECUTION

3.1 VERIFICATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for cold formed metal framing 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..

3.2 ERECTION

- .1 Erect structural metal stud framing to reviewed shop drawings and CSA S136.
- .2 Perform welding in accordance with CSA W59.
- .3 Erect components to requirements of reviewed shop drawings.
- .4 Anchor tracks securely to structure at a maximum of 800 mm o.c., unless lesser spacing is indicated on shop drawings.
- .5 Erect studs plumb, aligned, and securely attached with a minimum of 1 screws, or welded in accordance with shop drawings. Penetration of sheet metal screws beyond joined materials shall be not less than three exposed threads.
- .6 Seat studs into bottom tracks and top track. Gap between the end of stud and web of track shall not exceed 3.2 mm.
- .7 Install studs at a maximum of 50 mm from abutting walls, openings, and each side of corners and terminations with dissimilar materials.
- .8 Brace steel studs with horizontal internal bridging at a maximum 1500 mm for wind-bearing walls and 1200 mm for load bearing walls.
 - .1 Fasten bridging to steel clips fastened to steel studs with screws or by welding.
- .9 Frame openings in stud walls to adequately carry loads by using additional framing members and bracing as detailed on shop drawings.
- .10 Cutouts: Maximum size of cutouts for services as follows:

Member Depth	Across Member Depth	Along Member Length	On Centre Spacing
92 mm	Max. 40 mm	Max. 105 mm	Min. 600 mm
102 mm	Max. 40 mm	Max. 105 mm	Min. 600 mm
152 mm	Max. 65 mm	Max 115 mm	Min. 600 mm

- .11 Tolerances:
 - .1 Plumb: Maximum 1/500th of member length
 - .2 Camber: Maximum 1/1000th of member length
 - .3 Spacing: Maximum +/- 3 mm from design spacing
 - .4 Gap between end of stud and track web: Maximum 4 mm

3.3 SITE QUALITY CONTROL

- .1 Site Tests and Inspections: Structural metal stud framing delegated design engineer responsible for shop drawings to perform the following:

- .1 Periodically inspect structural metal stud framing work at Project site, including inspection of welded and screwed system connections; connections to primary building structural elements; review member sizes, locations, steel thicknesses, coating thicknesses; erection tolerances; and framing members cut or altered at the Project site.
- .2 Review mill test reports.
- .3 Submit report(s) and a confirmation letter signed and sealed, as described in QUALITY ASSURANCE in Part 1 of this Section.
- .2 Non-Conforming Work: Replace members with localized damage.

3.4 ADJUSTING

- .1 Touch-up welds with one coat of zinc-rich primer. Before applying paint, prepare surface in accordance with paint manufacturer's recommendations.

3.5 CLEANING

- .1 Cleaning: in accordance with Section 01 74 00 - Cleaning. Leave Work area clean at the 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 Protect steel waste from moisture and excessive corrosion.
 - .2 Separate stud framing waste from other construction waste for potential re-use in the Project or recycling.
- .4 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply, fabrication, and install of finishes, isolation coating, shop painting, angle lintels, pipe railings, corner guards, access ladders, trench covers and frames and channel frames.

1.2 RELATED REQUIREMENTS

- .1 Section 05 52 13 – Pipe and Tube Railings

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A 53/A 53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A269M, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
- .2 CSA Group (CSA)
 - .1 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA S16, Design of Steel Structures.
 - .4 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .5 CSA W59, Welded Steel Construction (Metal Arc Welding)
- .3 Environmental Choice Program (ECP)
 - .1 CCD-048, Surface Coatings – Recycled Water-borne
- .4 The Master Painters Institute (MPI)
 - .1 MPI-INT 5.1, Structural Steel and Metal Fabrications
 - .2 MPI-EXT 5.1, Structural Steel and Metal Fabrications
 - .3 Architectural Painting Specification Manual
- .5 ULC Standards (ULC)
 - .1 CAN/ULC-S101, Standard Method of Fire Endurance Tests of Building Construction and Materials
- .6 NACE International
 - .1 ANSI/NACE No. 13/SSPC-ACS-1-2016-SG, Industrial Coating and Lining Application Specialist Qualification and Certification

1.4 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 sections, plates, pipes, tubing, and bolts. Include product characteristics, performance criteria, physical sizes, metallic coatings, and limitations.
 - .2 Submit two copies of Workplace Hazardous Materials Information System (WHMIS), Safety Data Sheets (SDS).
 - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration

in g/L.

- .3 Shop Drawings:
 - .1 Submit shop drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Perform 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 a clean and dry area, and in accordance with manufacturer's recommendations.
 - .2 Replace defective or damaged materials with new.

2 PRODUCTS

2.1 MATERIALS

- .1 Steel Sections and Plates: to CSA G40.20/G40.21.
- .2 Steel Pipe: to ASTM A53/53M.
- .3 Welding Materials: to CSA W59.
- .4 Welding Electrodes: to CSA W48 Series.
- .5 Bolt and Anchor Bolts: To ASTM A307
- .6 Stainless Steel Tubing: To ASTM A269.
- .7 Grout: Non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Use self-tapping shake-proof screws on items requiring assembly by screws or as indicated.
- .3 Where possible, fit and shop assemble work, ready for erection.
- .4 Exposed welds continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating to CAN/CSA-G164.
- .2 Chromium plating: chrome on steel with plating sequence of 0.009 mm thickness of copper, 0.010 mm thickness of nickel and 0.0025 mm thickness of chromium.
- .3 Shop coat primer: MPI-INT, EXT 5.1A; MPI-INT, EXT 5.1B.

- .4 Zinc primer: zinc rich, ready mix to MPI-INT, EXT 5.2C.

2.4 ISOLATION COATING

- .1 Isolate aluminum from following components, by means of bituminous paint:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 - .2 Concrete, mortar and masonry.
 - .3 Wood.

2.5 SHOP PAINTING

- .1 Primer: Low VOC content limit to GS-11.
- .2 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Paint when temperature minimum 7C.
- .4 Clean surfaces to be field welded; do not paint.

3 EXECUTION

3.1 VERIFICATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for metal fabrications 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..

3.2 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CSA S16 or Weld field connection as indicated in Drawings.
- .7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer.
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.3 CLEANING

- .1 Cleaning: in accordance with Section 01 74 00 - Cleaning. Leave Work area clean at the 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.

3.4 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply, fabrication, and install of steel pipe railings.

1.2 RELATED REQUIREMENTS

- .1 Section 05 50 00 – Metal Fabrication

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM F3125/F3125M, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
- .2 CSA Group (CSA)
 - .1 CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA W59, Welded Steel Construction (Metal Arc Welding).
- .3 Green Seal Environmental Standards (GS)
 - .1 GS-11, Paints and Coatings
- .4 The Master Painters Institute (MPI)
 - .1 MPI-INT 5.1, Structural Steel and Metal Fabrications
 - .2 MPI-EXT 5.1, Structural Steel and Metal Fabrications
 - .3 Architectural Painting Specification Manual
- .5 Underwriter's Laboratories (UL)
 - .1 UL 2768, Architectural Surface Coatings
- .6 NACE International
 - .1 ANSI/NACE No. 13/SSPC-ACS-1-2016-SG, Industrial Coating and Lining Application Specialist Qualification and Certification

1.4 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 sections, plates, pipes, tubing, and bolts. Include product characteristics, performance criteria, physical sizes, metallic coatings, and limitations.
 - .2 Submit two copies of Workplace Hazardous Materials Information System (WHMIS), Safety Data Sheets (SDS).
 - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.
- .3 Shop Drawings:
 - .1 Submit shop drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
 - .2 Indicate construction details, sizes of steel sections, and thickness of steel sheet.

- .3 Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
- .4 Indicate installation of handrails and guardrails including but not limited to plans, elevations, sections, details of components, anchor details, and clearances to adjacent assemblies. Indicate critical field dimensions and conflicts.
- .5 Indicate installation conditions at obstructions or at junction with adjacent construction as necessary to provide continuity of protection.
- .4 Samples:
 - .1 Provide samples when requested for review and acceptance.
 - .2 Submit two 300 mm long samples of handrail and typical fittings complete with specified finish.
 - .3 Submit two complete sets of colour chips showing manufacturer's complete range of finishes.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Perform 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 a clean and dry area, and in accordance with manufacturer's recommendations.
 - .2 Replace defective or damaged materials with new.

2 PRODUCTS

2.1 MATERIALS

- .1 Steel Sections and Plates: to CSA G40.20/G40.21.
- .2 Steel Pipe: to ASTM A53/53M.
- .3 Steel Tubing: to CSA G40.20/G40.21.
- .4 Welding materials: to CSA W59.
- .5 Bolt and Anchor Bolts: to ASTM A307
- .6 High Strength Bolts: to ASTM A F3125/F3125M
- .7 Grout: Non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

- .1 Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- .2 Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.

- .1 Clearly mark units for reassembly and coordinated installation.
- .2 Use connections that maintain structural value of joined pieces.
- .3 Cut, drill, and punch metals cleanly and accurately.
 - .1 Remove burrs and ease edges smooth
 - .2 Remove sharp or rough areas on exposed surfaces.
- .4 Form work true to line and level with accurate angles and surfaces.
- .5 Fabricate connections that are exposed to weather in a manner that excludes water.
 - .1 Provide weep holes where water may accumulate.
 - .2 Locate weep holes in inconspicuous locations.
- .6 Cut, reinforce, drill, tap as indicated to receive finish hardware, screws, and similar items.
- .7 Fabricate railings with welded connections unless otherwise indicated.
- .8 Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- .9 Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.
- .10 Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 6mm or less.
- .11 Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
- .12 Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.
 - .1 Fabricate anchorage devices capable of withstanding loads imposed by railings.
 - .2 Coordinate anchorage devices with supporting structure.
- .13 For railing posts set in concrete, provide stainless steel sleeves not less than 150 mm long with inside dimensions not less than 13 mm greater than outside dimensions of post, with metal plate forming bottom closure.
- .14 Handrails:
 - .1 Fabricate steel handrails as detailed. Fabricate as detailed, including, but not limited to design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than needed to withstand indicated design loads. Accurately and uniformly fabricate components. Fabricate guard rails and balustrades to Building Code requirements and to ANSI/NAAMM AMP521.
 - .2 Grind weld smooth. Remove sharp edges and burrs, Welds must be ground smooth and flush with adjacent surfaces. Fill welded areas and grind markings and sand smooth. Ensure welded areas, cut locations and all other fabricated surfaces are undetectable from adjacent architectural quality steel. Ensure that bends are smooth and uniform to radii indicated.
 - .1 Cope components at connections to provide close fit, or using fittings designed for this purpose.
 - .2 Weld all around at connections, including at fittings.
 - .3 Form changes in direction of railings by radius bends of radius indicated.
 - .3 Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required, maintain cross section of members throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
 - .4 Provide expansion joints in railings as required and as indicated on the reviewed shop drawings. Ensure that expansion joints are flush.
 - .5 Provide wall brackets, end closures, flanges, miscellaneous fittings and anchors for

interconnecting components and for attaching to other work.

- .1 63 mm diameter and 6 mm thick attachment plate with counter-sunk holes fastened to solid blocking with suitable fasteners at 1220 mm o.c. maximum.
- .2 Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
- .3 Connect posts to stair framing by direct welding, unless otherwise indicated.
- .4 Ensure that surface is smooth and continuous in appearance.
- .5 For non-galvanized railings, provide non-galvanized ferrous metal fittings, brackets, fasteners, and sleeves, except galvanized anchors embedded in exterior masonry and concrete construction.
- .6 Wall-Mounted Handrails:
 - .1 Where wall-mounted handrails are indicated, provide handrails and brackets as detailed. Provide wall returns at wall mounted handrails, unless otherwise indicated.
 - .1 63 mm diameter x 6 mm thick attachment plate with counter-sunk holes fastened to solid blocking with suitable fasteners at 1220 mm.
 - .2 Close ends of returns unless clearance between end of rail and wall is 6 mm or less.
 - .3 Provide filler made from steel plate, or other suitably crush resistant material, where required to transfer wall bracket loads through wall finishes to structural supports.
 - .4 Size fillers to suit wall finish thickness and to produce adequate bearing area to prevent bracket rotation.

2.3 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating to CAN/CSA-G164.
- .2 Shop coat primer: MPI-INT, EXT 5.1A; MPI-INT, EXT 5.1B.
- .3 Zinc primer: zinc rich, ready mix to MPI-INT, EXT 5.2C.

2.4 SHOP PAINTING

- .1 Clean surfaces in accordance with Steel Structures Painting Council Manual Volume 2.
- .2 Apply one coat of shop primer except interior surfaces of pans.
- .3 Apply two coats of primer of different colours to parts inaccessible after final assembly.
- .4 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease. Minimum temperature for painting 7C.
- .5 Do not paint surfaces to be field welded.

3 EXECUTION

3.1 VERIFICATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for metal fabrications 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..

3.2 INSTALLATION

- .1 Installation shall be by skilled personnel only as directed by manufacturer.
- .2 Provide matching end caps and returns/covers at exposed ends.
- .3 Install work, plumb, straight, even and true to required lines, levels, and slopes. Reject and replace bent, scratched, dented mismatched, loose, or out-of-true work.
- .4 Perform cutting, drilling, and fitting required for installing railings.
 - .1 Fit exposed connections together to form tight, hairline joints.
 - .2 Install railings level, plumb, square, true to line without distortion, warp, or rack.
 - .3 Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
 - .4 Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
- .5 Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - .1 Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- .6 Adjust railings before anchoring to ensure matching alignment at abutting joints.
- .7 Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.
- .8 Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field

3.3 CLEANING

- .1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .2 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
- .5 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.4 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and install of rough carpentry work in accordance with the Drawings.

1.2 RELATED REQUIREMENTS

- .1 Section 06 20 00 – Finish Carpentry
- .2 Section 06 40 00 – Architectural Woodwork
- .3 Section 07 62 00 – Sheet Metal Flashing and Trim

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.
 - .2 ASTM C954, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
 - .3 ASTM D7612, Standard Practice for Categorizing Wood and Wood-Based Products According to their Fiber Sources
 - .4 ASTM F593: Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.
 - .5 ASTM F594: Standard Specification for Stainless Steel Nuts
 - .6 ASTM F1482, Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
 - .7 ASTM F1667, Standard Specification for Driven Fasteners: Nails, Spikes and Staples
- .2 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-11.3, Hardboard.
 - .2 CAN/CGSB-51.32, Sheathing, Membrane, Breather Type.
 - .3 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - .4 CAN/CGSB-71.26, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems
- .3 CSA Group (CSA)
 - .1 CSA O86, Engineered Design in Wood
 - .2 CSA O112.9, Evaluation of Adhesives for Structural Wood Products (Exterior Exposure)
 - .3 CSA O121, Douglas Fir Plywood
 - .4 CSA O141, Softwood Lumber
 - .5 CSA O151, Canadian Softwood Plywood
 - .6 CSA O153, Poplar Plywood
 - .7 CSA O325, Construction Sheathing
- .4 Canadian Wood Council
 - .1 Wood Design Manual
 - .2 Engineering Guide for Wood Frame Construction
- .5 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber
 - .2 NLGA SPS-1, Fingerjoined Structural Lumber
 - .3 NLGA SPS-2, Machine Graded Lumber
 - .4 NLGA SPS-4, Fingerjoined Machine Graded Lumber

- .6 ULC Standards/UL Canada (ULC)
 - .1 CAN/ULC-S101, Standard Methods for Fire Endurance Tests of Building Construction and Materials
 - .2 CAN/ULC-S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

1.4 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 wood products and accessories and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Include manufacturer's pre-engineered installation details and pre-engineered floor, ceiling and roof joist span charts.
 - .3 Submit certified test reports for prefabricated structural members from an approved independent laboratory indicating compliance with specifications for specified performance characteristics and physical properties.
 - .4 Submit Canadian Construction Materials Centre (CCMC) Product Evaluation Report and/or Certificate number for engineered wood products.
 - .5 Submit manufacturer's installation instructions
- .3 Shop Drawings:
 - .1 For structural applications or conditions beyond the scope of the manufacturer's pre-engineered design information, submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
 - .2 Include on drawings:
 - .1 Design data in accordance with CSA O86 and CWC Engineering Guide for Wood Frame Construction.
 - .2 Indicate configuration and spacing of pre-engineered timber members, hanger and connector types, fasteners, locations and design values; bearing details.
 - .3 Indicate allowable load and stress increase.
 - .4 Indicate arrangement of webs or other members to accommodate ducts and other specialties.
 - .3 Provide a comprehensive set of engineering calculations or computer analysis and design outputs demonstrating the adequacy of the proposed system when requested by the Owner and Consultant.
- .4 Informational Submittals (to be submitted during the course of Work):
 - .1 Material Certificates: Submit certificates for machine-graded and fingerjoined dimensional lumber indicating species and grade selected for each use and design values approved by the NLGA.

1.5 QUALITY ASSURANCE

- .1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.
- .3 Lumber quality: Carefully select individual pieces so that knots and obvious defects will not interfere with placing bolts, proper nailing or making proper connections.
- .4 Moisture Content of wood at time of construction shall be 19% maximum.

- .5 Each piece of fire retardant treated lumber shall be shop marked with the ULC monogram, in accordance with CAN/CSA O80-M.
- .6 Dimensions of lumber shall conform to dressed sizes specified in CAN/CSA-0141 unless actual dimensions are otherwise indicated or specified.
- .7 Dimensional references to lumber on Drawings and in Specifications are to nominal sizes unless actual dimensions are indicated. Such actual dimensions shall be dry size.
- .8 Lumber defects: Discard wood with defects which will render a piece unable to serve its intended function. Lumber will be rejected by Consultant for excessive warp, twist, bow, crook, mildew, fungus, or mould, as well as for improper cutting and fitting, whether or not it has been installed.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Perform 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 using pallets or blocking a minimum of 150 mm from the ground and covered with protective waterproof sheets allowing for air circulation and ventilation under the covering.
 - .2 Protect edges and corners of sheet materials from damage during handling and storage.
 - .3 Protect kiln-dried and seasoned wood materials from conditions that will cause an increase to moisture content.
 - .4 Store engineered lumber on its edge.
 - .5 Stack, lift, brace, cut and notch engineered lumber products in accordance with manufacturer's instructions and recommendations.
 - .6 Store separated reusable wood waste convenient to cutting station and work areas.
- .3 Packaging Waste Management: Perform In accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.1 PERFORMANCE CRITERIA

- .1 Plywood Grades: Provide plywood products in nominal dimensions required for the project; grade-marked by accredited agencies of the APA and that conform to the Canadian Plywood Grading Guide, and tolerances described for specific plywood Products below, and identified as follows:
 - .1 Name of Standard CSA O121 or CSA O151;
 - .2 Manufacturer's Mill Identification;
 - .3 Bond Quality (Exterior or Interior);
 - .4 Commercial Species Grouping (DFP, CSP, ASP or HEM-FIR);
 - .5 Product Grade (SHG, SEL, SEL TF, G1S or G2S);
 - .6 Nominal Thickness; and
 - .7 Additional Grade or Product Designations (if applicable).
- .2 Lumber Grades: Provide lumber products that are all sides finished (S4S) in nominal dimensions required for the project; grade marked by accredited agencies of the Canadian Lumber Standards Accreditation Board and conform to National Grading Rules published by the National Lumber Grades Authority, and as follows:

- .1 Grading: Machine Grading, Visual Grading, or Both.
- .2 Moisture Content: 19% or less.
- .3 Structural Design Properties: Strength and related properties in accordance with CSA O86 and NLGA SPS 2.
- .4 Sizes: Nominal dressed dimensions described in CSA O141 for surfaced dry conditions and wood species.
- .5 Acceptable Alternative Products: Lumber products meeting requirements of the American Lumber Standards Committee designated ALS Program Lumber and that are accepted by the Canadian Lumber Standards Accreditation Board, may be acceptable for the Project when proof of compliance with strength and related properties meeting CSA O86 are submitted before purchasing any lumber products.

2.2 MATERIALS

- .1 Dimensional Lumber: to CSA O141, S4S.
 - .1 Grading: As indicated on Drawings
 - .2 Sizes: As indicated on Drawings.
 - .3 Species Group: Spruce-Pine-Fir (SPF), Douglas Fir-Larch (D.FIR-L), Hemlock-Douglas Fir (HEM-FIR).
 - .4 Strapping: Provide 19 mm deep x 38 mm wide materials as described above for stud framing and stud grade.
 - .5 Miscellaneous Framing: Provide furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers, and other materials matching lumber used within framed construction; or use Light Framing, No.2 Grade or better materials where lumber grade is not indicated.
- .2 Panel Materials:
 - .1 Structural Shear Walls and Floor Diaphragm Panels: Provide design rated plywood panels meeting requirements of CSA O86, thickness as indicated on drawings.
 - .1 Design Rated Plywood: Exterior rated, sheathing grade Douglas Fir or Canadian Softwood Plywood meeting requirements of CSA O121 or CSA O151.
 - .2 Design Rated OSB: Structural 1, exterior rated OSB panels meeting requirements of CSA O452.
 - .1 CSA O437 Design Rated Grade O 2 may be used when accepted by Consultant, submit engineering information indicating proposed thickness and manufacturer's proprietary usage information before ordering materials.
 - .2 Wall Sheathing: Provide plywood wall sheathing or OSB having End Use Mark W (Walls); at choice of Constructor, thickness as required by span rating and meeting requirements of CSA O325 and as follows:
 - .1 Plywood: Exterior rated, sheathing grade square edged Douglas Fir or Canadian Softwood Plywood meeting requirements of CSA O121 or CSA O151.
 - .2 Span Rated OSB:
 - .1 Exterior rated, sheathing grade, OSB or waferboard meeting requirements of CSA O437 SR.
 - .2 Use products with fire-resistant treatment or intumescent coating for sheathing panels facing adjacent wall construction that meets requirements of the NBC.
 - .3 Fire-Endurance Rating: No burn through (stay in place) for a minimum 15 minutes or more in accordance with CAN/ULC S101.
 - .4 Maximum Flame Spread (FS): Clearly labelled on face of sheathing indicating maximum FS 25 or less in accordance with CAN/ULC S102.

- .3 Roof Sheathing: Provide plywood roof sheathing, thickness as required by span rating and meeting requirements of CSA O325 and as follows:
 - .1 Span Rated Plywood: Exterior rated, sheathing grade Douglas Fir or Canadian Softwood Plywood meeting requirements of CSA O121 or CSA O151.
 - .2 Span Rated OSB: Exposure 1 Rated, sheathing grade OSB or waferboard meeting requirements of CSA O437.
 - .3 H-Clips: Galvanized steel or extruded aluminum; 38-mm x 38-mm blocking securely nailed between framing members will be considered as an acceptable alternative to tongue and groove material and H-Clip materials.
- .4 Floor Sheathing: Provide plywood subfloor, thickness as required by span rating and meeting requirements of CSA O325 and as follows:
 - .1 Span Rated Plywood: Exterior rated, sheathing grade tongue and groove edged Douglas Fir or Canadian Softwood Plywood meeting requirements of CSA O121 or CSA O151.
 - .2 Span Rated OSB: Exterior rated, sheathing grade tongue and groove edged OSB, faces and edges sealed to prevent swelling when wet and meeting requirements of CSA O437.
- .5 Floor Underlayment: Provide plywood or OSB, G1S with no knot fillers or adhesives detrimental to finished flooring products; minimum thickness 10 mm and meeting requirements of CSA O325 and ASTM F1482, and as follows:
 - .1 Plywood Underlayment: Exterior rated, sheathing grade square edged Poplar plywood meeting requirements of CSA O153.
 - .2 OSB Underlayment: Exterior rated, sheathing grade square edged OSB or waferboard, Grade O 1.
- .6 Plywood Blocking and Backing Panels: Douglas Fir and Canadian Softwood Plywood using exterior grade adhesives meeting requirements of CSA O121 or CSA O151; kiln dry plywood to moisture content of 15% or less, and as follows:
 - .1 Concealed Blocking: Select Grade (SEL) Canadian Softwood Plywood).
 - .2 Exposed Panels and Panel Boards: Good One Side (G1S) Douglas Fir Plywood.
 - .3 Fire Rated Intumescent Coating: Refer to Section 07 84 00 – Fire Stopping.

2.3 ACCESSORIES

- .1 Driven Fasteners: Steel nails, spikes, brads and staples meeting requirements of ASTM F1667. Ensure length is sufficient to penetrate connecting solid wood materials.
 - .1 Exterior Work: Hot-dipped galvanized.
 - .2 Interior High Humidity Work: Hot-dipped galvanized.
 - .3 Interior Work: Electroplated zinc plated, or cadmium plated.
- .2 Rough Hardware (Bolts, Nuts and Washers): Provide manufacturer recommended fastening devices and anchors meeting requirements of ASTM A307 and as follows:
 - .1 Ground Contact Materials: Stainless steel.
 - .2 Exterior Work: Hot-dipped galvanized.
 - .3 Interior High Humidity Work: Hot-dipped galvanized.
 - .4 Interior Work: Electroplated zinc plated, or cadmium plated.
- .3 Wood Screws: Steel screws meeting requirements of ASME B18.6.1 and as follows:
 - .1 Exterior Work: Galvanized, ceramic coated or stainless steel.
 - .2 Interior Work: Galvanized.
- .4 Screws for Fastening to Cold-Formed Metal Framing: Steel screws meeting requirements of ASTM

- C954, except for wafer heads and reamer wings whose length should be as recommended by screw manufacturer for material being fastened.
- .5 Prefabricated Metal Anchoring Systems, Framing Connectors and Hangers: Prefabricated products tested or designed in accordance with CSA O86; types and configurations as indicated on drawings.
 - .6 Sill Gaskets: Flexible, self-adhering closed-cell foam membrane that bridges gaps and irregularities between top of concrete foundation and sill components; nominal 10-mm thickness x width indicated on Drawings x manufacturer's maximum length.
 - .7 Subflooring Adhesive: CAN/CGSB-71.26, cartridge loaded.
 - .8 General Purpose Adhesive: CSA O112.9.
 - .9 Joist Hangers, Connectors and Fasteners: In accordance with accepted shop drawings, minimum 1-mm thick steel sheet, galvanized to a minimum ZF001 coating designation.
 - .10 Nailing Discs: Flat caps, minimum 25-mm diameter, minimum 0.4 mm thick formed to prevent dishing. Bell or cup shapes not acceptable.
 - .11 Roof Sheathing H-Clips: Formed "H" shape, thickness to suit panel material.

3 EXECUTION

3.1 VERIFICATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for metal fabrications 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..

3.2 INSTALLATION

- .1 Requirements:
 - .1 Accurately frame and properly assemble rough carpentry work
 - .2 Securely attach rough carpentry work to substrate by anchoring and fastening
 - .3 Include required nails, fastenings and other connectors
 - .4 Set rough carpentry to required levels and lines with members plumb, true to line, cut, and fitted
 - .5 Fit rough carpentry to other construction
 - .6 Scribe and cope as needed for accurate fit
 - .7 Locate furring, nailers, blocking, grounds, and similar supports as required when attaching to other construction.
 - .8 Do not use materials with defects that impair the quality of the rough carpentry or use pieces that are too small to use with a minimum number of joints or optimum joint arrangement.
- .2 Sill Plate Construction: Install sill gasket material between pressure treated sill plate and concrete foundation wall in accordance with manufacturer's instructions.
- .3 Wood Frame Construction: Space framing members at maximum 406 mm on centre using continuous pieces of the longest possible length and as follows:
 - .1 Fabricate wood frame construction to the requirements of Part 9 of the NBC, except where more stringent requirements are indicated on the drawings.

- .2 Make allowance for erection stresses.
- .3 Securely brace members in place to maintain plumb and true until permanently fixed and held to structure.
- .4 Minimize cutting of framing members for pipes and other penetrations by coordinating with other parts of the Work before starting work of this Section; limit cutting and hole drilling to limitations listed in Part 9 of the NBC.
- .4 Sheathing Installation: Install sheathing in accordance with Part 9 of the NBC and as follows:
 - .1 Wall Sheathing: Install wall sheathing horizontally to wood framing using minimum 50-mm long coated nails at 150 mm along edges and 305 mm along vertical members in the middle of the sheets; leave 2 mm to 3 mm between sheets to allow for shrinkage of wood framing.
 - .2 Shear Wall Sheathing: Refer to drawings for nailing patterns and installation details; install blocking behind all shear wall sheathing joints; adhere and nail sheathing to wall framing.
 - .3 Roof Sheathing: Install roof sheathing with length perpendicular to roof framing using 50-mm coated nails at 150 mm along edges and 305 mm along roof framing in the middle of the sheets and as follows:
 - .1 Nail size and pattern noted above is a minimum requirement; increase number and decrease spacing, or increase size as required to meet site conditions.
 - .2 Butt joints tightly together, support all edges of non tongue and grooved sheathing with 38-mm x 89-mm framing, H Clips or other acceptable method for square edge sheathing.
 - .4 Floor Sheathing:
 - .1 Install subfloor sheathing with the length in the direction of face orientation at right angles to floor framing.
 - .2 Offset joints parallel to the floor joists.
 - .3 Make panels continuous over two or more supports.
 - .4 Use a continuous bead of adhesive along each floor framing member and screw fasten at 150 mm along edges and 305 mm along floor framing in middle of sheathing.
 - .5 Nail size and pattern noted above is a minimum requirement; increase number and decrease spacing, or increase size as required to meet site conditions.
 - .6 Butt joints tightly together, use only tongue and grooved floor sheathing materials to maintain edge support.
 - .7 Support all edges of tongue and grooved plywood with 38-mm x 89-mm framing where indicated for diaphragm construction.
 - .8 Leave a minimum 3-mm gap between subfloor sheathing panels where panels will be covered with underlayment. Butt panels into light contact for combined subfloor and underlayment sheathing.
 - .9 Drill holes in subfloor sheathing in ponded areas where flooding has occurred to allow standing water to drain from floor; repair holes in combined subfloor and underlayment sheathing prior to installation of floor finish materials.
- .5 Floor Underlayment:
 - .1 Install underlayment using adhesive and nails fastened at 150 mm on centre throughout the entire piece of underlayment.
 - .2 Run sheets perpendicular to subfloor underlayment sheathing.
 - .3 Offset underlayment joints by a minimum of one joist space from sheathing joints, stagger end joints of underlayment.
 - .4 Butt end and edge joints into light contact to form a smooth and uniform surface ready for installation of floor finish materials.
 - .5 Maintain a minimum 6-mm space around room perimeters.

- .6 Install underlayment immediately prior to installation of flooring materials; coordinate with Section 09 65 00 - Resilient Flooring and Accessories and Section 09 65 66 – Resilient Athletic Flooring.
- .5 Roof Framing, Parapets, Cant Strips, and Plates:
 - .1 Construct wooden roof curbs around openings in the roof for vents, ducts, and other penetrations.
 - .2 Make curbs a minimum height of 200 mm above roof membrane; make base of curbs same thickness as insulation.
 - .3 Form sloped tops to wood parapet plates and wood up stands more than 38 mm wide to roofs that receive metal flashings; sloped not less than 2:12.
 - .4 Provide continuous wood backing for flashings.
 - .5 Provide solid wood or plywood sheathing and backing to receive membrane and metal flashings, conforming to CRCA Manual; fasten plywood sheathing securely to walls of parapets using mechanical fasteners; nails are not acceptable.
 - .6 Construct framing and blocking for membrane control joints conforming to CRCA Manual.
- .6 Telecommunications and Data Panel Boards:
 - .1 Install 19-mm DFP G1S plywood on all walls in telephone [and data] rooms receiving wiring and equipment
 - .2 Minimum 1220-mm x 2440-mm panels on periphery walls over 300 mm wide, mounted 150 mm off of finished floor
 - .3 Coordinate installation and locations with Section 26 05 00 - Common Work Results for Electrical.
- .7 Provide electrical equipment backboards for mounting electrical equipment as indicated. Use 19-mm thick plywood on 19 x 38 mm furring around spacing, perimeter and at maximum 305 mm intermediate.

3.3 CLEANING

- .1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .2 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
- .5 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.4 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and install of wood based finishing products purchase ready-made and installed by finish carpenter with minimal fabrication. Includes, but is not limited to, standard pattern wood trim, mouldings and millwork; standard paneling, shelving and related products; standard profile board paneling; fasteners, adhesives, wood treatment, and accessory hardware.

1.2 RELATED REQUIREMENTS

- .1 Section 06 10 00 – Rough Carpentry
- .2 Section 09 91 23 – Interior Painting

1.3 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI A208.1, Particleboard.
 - .2 ANSI A208.2, Medium Density Fibreboard (MDF) for Interior Applications
 - .3 ANSI/HPVA HP-1, American National Standard for Hardwood and Decorative Plywood
 - .4 ANSI/BHMA A156, Auxiliary Hardware
 - .5 ANSI/ASME 18.6.1, Wood Screws (Inch Series)
- .2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
 - .1 Architectural Woodwork Quality Standards
- .3 ASTM International (ASTM):
 - .1 ASTM A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - .2 ASTM E1333, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber.
 - .3 ASTM F1667, Standard Specification for Driven Fasteners: Nails, Spikes and Staples
- .4 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-11.3, Hardboard.
- .5 CSA Group (CSA)
 - .1 CSA O121, Douglas Fir Plywood.
 - .2 CSA O151, Canadian Softwood Plywood.
 - .3 CSA O153, Poplar Plywood.
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS)
- .7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168, Adhesives and Sealants Applications
- .8 ULC Standards/UL Canada (ULC)
 - .1 CAN/ULC-S104, Standard Method for Fire Tests of Door Assemblies.
 - .2 CAN/ULC-S105, Standard Specification for Fire Door Frames

1.4 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, data sheets and catalogue pages for specified products. Include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
 - .2 Submit two copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements
- .3 Shop Drawings:
 - .1 Prepare and submit shop drawings in general accordance with AWMAC AWS manual.
 - .2 Indicate profiles and dimensions, assembly techniques, jointing, methods of fastening, terminations and other related details.
 - .3 Indicate materials, thicknesses, finishes and hardware.
 - .4 Include schedule or key plan.
 - .5 Show profiles, elevations and details at scales recommended by AWMAC AWS.
 - .6 Where necessary, show location and type of blocking and backing required within supporting assemblies.
- .4 Samples:
 - .1 Submit triplicate 300 mm long representative samples of each typical item of finish carpentry.
 - .1 Standing and running trim: 300 mm long.
 - .2 Panel materials: 300 mm x 300 mm.
 - .2 Shop applied coating samples:
 - .1 For transparent finish, submit triplicate samples of each species and cut of wood veneer to be used, finished to match project sample.
 - .2 For opaque finish, submit triplicate samples for each colour selection, finished to match project sample.
 - .3 Decorative overlaid composite panels, complete with applied edge treatment and corner treatment, minimum 300 mm x 300 mm.
 - .4 Samples for site applied finish:
 - .1 Furnish four samples of each finish carpentry item and composite panel material to Contractor for preparation of site applied finish samples.
 - .5 Submit duplicate samples of each hardware item to be left exposed in final construction. Samples will not be returned for incorporation into the work
- .5 Certifications: Submit certificates signed by manufacturer certifying materials comply with specified performance characteristics, physical properties and requirements of referenced standards

1.5 QUALITY ASSURANCE

- .1 Perform Work of this Section by finish carpentry contractor with minimum 5 years of current experience and having completed minimum one project in the past 5 years with value within 20% of the cost of the work of this Section

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Deliver finish carpentry materials only when area of work is enclosed, plaster and concrete work is dry, area is broom clean and site environmental conditions are acceptable for installation.
- .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 Maintain indoor temperature and humidity within range recommended by AWS for location of the Work.
- .3 Store products on site as specified for minimum 72 hours before installation.
- .4 Store and protect finish carpentry products from moisture, nicks, scratches, and blemishes.
- .5 Replace defective or damaged materials with new.
- .4 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.1 PERFORMANCE CRITERIA

- .1 Wood fire rated frames and panels: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 or NFPA 252 for ratings specified or indicated.
- .2 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104 or NFPA 252 and listed by nationally recognized agency having factory inspection services.

2.2 MATERIALS

- .1 Lumber Material:
 - .1 Softwood lumber: unless specified otherwise, S4S, moisture content 19% or less by following standards:
 - .1 CAN/CSA-O141
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
 - .3 AWMAC custom grade, moisture content as specified.
 - .2 Machine stress-rated lumber is acceptable.
 - .3 Hardwood lumber: moisture content 7 % or less in accordance with the following standards:
 - .1 National Hardwood Lumber Association (NHLA).
 - .2 AWMAC custom grade, moisture content as specified.
 - .4 Concealed framing lumber and plywood:
 - .1 Eastern Spruce, Balsam Fir, or Jack Pine, to CAN/CSA O141, NLGA, and NAAWS Custom Grade, S4S, average moisture content 7% +/- 2% at installation.
 - .2 Softwood plywood: CSA O151-M; in thickness as indicated on drawings, (G2S)
- .2 Veneer Core Plywood:
 - .1 Hardwood plywood conforming to ANSI/HPVA HP-1.
 - .2 Plywood grade: APA plywood, Grade A-D, in sizes, thickness and shapes as indicated.
 - .3 Laminate types:
 - .1 PLAM on 12.7 mm and 19 mm plywood as indicated.
 - .2 PLAM on 19 mm fire retardant treated plywood as indicated
- .3 Wood veneer:
 - .1 White Oak, conforming to ANSI/HPVA HP-1 having finishes and meeting grades as follows:
 - .1 Opaque finish, Grade B.
 - .2 Transparent finish, Grade AA.
 - .3 Face veneer cut: Rift cut.
 - .4 Sizes, thickness, and shapes as indicated.

- .4 High Pressure Decorative Laminate
 - .1 Refer to Section 06 24 00 – High Pressure Decorative Laminate.
- .5 Miscellaneous metals: In accordance with Section 05 50 00 – Metal Fabrication.
- .6 Glass and glazing materials: In accordance with Section 08 80 00 - Glazing.
- .7 Finishing: In accordance with Section 09 91 23 – Interior Painting

2.3 ACCESSORIES

- .1 Provide screws, bolts, expansion shields and other fastening devices required for satisfactory installation.
- .2 Exposed fasteners to match finish of hardware.
- .3 Nails and staples: to ASTM F1677, galvanized to ASTM A153/A153M for exterior work, interior humid areas; plain finish elsewhere.
- .4 Wood screws: to ANSI/ASME 18.6.1, countersunk flush type unless indicated otherwise, in sizes to suit application, galvanized to ASTM A153/A153M for exterior work, interior humid areas.
- .5 Panel adhesive: Type to suit application.
 - .1 Low VOC limit to SCAQMD Rule 1168.

3 EXECUTION

3.1 VERIFICATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for metal fabrications 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..

3.2 PREPARATION

- .1 Back prime woodwork before installation, to AWS.

3.3 INSTALLATION

- .1 Install items of finish carpentry in accordance with AWMAC AWS grade specified for respective items
- .2 In case of conflict between Contract Documents and AWS grade requirements, Contract Documents govern.
- .3 Install items of finish carpentry at locations shown on drawings.
 - .1 Position accurately, level, plumb straight.
 - .2 Fasten and anchor securely.
- .4 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.
- .5 Form joints to conceal shrinkage

3.4 CONSTRUCTION

- .1 Fastening:
 - .1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
 - .2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
 - .3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.
 - .4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.
- .2 Standing and running trim:
 - .1 Butt and cope internal joints of baseboards to make snug, tight, joint. Cut right angle joints of casing and base with mitred joints.
 - .2 Fit backs of baseboards and casing snugly to wall surfaces to eliminate cracks at junction of base and casing with walls.
 - .3 Make joints in baseboard, where necessary using a 45 degrees scarf type joint.
 - .4 Install door and window trim in single lengths without splicing.
- .3 Interior and exterior frames:
 - .1 Set frames with plumb sides and level heads and sills and secure.
- .4 Panelling:
 - .1 Secure panelling and perimeter trim using adhesive recommended for purpose by manufacturer. Fill nail holes caused by temporary fixing with filler matching wood in colour.
 - .2 Secure panelling and perimeter trim using concealed fasteners.
 - .3 Secure panelling and perimeter trim using counter sunk screws plugged with matching wood plugs.
- .5 Stairs:
 - .1 Install stairs to location and details as indicated.
- .6 Handrails, wall rails and bumper rails.
 - .1 Install handrails, wall rails and bumper rails in locations indicated.
 - .2 Make joints hair line, dowelled and glued.
 - .3 Install support brackets as indicated.
 - .4 Install brackets at ends and at 1220 mm o.c. minimum at intermediate spacings.
 - .5 Secure using counter sunk screws plugged with matching wood plugs.
- .7 Shelving:
 - .1 Install shelving on as indicated.

3.5 CLEANING

- .1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .2 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

3.6 PROTECTION

- .1 Fill and retouch all nicks, chips and scratches in factory finishes and substrate materials to AWS standards. Replace damaged items that cannot be repaired to AWS standards
- .2 Protect installed products and components from damage during construction.
- .3 Repair damage to adjacent materials caused by finish carpentry installation.
- .4 Leave work to be site finished ready for finishing by Section 09 91 23 - Interior Painting.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and install of high pressure decorative laminate.

1.2 RELATED REQUIREMENTS

- .1 Section 06 20 00 – Finish Carpentry
- .2 Section 06 40 00 – Architectural Woodwork
- .3 Section 06 47 00 – Plastic Laminate Finishing
- .4 Section 09 91 23 – Interior Painting

1.3 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI/NEMA LD 3, High Pressure Decorative Laminates
- .2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
 - .1 Architectural Woodwork Quality Standards
 - .2 AWMAC NAAWS 3.1, North American Architectural Woodwork Standards
- .3 ASTM International (ASTM):
 - .1 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials
- .4 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-71, Adhesive, Contact, Brushable
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS)
- .6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168, Adhesives and Sealants Applications

1.4 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, data sheets and catalogue pages for specified products. Include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
 - .2 Submit two copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements
- .3 Samples:
 - .1 Submit two copies of laminate samples for selection, illustrating available colours and surface textures.

1.5 QUALITY ASSURANCE

- .1 Installer Qualifications: Company specializing in fabricating and installing decorative plastic laminate finished work.
- .2 Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful service performance.
- .3 Mock-Ups: Build mockups to verify selections made under submittals and to demonstrate aesthetic

effects, set quality for materials and construction, set quality standard for fabrication and installation

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Deliver decorative laminate with heavy kraft paper protection and store in cartons during shipping.
- .3 Protect decorative laminate surfaces during fabrication and installation stages. Do not remove protective covering until final clean-up prior to final inspection.
- .4 Do not store or install Products in areas where relative humidity is less than 25% or greater than 60% at 22C
- .5 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Acceptable Manufacturers:
 - .1 Formica
 - .2 Abet Laminaati
 - .3 Trespa
 - .4 Wilsonart
- .2 Substitutions: Permitted, subject to review by HWDSB and JASON FUNG ARCHITECT INC.
- .3 Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 MATERIALS

- .1 High Pressure Decorative Laminate (HDPL):
 - .1 Basis-of-Design Product: Formica Laminate – Commercial (0.69 mm thickness).
 - .2 Colour: to be selected by HWDSB and JASON FUNG ARCHITECT INC. from manufacturer's standard range.
 - .3 Finish: Matte.
 - .4 Grade: Grade 20 – vertical postforming grade.
 - .5 Dimensions: Largest allowed with minimal seams.

2.3 ACCESSORIES

- .1 Core Materials: as per section 06 20 00 – Finish Carpentry and as indicated on Drawings.
- .2 Sealer: Water-resistant type.
- .3 Draw Bolts and Splines: Suitable for new core bases, and acceptable to fabricator.
- .4 Contact Adhesive: to CAN/CGSB-71.20-M and low VOC content

3 EXECUTION

3.1 VERIFICATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for metal fabrications 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..
- .2 Verify cutouts in core materials are prepared for fixtures and other penetrating components.

3.2 PREPARATION

- .1 Follow all manufacturer instructions.
- .2 Make joints in core materials tight, flush, and hairline, using draw bolts and splines.
- .3 Round internal corners, chamfer edges and seal exposed edges in core materials.

3.3 INSTALLATION

- .1 Comply with ANSI/NEMA LD 3, Annex A and AWMAC NAAWS 3.1., and Manufacturer's instructions.
- .2 Install Products plumb, true and square, neatly scribed and fitted to adjoining surfaces.
- .3 Ensure adjacent laminate sheets match in colour, texture, and pattern.
- .4 Ensure decorative laminate and core profiles coincide to ensure full continuous support and bond over entire surface.
- .5 Use continuous lengths to minimize joints. Maintain joints a minimum of 600 mm from sink cutouts.
- .6 Offset joints in decorative laminate from joints in core material.
- .7 Apply decorative laminate to exposed edges of core material for straight self-edging strips flat work.
- .8 Chamfer exposed edges of decorative laminate uniformly at 20 degrees.
- .9 Do not mitre decorative laminate edges.
- .10 Apply backing sheets where required to conceal and balance core material.
- .11 Apply cabinet liner sheets to interior of cabinets where indicated on Drawings.

3.4 FIELD QUALITY CONTROL

- .1 Gaps at corners, or between trim and core materials will be rejected by HWDSB and JASON FUNG ARCHITECT INC..

3.5 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.

3.6 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Provide temporary protective covering until approval by HWDSB and JASON FUNG ARCHITECT INC.. Keep in place until Project Handover.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and install of plastic laminate finishing.

1.2 RELATED REQUIREMENTS

- .1 Section 06 10 00 – Rough Carpentry
- .2 Section 06 20 00 – Finish Carpentry
- .3 Section 06 47 00 – Plastic Laminate Finishing
- .4 Section 09 91 23 – Interior Painting

1.3 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI 208.1, Particleboard
 - .2 ANSI A208.2, Medium Density Fibreboard (MDF) for Interior Applications
- .2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
 - .1 Architectural Woodwork Quality Standards
 - .2 AWMAC NAAWS 3.1, North American Architectural Woodwork Standards
- .3 ASTM International (ASTM):
 - .1 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-71, Adhesive, Contact, Brushable
- .5 CSA Group (CSA)
 - .1 CAN3-A172, High Pressure Paper Base, Decorative Laminates
 - .2 CSA O112 Series, CSA Standards for Wood Adhesives
 - .3 CSA O121, Douglas Fir Plywood
 - .4 CSA O151, Canadian Softwood Plywood
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS)
- .7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168, Adhesives and Sealants Applications

1.4 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, data sheets and catalogue pages for specified products. Include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
 - .2 Submit two copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements
- .3 Samples:
 - .1 Submit two copies of laminate samples for selection, illustrating available colours and surface textures.

1.5 QUALITY ASSURANCE

- .1 Installer Qualifications: Company specializing in fabricating and installing decorative plastic laminate finished work.
- .2 Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful service performance.
- .3 Mock-Ups: Build mockups to verify selections made under submittals and to demonstrate aesthetic effects, set quality for materials and construction, set quality standard for fabrication and installation

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Deliver laminated plastic finished surfaces with heavy kraft paper protection and store in cartons during shipping.
- .3 Protect laminated plastic surfaces during fabrication and installation stages. Do not remove protective covering until final clean-up prior to final inspection.
- .4 Do not store or install Products in areas where relative humidity is less than 25% or greater than 60% at 22C
- .5 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

1.7 WARRANTY

- .1 Manufacturer Warranty: 2-year warranty, including coverage against warping, splitting, or delaminating, subject to normal usage, excluding excessive moisture or heat.
- .2 Installer Warranty: 1-year warranty, including coverage for the installation of the Work.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Acceptable Manufacturers:
 - .1 Formica
 - .2 Abet Laminaati
 - .3 Wilsonart
- .2 Substitutions: Permitted, subject to review by HWDSB and JASON FUNG ARCHITECT INC.
- .3 Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 MATERIALS

- .1 Laminated Plastic for Flatwork: to CAN3-A172, Grade GP, Type SD, 1.25 mm thick. Based on full colour range with velour finish.
 - .1 Type: General purpose.
 - .2 Grade: HGS.
 - .3 Colour: integral colour throughout
 - .4 Pattern: to be determined by HWDSB and JASON FUNG ARCHITECT INC. selected from manufacturer's standard range of colour and finish.
 - .5 Finish: Velour
- .2 Laminated Plastic for Postforming Work: to CAN3-A172, Grade PF, Type S, 1.07 mm thick. Based on full colour range with velour finish.

- .1 Type: Portforming.
- .2 Grade: HGP.
- .3 Colour: integral colour throughout
- .4 Pattern: to be determined by HWDSB and JASON FUNG ARCHITECT INC. selected from manufacturer's standard range of colour and finish.
- .5 Finish: Velour
- .3 Laminated Plastic Backing Sheet: Supplied by same manufacturer as facing sheet. Not less than 0.508 mm thick and same colour as face laminate. Sanded one side.
- .4 Laminated Plastic Liner Sheet: Supplied by same manufacturer as facing sheet. Not less than 0.760 mm thick and white colour.
- .5 Laminated Plastic Fire Retardant: to NEMA LD 3
 - .1 Type: Flame retardant.
 - .2 Grade: HGF.
 - .3 Size: 1.27 mm thick.
 - .4 Colour: Integral colour throughout
 - .5 Pattern: to be determined by HWDSB and JASON FUNG ARCHITECT INC. selected from manufacturer's standard range of colour and finish.
 - .6 Finish: to be determined by HWDSB and JASON FUNG ARCHITECT INC. selected from manufacturer's standard range of colour and finish
- .6 Plywood Core: Douglas Fir Plywood to CSA-O121 or Canadian Softwood Plywood to CSA-O151 solid two sides, 19 mm thick.
- .7 Particleboard Core: to CAN3-0188.1, Grade R, sanded faces, of thickness indicated.
- .8 Adhesive for Laminated Plastic: to be CSA approved and one of the following types as selected by the laminate manufacturer as being suitable for the application.
 - .1 Urea resin adhesive to CSA-O112.
 - .2 Contact adhesive to CAN/CGSB-71.20.
 - .3 Resorcinol resin adhesive to CSA-O112.
 - .4 Polyvinyl adhesive to CSA-O112.
 - .5 Two component epoxy thermosetting adhesive.
- .9 Sealer: Water-resistant sealer or glue acceptable to laminate manufacturer.
- .10 Sealant: as recommended by the laminate manufacturer and in accordance with Section 07 92 00 – Joint Sealants. Colour to be selected by the Consultant.
- .11 Draw Bolts and Splines: Suitable for new core bases, and acceptable to fabricator.
- .12 Apply laminate backing sheet to reverse side of core of plastic laminate work.
- .13 Apply laminated plastic liner sheet to interior of cabinetry, including all exposed surfaces such as gable ends, doors and drawers, and where otherwise indicated.

2.3 FABRICATION

- .1 Comply with NEMA LD3, Annex A.
- .2 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.
- .3 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .4 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 2400 mm. Keep joints 600 mm from sink cutouts.

- .5 Form shaped profiles and bends as indicated, using postforming grade laminate to laminate manufacturer's instructions.
- .6 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.
- .7 Apply laminate backing sheet to reverse side of core of plastic laminate work.
- .8 Apply laminated plastic liner sheet to interior of cabinetry.

3 EXECUTION

3.1 VERIFICATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for metal fabrications 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..
- .2 Surfaces to be adhesively bonded shall be clean, dry and free of any dust, loose paint, wax, moisture, dirt, grease, oil, rust, or other contaminants.

3.2 PREPARATION

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

3.3 INSTALLATION

- .1 Comply with ANSI/NEMA LD 3, Annex A and AWMAC NAAWS 3.1., and Manufacturer's instructions.
- .2 Install Products plumb, true and square, neatly scribed and fitted to adjoining surfaces.
- .3 Make allowances around perimeter where fixed objects pass through or project into laminated plastic work to permit normal movement without restriction.
- .4 Use draw bolts and splines in countertop joints. Maximum spacing 450 mm o.c., 75 mm from edge. Make flush hairline joints.
- .5 At junction of laminated plastic counter backsplash and adjacent wall finish, apply small bead of sealant.
- .6 Where applicable, site apply laminated plastic to units as indicated. Adhere laminated plastic over entire surface. Make corners with hairline joints. Use full sized laminate sheets. Make joints only where indicated and approved. Slightly bevel edges.
- .7 For site application, offset joints in plastic laminate facing from joints in core.

3.4 ADHESIVE SPRAY APPLICATIONS

- .1 Comply with adhesive manufacturer's printed installation instructions.
- .2 Apply contact adhesive uniformly to both surfaces and with a minimum of 80% coverage for each surface. Apply PVA adhesive to one side with a minimum of 80% coverage.
- .3 Apply two coats of adhesive to porous surfaces. Provide 100% coverage for edges.
- .4 Apply uniform downward pressure (30 to 40 psi minimum) across the entire bonded surface.

3.5 ADHESIVE BRUSH APPLICATIONS

- .1 Comply with adhesive manufacturer's printed installation instructions.
- .2 Apply contact adhesive uniformly to both surfaces with a brush or solvent-resistant medium nap roller; cover each surface 100%. Apply PVA adhesive to one side, for 100%.
- .3 Provide two coats of adhesive on porous surfaces. Double coat edges.
- .4 Apply uniform downward pressure (30 to 40 psi minimum) across the entire bonded surface

3.6 FIELD QUALITY CONTROL

- .1 Gaps at corners, or between trim and core materials will be rejected by HWDSB and JASON FUNG ARCHITECT INC..

3.7 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.

3.8 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Provide temporary protective covering until approval by HWDSB and JASON FUNG ARCHITECT INC.. Keep in place until Project Handover.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and install of various forms of board insulation, including perimeter foundation, underslab, cavity wall, and roof.

1.2 RELATED REQUIREMENTS

- .1 Section 03 30 00 – Cast-in-Place Concrete
- .2 Section 07 26 00 – Vapour Retarders
- .3 Section 07 27 00 – Air Barriers
- .4 Section 07 62 00 – Sheet Metal Flashing and Trim
- .5 Section 08 80 00 – Glazing

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A653/A653M, Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process
 - .2 ASTM A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
 - .3 ASTM C165, Standard Test Method for Measuring Compressive Properties of Thermal Insulations
 - .4 ASTM C208, Standard Specification for Cellulosic Fiber Insulating Board
 - .5 ASTM C518, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - .6 ASTM C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
 - .7 ASTM C591, Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
 - .8 ASTM C612, Standard Specification for Mineral Fibre Block and Board Thermal Insulation
 - .9 ASTM C726, Standard Specification for Mineral Fiber Roof Insulation Board
 - .10 ASTM C728, Standard Specification for Perlite Thermal Insulation Board
 - .11 ASTM C1104/C1104M, Standard Test Method for Determining the Water Vapour Sorption of Unfaced Mineral Fibre Insulation
 - .12 ASTM C1126, Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation
 - .13 ASTM C1289, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
 - .14 ASTM C1303/C1303M, Standard Test Method for Predicting Long-Term Thermal Resistance of Closed-Cell Foam Insulation
 - .15 ASTM D1621, Standard Test Method for Compressive Properties of Rigid Cellular Plastics
 - .16 ASTM D2842, Standard Test Method for Water Absorption of Rigid Cellular Plastics
 - .17 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials
 - .18 ASTM E96/E96M, Standard Test Methods for Water Vapour Transmission of Materials.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 71-GP-24M, Adhesive, Flexible, for Bonding Cellular polystyrene Insulation
- .3 CSA Group (CSA)
 - .1 CSA B149 PACKAGE-20, Consists of B149.1, Natural Gas and Propane Installation Code and B149.2, Propane Storage and Handling Code
- .4 UL Canada (ULC)

- .1 CAN/ULC-S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .2 CAN/ULC-S107, Standard Methods of Fire Tests of Roof Coverings.
- .3 CAN/ULC-S114, Standard Method of Test for Determination of Non-Combustibility in Building Materials.
- .4 CAN/ULC-S126, Standard Method of Test for Fire Spread Under Roof-Deck Assemblies.
- .5 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
- .6 CAN/ULC-S702, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
- .7 CAN/ULC-S702.2, Mineral Fibre Thermal Insulation for Buildings Part 2: Application Guidelines.
- .8 CAN/ULC-S704, Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS)

1.4 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, data sheets and catalogue pages for specified products. Include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
 - .2 Submit two copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements
- .3 Samples: When requested, submit 300 x 300 mm x full board thickness of each type of board insulation.
- .4 Certificates: When requested, submit manufacturer's product certificates certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .5 Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .6 Manufacturer's Instructions: Submit manufacturer's installation instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Deliver board insulation marked with its thermal resistance value, associated reference standard number, Type, and Class. Packaged in accordance with the associated reference standard.
- .3 Storage and Handling Requirements:
 - .1 Store materials in a clean, dry area and in accordance with manufacturer's recommendations.
 - .2 Store and protect plastic insulation from sunlight except as necessary during installation, protect from ignition sources, hydrocarbons, other petroleum derivatives, and other products that may cause degeneration.
- .5 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Acceptable Manufacturers of mineral fibre rigid board insulation:
 - .1 Rockwool
- .2 Acceptable Manufacturers of extruded polystyrene rigid board insulation:
 - .1 DuPont Performance Building Solutions.
 - .2 Owens-Corning Canada Inc.
- .3 Acceptable Manufacturers of polyisocyanurate rigid board insulation:
 - .1 Atlas Roofing Corporation.
 - .2 Firestone Building Products.
 - .3 GAF Materials Corporation.
 - .4 Hunter Panels.
 - .5 IKO Industries Ltd.
 - .6 Soprema.
- .4 Acceptable Manufacturers of mineral fibre batt, blanket, and semi-rigid board insulation:
 - .1 CertainTeed Canada, Inc.
 - .2 Knauf Insulation.
 - .3 Owens-Corning Canada Inc.
 - .4 Rockwool.
- .5 Substitutions: Permitted, subject to review by HWDSB and JASON FUNG ARCHITECT INC.
- .6 Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 REGULATORY REQUIREMENTS

- .1 Conform to applicable code for combustibility, flame and smoke performance requirements of polystyrene insulation.
- .2 Ensure foamed plastic insulations contain zero HFC and HCFC blowing agents, and conform to the Global Warming Potential (GWP) values required by The Montreal Protocol.

2.3 MATERIALS

- .1 Rigid Board Insulation: To CAN/ULC-S702.1, Type 1; mineral fibre rigid board insulation, manufactured from rock or slag fibers; and as follows:
 - .1 Aged Thermal Resistance (ASTM C518): RSI > 0.76 per 25 mm of thickness.
 - .2 Compressive Strength (ASTM C165): 35 kPa at 25% deformation.
 - .3 Facing: Unfaced.
 - .4 Board Size: 1 220 x 1 830 mm.
 - .5 Density (ASTM C612): 128 kg/m³.
 - .6 Combustibility (CAN/ULC-S114): Noncombustible.
 - .7 Surface Burning Characteristics (CAN/ULC-S102):
 - .1 Flame Spread Index = 0.
 - .2 Smoke Developed Index = 5.
 - .8 Moisture Resistance (ASTM C1104/C1104M): 0.04%.
 - .9 Thickness: As indicated on Drawings.
- .2 Rigid Board Insulation: To CAN/ULC-S701.1, Type 4; extruded polystyrene (XPS) rigid board insulation, closed cell type, with integral high density skin; and as follows:
 - .1 Aged Thermal Resistance (ASTM C518): RSI > 0.88 per 25 mm of thickness.

- .2 Compressive Strength (ASTM D1621): 275 KPa.
- .3 Water Absorption (ASTM D2842): < 0.7 percent by volume.
- .4 Water Vapour Permeance (ASTM E96/E96M): 57 ng/Pa•s•m².
- .5 Thickness: As indicated on Drawings.
- .3 Rigid Board Insulation: To CAN/ULC-S704.1; polyisocyanurate rigid board insulation, closed cell type; and as follows:
 - .1 Long Term Thermal Resistance (CAN/ULC-S770): RSI > 0.93 per 25 mm of thickness.
 - .2 Compressive Strength (ASTM D1621): 140 kPa.
 - .3 Faces: Glass reinforced mat facers both sides.
 - .4 Water Absorption (ASTM D2842): < 1 percent.
 - .5 Edges: Square.
 - .6 Combustibility: Meets CAN/ULC-S107 and CAN/ULC-S126.
 - .7 Water Vapour Permeance (ASTM E96/E96M): 85 ng/Pa•s•m².
 - .8 Thickness: Do not use boards less than 38 mm thick; total thickness as indicated on Drawings using a minimum of two layers.
- .4 Semi-rigid stone wool Batt Insulation (Rated Walls) (between studs or as indicated on the drawings): to CAN/ULC-S702, Type 1; non-rigid, friction fit type, manufactured from glass, rock or slag:
 - .1 Aged Thermal Resistance: R value of 22.5 total (152 mm thick)
 - .2 Combustibility: Noncombustible to CAN/ULC-S114.
 - .3 Surface Burning Characteristics: to CAN/ULC-S102, maximum flame spread of 0, smoke development of 0.
- .5 Sound Attenuation Batts (Non-Rated Walls)
 - .1 Type: Unfaced glass fiber acoustical insulation complying with ASTM C 665, Type I.
 - .2 Size
 - .3 Surface Burning Characteristics:
 - .1 Maximum flame spread: 10
 - .2 Maximum smoke developed: 10When tested in accordance with ASTM E 84.
 - .4 Combustion Characteristics: Passes ASTM E 136.
 - .5 Fire Resistance Ratings: Passes ASTM E 119 as part of a complete fire tested wall assembly.
 - .6 Sound Transmission Class: minimum STC 45, max STC 55
 - .7 Dimensional Stability: Linear Shrinkage less than 0.1%

2.3 ADHESIVES

- .1 Mastic type, synthetic rubber base, fungi resistant, gun or trowel application, application temperature 12°C to 50°C. Product as recommended by manufacturer.

2.4 ACCESSORIES

- .1 Mechanical Fasteners: Stainless steel screw type fastener, complete with 75 mm OD moulded plastic disc washer.
- .2 Adhesive for Use with Polystyrene: To CGSB 71-GP-24M, Type 1.
- .3 Adhesive for Use with Other Materials: Mastic type, synthetic rubber base, fungi resistant, gun or trowel application.

3 EXECUTION

3.1 VERIFICATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for thermal insulation 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..

3.2 PREPARATION

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
- .4 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .5 Offset both vertical and horizontal joints in multiple layer applications.
- .6 Do not enclose insulation until it has been inspected and approved by Consultant.

3.3 INSTALLATION – GENERAL

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .2 Fit insulation tight around penetrating electrical boxes, plumbing piping heating pipes, and ducts, around exterior doors and windows and other protrusions.
- .3 Keep plastic insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of ULC-604 type A chimney and CSA B149.1 and CSA B149.2 vents.
- .4 Cut and trim insulation neatly to fit spaces. Butt joints tightly.
- .5 In multi-layered applications, offset vertical and horizontal joints.
- .6 Use only insulation boards free from chipped or broken edges.
- .7 Use largest possible boards to reduce number of joints.

3.4 INSTALLATION – RIGID AND SEMI-RIGID INSULATION

- .1 Unless specified otherwise, apply Type 1 adhesive to the substrate by notched trowel at the rate in accordance with the manufacturer's recommendations.
- .2 Embed insulation boards into air/vapour barrier type adhesive, applied as specified, prior to skinning of adhesive.
- .3 Install insulation boards on wall surface either horizontally or vertically as required. Place membrane surface of insulation solidly against substrate and securely fasten.
- .4 Install mineral fibre semi-rigid boards to CAN/ULC-S702.2..

3.5 INSTALLATION – SOUND ATTENUATION INSULATION

- .1 Comply with manufacturer's instructions for particular conditions of installation in each case.
- .2 Batts may be friction-fit in place until the interior finish is applied. Install batts to fill entire stud

cavity. If stud cavity is less than 2438 mm in height, cut lengths to friction-fit against floor and ceiling tracks. Walls with penetrations require that insulation be carefully cut to fit around outlets, junction boxes and other irregularities.

- .3 Where walls are not finished on both sides or insulation does not fill the cavity depth, supplementary support must be provided to hold product in place.
- .4 Where insulation must extend higher than 2438 mm, temporary support can be provided to hold product in place until the finish material is applied.

3.6 INSTALLATION – UNDERSLAB INSULATION

- .1 Extend boards as indicated on Drawings, and as follows:
 - .1 Lay boards on level compacted fill.
 - .2 Protect top surface of horizontal insulation from damage during concrete work by installing protection board.
- .2 Tape joints of underslab insulation and fill with 2 lb spray insulation

3.7 INSTALLATION – CAVITY WALL INSULATION

- .1 Install polystyrene insulation boards on outer surface of inner wythe of wall cavity on bed of adhesive as recommended by board manufacturer.

3.8 INSTALLATION – BATTS AND BLANKETS

- .1 Install mineral fibre batts and blankets to ULC-S702.2.
- .2 Install batt insulation in spaces without gaps and voids.
- .3 Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.

3.9 CLEANING

- .1 Progress Cleaning: Perform 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.

3.10 PROTECTION

- .1 Protect installed insulation as recommended by manufacturer.
- .2 Protect insulation edges at the end of each working day.
- .3 Protect insulation in areas where welding will be carried out.
- .4 Replace insulation damaged by other trades.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and install of sheet vapour barriers utilizing accessories. Installation includes exterior surface openings, perimeter seals, lap joint seals and around electrical boxes..

1.2 RELATED REQUIREMENTS

- .1 Section 07 21 00 – Thermal Insulation
- .2 Section 07 27 00 – Air Barriers
- .4 Section 07 62 00 – Sheet Metal Flashing and Trim
- .5 Section 07 92 00 – Joint Sealants

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials
 - .2 ASTM E96/E96M, Standard Test Methods for Water Vapor Transmission of Materials
 - .3 ASTM E154/E154M, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
 - .4 ASTM E1643, Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
 - .5 ASTM E1745, Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
 - .6 ASTM E1993/E1993M, Standard Specification for Bituminous Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.33, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction
 - .2 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction

1.4 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, data sheets and catalogue pages for vapour retarders. Include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
 - .2 Submit two copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements
- .3 Certificates: When requested, submit manufacturer's product certificates certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .5 Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .6 Manufacturer's Instructions: Submit manufacturer's installation instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Perform 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, indoors in a clean, dry area and in accordance with manufacturer's recommendations.
 - .2 Store and protect from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.1 SHEET VAPOUR BARRIERS

- .1 Polyethylene film: to CAN/CGSB-51.34.
- .2 Foil: to CAN/CGSB-51.33, Type 1.
- .3 Smart Vapour Retarder (Exterior and Interior): polyimide film vapour retarder for use with unfaced, vapor permeable glass fiber and mineral wool insulation in wall and ceiling cavities, meeting or exceeding the following minimum requirements:
 - .1 Water Vapour Permeance, to ASTM E96.
 - .2 Dry cup method: 1.0 perms (57ng/Pa*s*m2).
 - .3 Wet cup method: 10.0 perms (1144ng/Pa*s*m2).
 - .4 Surface burning characteristics, to ASTM E84: Class A.
- .4 Underslab Plastic Sheet Vapour Retarder: High density, puncture resistant polyolefin resin sheet in accordance with ASTM E1745 and CAN/CGSB-51.34.
- .5 Pre-Formed Vapour Retarder: 2.8 mm thick, semi-flexible, seven-ply sheet membrane consisting of reinforced bituminous core and carrier sheet with fortified asphalt layers, protective weather coating, and removable plastic release liner in accordance with ASTM E1993 and as follows:
 - .1 Vapour Permeance: 0.011 perm maximum.
 - .2 Water Vapour Transmission Rate: 1.6 ng/Pasm2 maximum.
 - .3 Tensile Strength: 27.4 kN/m minimum.
 - .4 Puncture Resistance: 660 N.
- .6 Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim, and as follows:
 - .1 Weight: not less than 12 kg/100 m2.
 - .2 Water Vapour Transmission: 2.9 ng/Pasm2 maximum.
- .7 Fire-Retardant, Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either a nonwoven grid of nylon cord or polyester scrim and
 - .1 Weight: not less than 10 kg/100 m2.
 - .2 Water Vapour Transmission: 7.53 ng/Pasm2 maximum.
 - .3 Flame-spread and smoke-developed: not more than 5 and 60, respectively.

2.2 ACCESSORIES

- .1 Fasteners: Provide non-corrosive metal screws, nails, plastic clips and other fasteners as recommended by vapour retarder manufacturer required for complete installation of Work.
- .2 Joint sealing tape: High density, air resistant pressure sensitive adhesive tape, type recommended

by vapour barrier manufacturer, 50 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.

- .3 Sealant: Asbestos free non hardening sealant, compatible with vapour retarder materials, recommended by vapour retarder manufacturer and to Section 07 92 00 - Joint Sealants.
- .4 Staples: minimum 6 mm leg.
- .5 Substrate Crack Filler: Closed cell foam backer rod.
- .6 Through Wall Membranes: Manufacturer's recommended reinforced self adhesive, compatible with vapour membrane and that will not become plastic and extrude onto finished surfaces when exposed to high wall temperatures.
- .7 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.
- .3 Adhesive for Use with Other Materials: Mastic type, synthetic rubber base, fungi resistant, gun or trowel application.

3 EXECUTION

3.1 VERIFICATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for vapour retarder 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..

3.2 INSTALLATION

- .1 Ensure services are installed and inspected before installation of retarder.
- .2 Install sheet vapour retarder on warm side of exterior wall, ceiling, and floor assemblies before installation of finish to form continuous retarder.
- .3 Use sheets of largest practical size to minimize joints.
- .4 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

3.3 EXTERIOR SURFACE OPENINGS

- .1 Cut sheet vapour retarder to form openings and ensure material is lapped and sealed to frame.

3.4 PERIMETER SEALS

- .1 Seal perimeter of sheet vapour barrier as follows:
 - .1 Apply continuous bead of sealant to substrate at perimeter of sheets.
 - .2 Lap sheet over sealant and press into sealant bead.
 - .3 Install staples through lapped sheets at sealant bead into appropriate substrate.
 - .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.5 LAP JOINT SEALS

- .1 Seal lap joints of sheet vapour barrier as follows:

- .1 Attach first sheet to substrate.
- .2 Apply continuous bead of sealant over solid backing at joint.
- .3 Lap adjoining sheet and press into sealant bead in accordance with manufacturer's requirements.
- .4 Install staples through lapped sheets at sealant bead into appropriate substrate.
- .5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.6 ELECTRICAL BOXES

- .1 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:
 - .1 Install moulded box vapour barrier or wrap boxes with film sheet providing minimum 300 mm perimeter lap flange.
 - .2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover

3.7 INSTALLATION – UNDERSLAB SHEET VAPOUR BARRIER

- .1 Install vapour barrier in accordance with manufacturer's written instructions and ASTM E1643, and generally as follows:
 - .1 Unroll vapour barrier with the longest dimension parallel to direction of concrete placement.
 - .2 Lap vapour barrier onto face of grade beams.
 - .3 Overlap joints in accordance with manufacturer's requirements.
 - .4 Seal penetrations including pipe and conduit risers in accordance with manufacturer's written instructions.
 - .5 Make no additional penetrations except as required for placing of reinforcing steel and permanent utilities.
- .2 Repair damaged areas by cutting patches of vapour barrier membrane; sized to overlap damaged area, and tape all sides using manufacturer's required tape.

3.8 INSTALLATION – PREMOULDED SHEET VAPOUR BARRIER

- .1 Apply membrane in accordance with manufacturer's instructions to provide a permanent, monolithic vapor seal without voids or open seams.
- .2 Ensure accessory materials are compatible with membrane and approved by membrane manufacturer.
- .3 Place membrane in position by either Dutch lap method with laps sealed with bonding asphalt or by butt joint method with joints sealed with joint tape.
- .4 Point exposed edges with pointing mastic to prevent water from traveling under membrane.
- .5 Place membrane collar around protrusions through concrete slab, including sewer pipes, water pipes, and utility inlets to create a positive seal between protrusions and membrane. Seal in place with joint tape and point around protrusions with pointing mastic.
- .6 Adhere membrane to vertical surfaces with adhesive.

3.9 CLEANING

- .1 Progress Cleaning: Perform 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.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and install of air/vapour barrier materials and assemblies. Air/vapour barrier materials to provide continuous seal between components of building envelope and building penetrations.

1.2 RELATED REQUIREMENTS

- .1 Section 07 21 00 – Thermal Insulation
- .2 Section 07 27 00 – Air Barriers
- .3 Section 07 62 00 – Sheet Metal Flashing and Trim
- .4 Section 07 92 00 – Joint Sealants
- .5 Section 08 51 13 – Aluminum Windows

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers Tension.
 - .2 ASTM E96/E96M, Standard Test Methods for Water Vapor Transmission of Materials.
 - .3 ASTM E154/E154M, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
 - .4 ASTM E2178, Standard Test Methods for Air Permeance of Buildings
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-19.13M, Sealing Compound, One Component, Elastomeric Chemical Curing
 - .2 CAN/CGSB-19.18M, Sealing Compound, One Component, Silicone Base Solvent Curing
 - .3 CAN/CGSB-19.24M, Multi-Component, Chemical Curing Sealing Compound
 - .4 CAN/CGSB-19-GP-14M, Sealing compound, One Component, Buyl-Polyisobutylene Polymer Base, Solvent Curing
- .3 National Building Code of Canada (NBC)
 - .1 NBC, Part 5 – Environmental Separation
- .4 Sealant and Waterproofer's Institute (SWI)
 - .1 SWI Sealant and Caulking Guide Specification
- .5 UL Canada (ULC)
 - .1 CAN/ULC-S741: Standard for Air Barrier Materials - Specification.
 - .2 CAN/ULC-S742: Standard for Air Barrier Assemblies - Specification.

1.4 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, data sheets and catalogue pages for air/vapour barriers. Include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
 - .2 Submit two copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements
- .3 Certificates: When requested, submit manufacturer's product certificates certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Test Reports: Submit certified test reports showing compliance with specified performance

characteristics and physical properties.

- .5 Manufacturer's Instructions: Submit manufacturer's standard installation instructions, indicating substrate preparation, and Product installation requirements and techniques.

1.5 QUALITY CONTROL

- .1 Perform Work to requirements of Sealant and Waterproofer's Institute – Sealant and Caulking Guide Specification requirements.
- .2 Applicators: recognized by membrane manufacturer as being suitable for the execution of the Work.

1.6 AMBIENT CONDITIONS

- .1 Apply membrane during dry weather and to dry substrates only, when air temperature is above 5C.
- .2 Apply liquid membranes during dry weather and when ambient temperature is above -12C
- .3 Apply materials only within the acceptable application temperature range determined by the manufacturer. Select a membrane system which is best suited for the expected application conditions. Use the same system throughout entire project.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Perform 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, indoors in a clean, dry area and in accordance with manufacturer's recommendations.
 - .2 Store and protect from tearing, puncturing, and other damage.
 - .3 Store roll goods in upright position and protected from weather.
 - .4 Protect rolls from direct sunlight until ready for use.
 - .5 Keep solvent away from open flame or excessive heat.
 - .6 Replace defective or damaged materials with new.
- .4 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Acceptable Manufacturers:
 - .1 Carlisle Coatings and Waterproofing, Inc.
 - .2 Henry Company Canada.
 - .3 IKO Industries Ltd.
 - .4 Soprema Inc.
 - .5 Tremco.
 - .6 W. R. Meadows of Canada Limited.
- .2 Substitutions: Permitted, subject to review by HWDSB and JASON FUNG ARCHITECT INC.
- .3 Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 PERFORMANCE CRITERIA

- .1 Ensure continuity of building enclosure air barrier in conjunction with adjacent Products.
- .2 Seal gaps between building enclosure components and wall and roof opening frames.

2.3 MATERIALS

- .1 Air/Vapour Barrier: To CAN/ULC-S741 and CAN/ULC-S742, Class A1; SBS rubberized asphalt sheet membrane, self-adhering grade; and as follows:
 - .1 Thickness: > 1.0 mm.
 - .2 Air Leakage (ASTM E2178): < 0.02 L/s•m² @ 75 Pa.
 - .3 Water Vapour Permeance (ASTM E96/E96M, Method A): < 1.71 ng/Pa•s•m².
 - .4 Elongation (ASTM D412 - Modified): 200 percent.
 - .5 Tensile Strength (ASTM D412 - Modified): 3.45 MPa.
 - .6 Puncture Resistance (ASTM E154/E154M): 178 N.
 - .7 Product and Manufacturer Name: eg.
 - .1 Blueskin SA by Henry Company Canada.
 - .2 Perm-A-Barrier by W.R. Grace
 - .3 Soprapap'r by Soprema
 - .4 PQ 7190 A/VR by Permaquik
 - .5 Sealtight Airshield by W.R. Meadows
- .2 Air/Vapour Barrier Sealant: To CAN/ULC-S741 and CAN/ULC-S742, Class A1; single component, trowel or brush-applied solvent type synthetic rubber; and as follows:
 - .1 Air Leakage (ASTM E2178): < 0.02 L/s•m² @ 75 Pa.
 - .2 Water Vapour Permeance (ASTM E96/E96M, Method A): < 1.7 ng/Pa•m²•s.
 - .3 Solids Content by Weight: 72 percent.
 - .4 Product and Manufacturer Name: eg. Bakor Air-Bloc 21 by Henry Company Canada.
- .3 Self-Adhered Vapor Permeable Air Barrier:
 - .1 Blueskin VP 160 by Bakor
- .4 Air Barrier Transition Sheet Membrane:
 - .1 1 mm thick, self-adhering and self-sealing sheet membrane, 915mm wide rolls, maximum air leakage rate of 0.05 L/s•m². eg
 - .1 Sealtight Air Shield by W.R. Meadows
 - .2 Blueskin SA by Bakor
 - .3 Sopraseal Stick 1100 by Soprema Inc.
- .5 Non-adhesive membrane: Exterior weather resistant air barrier on exterior side of exterior wall sheathing to be "Tyvek" commercial wrap by DuPont company or equivalent conforming to ASTM E-1677-95.
- .6 Insulating Air Sealant: two-component polyurethane sealant to CAN/ULC-S711.1. eg. Zerodraft Insulating Air Sealant to seal gaps larger than 2 inches.
- .7 Foam Sealant: one-component polyurethane sealant, to CAN/ULC-S710.1. eg. Zerodraft Foam Sealant. For use around window openings and doors.
- .8 Primer, as recommended by membrane manufacturer.
- .9 Adhesives, mastics, sealing tape and joint backing: as recommended by membrane manufacturer.
- .10 Attachments: Galvanized steel bars and anchors.
- .11 Tape: 66 mm wide, self-adhesive polypropylene tape.

- .12 Primer: As recommended by self-adhering membrane manufacturer.
- .13 Metal backing: cold rolled sheet steel, hot dip galvanized to ASTM 525, zinc coating designation Z275; unless otherwise shown minimum 0.9 mm thick

3 EXECUTION

3.1 VERIFICATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for air/vapour barrier installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate. Substrates shall be sound, reasonably smooth, dry, clean, free of frost, grease, oil and other substances which would adversely affect membrane adhesion.
 - .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..

3.2 PREPARATION

- .1 Clean substrates as required.
- .2 Remove sharp projections and repair defective areas in substrate.
- .3 Prime substrates if recommended by membrane manufacturer.
- .4 At open substrate joints, in excess of 3 mm width, and at other locations shown, provide metal backing for air barrier, securely fastened to supporting work both sides of joint.

3.3 INSTALLATION – GENERAL

- .1 Install membrane system in accordance with manufacturer's installation instructions, to SWI Sealant and Caulking Guide Specification.
- .2 Provide air tight joints.
- .3 Apply membrane to exterior face of exterior wall sheathing.
- .4 Completely cover substrates. Start at low point and proceed up the wall, overlapping subsequent sheets minimum 50 mm in the direction of water flow. Lap end joints minimum 100 mm.
- .5 At masonry wall ties and at other penetrations through sheet type membrane, accurately cut and fit membrane around penetrating component, and seal/tape all openings and joints to maintain integrity of air barrier.
- .6 At wall openings return membrane into rough openings. Install membrane to ensure that corners of openings are sealed.
- .7 Apply adhesive/mastic in hard to reach places to ensure continuity of sheet type air barrier.
- .8 At large joint gaps between dissimilar substrate materials slightly loop sheet membrane to accommodate expected movement; for liquid applied membranes in similar situations provide and incorporate into the air barrier system an approved sheet material and install accordingly.

3.4 SELF-ADHERING MEMBRANE

- .1 Apply primer with roller, brush or spray equipment. Do not apply more primer than that which can be covered, on the same working day, with air barrier membrane. Recoat primed areas which are not covered with membrane the same day.
- .2 Position membrane for alignment, with protective film in place. Roll membrane back, remove film and press membrane in place.

- .3 Roll completed membrane, including seams, with suitable roller, to ensure full contact with substrate.
- .4 Seal around masonry ties and other penetrations with adhesive/mastic.
- .5 Ensure compliance with manufacturer's recommendation

3.5 LIQUID AIR BARRIERS

- .1 Spray-apply liquid membrane using manufacturer's recommended spray equipment.
- .2 Apply material to form a continuous and seamless layer having a wet film thickness between 2.25-mm and 3-mm.
- .3 Overlap liquid membrane on to transition sheet membranes a minimum of 25 mm.
- .4 Apply membranes completely around all projections.
- .5 Air dry membrane and allow to cure before installation of insulation board.

3.6 FOAM SEALANTS

- .1 Apply one-component foam sealant for cracks or openings 6m to 50mm wide. Conform to CAN/ULCS710.2.
- .2 Apply two-component foam insulating air sealant for gaps over 50mm wide, and for voids in hidden cavities, to CAN/ULC-S711.2.
- .3 Install foam sealants in accordance with authorities having jurisdiction

3.7 FIELD QUALITY CONTROLS

- .1 Membrane manufacturer shall provide periodic site inspection and technical assistance to ensure work is properly executed.
- .2 Upon completion of membrane installation, membrane manufacturer shall issue a report verifying that membrane installation is complete and satisfactory.
- .3 Prior to allowing membrane to be covered with other work, request Consultant's inspection and acceptance.

3.9 CLEANING

- .1 Progress Cleaning: Perform 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 Ensure suitable substrate for subsequent installations.
- .3 Waste Management: Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and install of custom sheet metal fabrications including parapet flashing, base and counter flashing, wall transition flashing, flashing at openings, closures and trim, vent pipe and chimney flashings, gutters and down-spouts, and similar sheet metal fabrications in connection with roofing and wall cladding. Products may be fabricated using prefinished steel, galvanized steel, aluminum, copper, weathering steel or stainless steel.

1.2 RELATED REQUIREMENTS

- .1 Section 06 10 00 – Rough Carpentry
- .2 Section 07 21 00 – Thermal Insulation
- .3 Section 07 27 00 – Air Barriers
- .4 Section 07 62 00 – Sheet Metal Flashing and Trim
- .5 Section 07 92 00 – Joint Sealants
- .6 Section 08 51 13 – Aluminum Windows

1.3 REFERENCE STANDARDS

- .1 The Aluminum Association Inc. (AAI)
 - .1 AA Aluminum Design Manual 2020 Part VIII Guidelines for Aluminum Sheet Metal Work in Building Construction
 - .2 AAI DAF45, Designation System for Aluminum Finishes
- .2 Fenestration and Glazing Industry association (FGIA) Formerly AAMA
 - .1 AAMA 611, Voluntary Specifications for Anodized Architectural Aluminum
 - .2 AAMA 621, Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Substrates
 - .3 AAMA 2603, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
 - .4 AAMA 2604, Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
 - .5 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels
- .3 American National Standards Institute (ANSI)
 - .1 ANSI/SPRI/FM 4435/ES-1, Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems
- .4 ASTM International (ASTM)
 - .1 ASTM A240/A240M, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - .2 ASTM A606/A606M, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
 - .3 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .4 ASTM A755/A755M, Standard Specification for Steel Sheet, Metallic coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - .5 ASTM A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .6 ASTM B32, Standard Specification for Solder Metal
 - .7 ASTM B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

- .8 ASTM B 370, Standard Specification for Copper Sheet and Strip for Building Construction
- .9 ASTM D 523, Standard Test Method for Specular Gloss
- .10 ASTM D822/D822M, Standard Practice for Filtered Open Flame Carbon Arc Exposures of Paint and Related Coatings
- .11 ASTM D1970/D1970M, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
- .12 ASTM D4586/D4586M, Standard Specification for Asphalt Roof Cement, Asbestos-Free
- .13 ASTM D4587, Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings.
- .14 ASTM F1667, Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
- .5 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.29, Rubber-Asphalt Sealing Compound
 - .2 CAN/CGSB-51.32, Sheathing, Membrane, Breather Type
- .6 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI S8, Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.
 - .2 CSSBI B17, Barrier Series Prefinished Steel Sheet: Product Performance & Applications.
 - .3 CSSBI Sheet Steel Facts #12, Fastener Guide for Sheet Steel Building Products
- .7 CSA Group (CSA):)
 - .1 CSA A440, North American Fenestration Standard/Specification for windows, doors, and skylights, Includes Errata
 - .2 CSA B111, Wire Nails, Spikes and Staples
- .8 Green Seal Environmental Standards
 - .1 Standard GS-03, Anti-Corrosive Paints
 - .2 Standard GS-11Paints, Coatings, Stains, and Sealers
 - .3 Standard GS-36, Adhesives for Commercial Use
- .9 Sheet Metal and Air Conditioning Contractors Association of North America (SMACNA)
 - .1 Architectural Sheet Metal Manual
- .10 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule #1113, Architectural Coatings
 - .2 SCAQMD Rule #1168, Adhesives and Sealants

1.4 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, data sheets and catalogue pages for sheet metal flashing fasteners and accessory materials. Include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
 - .2 Submit two copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements
- .3 Shop Drawings:
 - .1 Submit shop drawings for all sheet metal fabrications.
 - .2 Indicate sheet thickness, flashing dimensions and fastenings. Include anchorage, expansion joints and other provisions for thermal movement.
 - .3 Submit manufacturer's catalogue cut sheets for manufactured items.
- .4 Samples:
 - .1 Submit two 50 x 50 mm samples of each type of sheet metal material, finishes and colour.

1.5 QUALITY ASSURANCE

- .1 Installer: Engage an experienced installer having a minimum of three years experience who has completed projects similar in material, design, and extent to that indicated for this Project and with a record of successful in service performance.
- .2 Construct and install roof metal flashings in accordance with CRCA Manual details and in accordance with the CRCA Manual. If requirements conflict, this specification takes precedence over the manual.
- .3 Mock-ups
 - .1 Include flashings in mock-ups as specified for work of other affected sections

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Handle and store flashing materials to prevent creasing, buckling, scratching, or other damage.
- .3 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.1 MATERIALS

- .1 Provide sheet metal in base metal thickness specified. Where no thickness specified, provide base sheet metal in thickness recommended in SMACNA Architectural Sheet Metal Manual for type of item being fabricated, but not less than the thickness required by the authority having jurisdiction.
- .2 Prefinished Sheet Steel: To ASTM A755/A755M, Structural Steel (SS) Grade 230; galvanized sheet steel, 0.76 mm thick before galvanizing; with monochromatic paint coating.
- .3 Unfinished Sheet Steel: To ASTM A653/A653M, Structural Steel (SS) Grade 230; galvanized sheet steel, 0.61 mm thick before galvanizing.
- .4 Sheet Aluminum: To ASTM B209M, 3003-H14 alloy; 0.61 mm uncoated metal thickness, with monochromatic and metallic paint coatings as indicated on Drawings
- .5 Cleats and edge strips: 22 ga. non-corrosive metal compatible with sheet metal, to provide rigid support and positive securement for metal flashings.
- .6 Screws, Bolts and Expansion Shields: non-ferrous metal, stainless steel unless steel is compatible with adjacent surfaces. Exposed fastenings to be same materials as metal surfaces through which they penetrate. However, all fasteners to be concealed unless connections prevent concealed application.
- .7 Nails: manufacturer's standard corrosion resistant type, material to suit metal flashing. Samples to be submitted
- .8 Starter Strips: 0.76 mm thick sheet steel; continuous lengths.
- .9 Back-up Plates: 0.91 mm thick prefinished sheet steel; minimum 300 mm wide where adjacent lengths of cap flashing meet.
- .10 Solder: to ASTM B32, 50% block tin, 50% pig lead.
- .11 Flux: commercial hydrochloric acid cut with zinc, or 10-20 percent solution of orthophosphoric acid in water, for use with galvanized metal work.
- .12 Sealant: One-part polysulphide to CAN/CGSB-19.13-M87, one-part low modulus silicone to CAN/CGSB-19.18-M87 or Dymeric by Tremco. Consultant will select colour of sealant exposed in finished work.
- .13 Asphaltic paint: Alkali resistant asphalt-based enamel: CAN/CGSB-1.108-M89.
- .14 Membrane Underlayment: To ASTM D1970/D1970M; 1.0 mm thick, self-sealing, self-adhering,

heat-resistant rubberized asphalt membrane, eg. Ice & Water Shield HT by Grace.

- .15 Primer: Water-based primer, eg. Perm-A-Barrier WB Primer by Grace.
- .16 Flashing Paint: Quick drying asphaltic base paint; eg. Primer 910-02 by Henry Company Canada

2.2 FABRICATION

- .1 Fabricate sheet metal building flashings and trim in accordance with the recommendations of SMACNA's Architectural Sheet Metal Manual that apply to the design, dimensions, metal, and other characteristics as required.
- .2 Fabricate aluminum flashings and other sheet aluminum work in accordance with AAI Aluminum Sheet Metal Work in Building Construction.
- .3 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .4 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.
- .5 Make flashings of prefinished metal for all cap flashings, for all flashings adjacent to roofing at roof edges and area dividers and where exposed to view from ground. Make flashings for other locations, of plain galvanized metal as follows:
- .6 Use 0.45 mm metal core thickness except where otherwise indicated.
- .7 Use 0.62 mm metal core thickness wherever a flat length exceeding 305 mm wide occurs.
- .8 Use 0.80 mm metal core thickness for concealed fastening strips.
- .9 S Lock all straight run joints.
- .10 Make joints allow for thermal movement, space S Lock joints at 2440 mm maximum centers.
- .11 Form non-expansion but movable joints in metal to accommodate elastomeric sealant in accordance with SMACNA standards.
- .12 Make flashings so that joints can be lapped 100 mm or more for building into masonry and concrete.
- .13 Strengthen free edges of metal flashings by folding to form a 13 mm hem.
- .14 Make flashings to curbs, walls and parapets a minimum of 200 mm high, where possible.
- .15 Provide flashing sleeves and collars for all pipes and conduit extending through the roof where curb mounted roof penetrations are not required. Sleeves shall be soldered to a piece of sheet metal extending at least 150 mm onto the surrounding roof.
- .16 Make joints for corners and intersections with standing seams except where exposed of pre finished metal when seams shall be flat locked.
- .17 All bends machine made; form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .18 Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, non corrosive metal recommended by sheet metal manufacturer, and as follows:
- .19 Size as recommended by SMACNA manual or sheet metal manufacturer for application but not less than thickness of metal being secured.
- .20 Back paint metal flashings in contact with dissimilar metals or materials with bituminous paint that would result in electrolytic action or corrosion.

2.3 METAL FLASHINGS

- .1 Form flashings, copings and fascias to profiles indicated of 1.6 mm thick prefinished steel, prefinished aluminum.

2.4 FINISHES

- .1 Shop Priming:
 - .1 Clean surfaces of rust, scale, grease, and foreign matter prior to shop priming.
 - .2 Do not prime surfaces designated to come into direct contact with concrete, or where field welding is required.
 - .3 Prime components with a minimum of two coats.
- .2 Galvanized Coating on Sheet Steel: To ASTM A653/A653M, Z275 hot dipped zinc alloy coating.
- .3 Monochromatic Paint Coating on Aluminum: To AAMA 2605, three-coat thermosetting fluoropolymer PVDF liquid extrusion and coil coating, factory-applied to 0.04 mm dry film thickness; eg. Duranar XL by PPG Industries, Inc.; two custom colours as selected by Consultant.
- .4 Metallic Paint Coating on Aluminum: To AAMA 2605, four-coat thermosetting fluoropolymer PVDF liquid extrusion and coil coating, complete with metal flakes incorporated in the colour coat; factory-applied to 0.05 mm dry film thickness; eg. Duranar XLB by PPG Industries, Inc.; two metallic colours as selected by Consultant.
- .5 Monochromatic Paint Coating on Sheet Steel: To ASTM A755/A755M, two-coat silicone modified polyester coil coating, factory-applied to 0.028 mm dry film thickness; eg. WeatherXL by Valspar, two colours as selected by Consultant

3 EXECUTION

3.1 VERIFICATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sheet metal flashing and trim 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..

3.2 PREPARATION

- .1 Prime substrate designated to receive a self-adhered membrane underlayment.
- .2 Secure membrane underlayment in place and lap joints 100 mm.

3.3 INSTALLATION

- .1 Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking and fastener disengagement.
- .2 Install metal flashings on all surfaces such as roof cant edges, sleepers, parapets and cap type, wall junctions, roof dividers, curbs, roof control joints, through roof penetrations and the like, and as otherwise required to provide flashing type protection to details. Extend all flashings down and onto the horizontal portion of the roof unless otherwise directed. Install counter and base flashings unless otherwise directed by the Consultant.
- .3 Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects:
 - .1 Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements.

- .2 Base engineering calculations on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.
- .3 Temperature change (range): 67 degrees Celsius ambient; 100 degrees Celsius material surfaces.
- .4 Provide sheet metal flashing and trim to create a rain screen assembly to the completed air/vapour and roofing membrane termination details.
- .5 Install prefinished metal fascia to complete edge details. Install as separate piece from flashing.
- .6 Coordinate installation of flashing work of this Section with flashing work of other Sections which ties into this work. Coat surfaces of different metals such as aluminum and galvanized steel which are in contact to each other, with bituminous paint to prevent electrolysis.

3.4 ADJUSTMENTS

- .1 Imperfections in sheet metal work (such as holes, dents, crease or oil-canning) will be rejected.
- .2 Make good damaged sheet metal work.
- .3 Wash entire installation down and leave in neat condition.

3.5 CLEANING

- .1 Progress Cleaning: Perform 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.

END OF SECTION

1 GENERAL

1.1 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.

1.2 RELATED REQUIREMENTS

1.3 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 resists 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.

1.4 REFERENCE STANDARDS

- .1 Firestop Contractors International Association (FCIA):
 - .1 FCIA Firestop Manual of Practice
- .2 Factory Mutual Approvals (FM):
 - .1 FM 4990, Approval Standard for Fire stopping
 - .2 FM 4991, Approval Standard for Firestop Contractors
- .3 International Accreditation Service (IAS):
 - .1 IAS AC291, 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

- .5 National Fire Protection Agency (NFPA):
 - .1 NFPA 251, 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, Standard Method of Fire Endurance Tests of Building Construction and Materials
 - .2 CAN/ULC-S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
 - .3 CAN/ULC-S114, Standard Method of Test for Determination of Non-Combustibility in Building Materials
 - .4 CAN/ULC-S115, Standard Method of Fire Tests of Firestop Systems
- .8 Underwriters Laboratories Inc. (UL):
 - .1 UL 1479, Fire Tests of Penetration Firestops
 - .2 UL Qualified Firestop Contractor Program

1.5 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.

1.6 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-S115
 - .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.

1.7 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.

1.8 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.

1.9 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

2.1 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.

2.2 SUSTAINABILITY CHARACTERISTICS

- .1 Not Used.

2.3 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.
- .6 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.

2.4 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.

2.5 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.

2.6 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.

2.7 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.

2.8 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.

2.9 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

3.1 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.

3.2 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.

3.3 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.

3.4 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.

3.5 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.

3.6 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.

3.7 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.

3.8 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 1 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.

3.9 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

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 04 05 00 – Common Work Results for Masonry.
- .2 07 84 00 – Fire Stopping.
- .3 08 51 13 – Aluminum Windows.
- .4 09 21 16 – Gypsum Board Assemblies.

1.2 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).

1.3 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB) 1330:
 - .1 CAN/CGSB-19.24, Multi-component, Chemical Curing Sealing Compound
- .2 Department of Justice Canada (Jus):
 - .1 Canadian Environmental Protection Act (CEPA)
- .3 General Services Administration (GSA) - Federal Specifications (FS):
 - .1 FS-SS-S-200, 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)
- .5 Sealant, Waterproofing, and Restoration Institute (SWRI)
 - .1 Sealants: The Professionals' Guide
- .6 Transport Canada (TC):
 - .1 Transportation of Dangerous Goods Act (TDGA)
- .7 ULC Standards/ UL Canada (ULC):
 - .1 CAN/ULC 115, Standard Method of Fire Tests of Firestop Systems

1.4 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.

1.5 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.

1.6 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.

1.7 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.

1.8 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.

1.9 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

2.1 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

2.2 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.

2.3 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-1-25-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.

2.5 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.

2.6 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.

2.7 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

3.1 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.

3.2 SURFACE PREPARATION

- .1 Clean bonding joint surfaces of harmful contaminates 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.

3.3 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).

3.4 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.

3.5 MIXING

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

3.6 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.

3.7 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.

3.8 PROTECTION

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

3.9 SCHEDULE

- .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

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 07 92 00 – Joint Sealants
- .2 Section 08 71 00 – Door Hardware
- .3 Section 08 80 00 – Glazing
- .4 Section 08 90 00 – Louvres and Vents

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute/Steel Door Institute (ANSI/SDI):
 - .1 ANSI/SDI A250.7, Nomenclature for Standard Steel Doors and Steel Frames
 - .2 ANSI/SDI A250.11, Recommended Erection Instructions for Steel Frames
- .2 ASTM International (ASTM):
 - .1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .2 ASTM A780/A780M, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
 - .3 ASTM A879/A879M, Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface
 - .4 ASTM A924/A924M, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
 - .5 ASTM B29, Standard Specification for Refined Lead
 - .6 ASTM B749, Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products
 - .7 ASTM D4726, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Exterior-Profile Extrusions Used for Assembled Windows and Doors
 - .8 ASTM E90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
 - .9 ASTM E413, Classification for Rating Sound Insulation
 - .10 ASTM E1425, Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems
 - .11 ASTM F2247, Standard Test Method for Metal Doors Used in Blast Resistant Applications (Equivalent Static Load Method)
- .3 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-1.132, Zinc Chromate Primer, Low Moisture Sensitivity
 - .2 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating
 - .3 CGSB 41-GP-19, Rigid Vinyl Extrusions for Windows and Doors
 - .4 CAN/CGSB 82.5, Insulated Steel Doors
- .4 CSA Group (CSA):
 - .1 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .2 CSA W59, Welded Steel Construction
- .5 Canadian Steel Door Manufacturers Association (CSDMA):
 - .1 Recommended Dimensional Standards for Commercial Steel Doors and Frames
 - .2 Recommended Specifications for Commercial Steel Doors and Frames

- .3 Recommended Selection and Usage Guide for Commercial Steel Door and Frame Products
- .4 Storage and Installation Guide
- .6 Fenestration & Glazing Industry Alliance (FGIA) (formerly American Architectural Manufacturers Association (AAMA)):
 - .1 AAMA 812, Voluntary Practice for Assessment of Frame Deflection When Using One Component Polyurethane Foams for Air-Sealing Rough Openings of Fenestration Installations
- .7 National Council on Radiation Protection and Measurements (NCRP):
 - .1 Report No. 049, Structural Shielding Design and Evaluation for Medical Use of X-Rays and Gamma Rays of Energies up to 10 MeV
- .8 National Fire Protection Association (NFPA):
 - .1 NFPA 80, Standard for Fire Doors and Other Opening Protectives
 - .2 NFPA 252, Standard Methods of Fire Tests of Door Assemblies
- .9 Steel Door Institute (SDI):
 - .1 SDI-108, Recommended Selection and Usage Guide for Standard Steel Doors
 - .2 SDI-111, Recommended Details for Standard Steel Doors, Frames, Accessories and Related Components
 - .3 SDI-122, Installation Troubleshooting Guide for Standard Steel Doors and Frames
- .10 Underwriters Laboratories (UL):
 - .1 UL 2985, Sustainability Standard for Thermal Insulation
- .11 ULC Standards (ULC):
 - .1 CAN/ULC-S104, Standard Method for Fire Tests of Door Assemblies
 - .2 CAN/ULC-S105, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104
 - .3 CAN/ULC S106, Standard Method for Fire Tests of Window and Glass Block Assemblies
 - .4 CAN/ULC-S701.1, Standard for Thermal Insulation, Polystyrene Boards
 - .5 CAN/ULC-S702, Standard for Mineral Fibre Thermal Insulation for Buildings
 - .6 CAN/ULC-S704, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced

1.03 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate primers for doors and frames with site-applied paint as indicated in Section 09 91 23 - Interior Painting.
 - .2 Coordinate throat dimensions based on actual material used for wall and partition construction assemblies.

1.4 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 door and frame. Indicate door designation, type and model, product characteristics, core description, fabrication details, dimensions, fire-protection rating, finishes, and limitations.
 - .2 Submit WHMIS Safety Data Sheet (SDS).
- .3 Shop Drawings:
 - .1 For each type of door, indicate material, steel core thicknesses, mortises, reinforcements,

- location of exposed fasteners, openings, glazed, louvred, arrangement of hardware, fire-protection rating, and finishes.
- .2 For each type of frame, indicate material, core metal thickness, reinforcements, glazing stops, location of anchors and exposed fastenings, reinforcing, fire-protection rating, sound transmission classification rating, and finishes.
- .3 Include a schedule identifying each unit with door marks and numbers matching numbering on Drawings and door schedule.
- .4 Samples:
 - .1 Submit one 305 x 305mm door section for each door type, showing corner detail, glazing detail and butt reinforcements.
 - .2 Submit one 305 x 305-mm corner sample of each frame type, illustrating corner detail and welding quality.
 - .3 Show butt cut-out, glazing stops, 305mm long removable mullion connection or snap-on trim with clips.
 - .4 Samples will not be returned for inclusion into work.
- .5 Certificates:
 - .1 Where fire-protection rated door and frame exceeds size limitations of fire labelled assemblies, submit evidence indicating compliance with fire labelling for door and frame assembly.
 - .2 Radiation Protection Compliance: For radiation protection assemblies, submit evidence of compliance in accordance with the requirements of the Cancer Agency, the Ontario or Hamilton Occupational Health and Safety, Radiation Safety and Protection Branch, and the National Council on Radiation Protection and Measurement.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Warranty Documentation: Submit manufacturer's material and fabrication warranty.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Manufacturer: A member in good standing of the Canadian Steel Door Manufacturers Association.
 - .2 Installers: Experienced with installation of hollow metal doors and frames of similar complexity and scope to that required for the Project.
 - .3 Testing Agencies: Provide doors and frames under label service program of a testing agency acceptable to authorities having jurisdiction (AHJ).
- .2 Manufacturer: Obtain doors and frames from a single manufacturer.
- .3 Mock-Ups:
 - .1 Provide site mock-up for work of this Section indicating methods and materials, and proposed procedures to achieve design intent in accordance with Section 01 43 00 - Quality Assurance, and to comply with the following requirements, using materials indicated for completed work:
 - .1 Build mock-ups in location and size as directed by HWDSB and JASON FUNG ARCHITECT INC.
 - .2 Obtain HWDSB and JASON FUNG ARCHITECT INC.'s acceptance of mock-ups before starting construction.
 - .3 Use mock-up throughout construction period as a standard of acceptance for work of

this Section.

- .4 Accepted mock-up may not form part of Work.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance CSDMA Guide Specification for Installation and Storage of Hollow Metal Doors and Frames.
- .2 Delivery and Acceptance Requirements: Deliver materials to site in original factory packaging with manufacturer's labels.
 - .1 Provide temporary protection during delivery and site storage to prevent distortion, surface damage, and rust.
 - .2 After arrival on site, remove wet wrapping materials, inspect doors and frames for damage, and notify delivery company and supplier if damage is found.
 - .3 Minor damage may be repaired if refinished products match new work, and are acceptable to HWDSB.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, in a dry, well-ventilated indoor location, in a manner that prevents sagging, bowing, or twisting, and in accordance with manufacturer's recommendations, and CSDMA Guide Specification for Installation and Storage of Hollow Metal Doors and Frames.
 - .2 Store with space between stacked doors to allow air circulation.
 - .3 Store and protect steel doors and frames from nicks, scratches, and distortion.

1.8 SITE CONDITIONS

- .1 Site Measurements: Before fabrication, verify actual dimensions of openings by measuring on site, and indicate actual measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- .2 Established Dimensions: When site measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating doors and frames without site measurements. Coordinate site construction to ensure that actual site dimensions correspond to established dimensions.

1.9 WARRANTY

- .1 Manufacturer's Warranty: Submit manufacturer's standard warranty.

2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- .1 Steel Fire-Protection Rated Doors, Frames, and Screens: Labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN/ULC-S104 and CAN/ULC-S105 for ratings indicated.
- .2 Affix appropriate label to each opening indicating the labelling requirement, as follows:
 - .1 At standard size openings: Fire endurance rating; radiation protection
 - .2 At oversized openings: Unclassified as to fire rating; radiation protection

2.3 PERFORMANCE REQUIREMENTS

- .1 Steel Fire-Rated Doors and Frames: Labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN/ULC-S104 or NFPA 252 for ratings specified or indicated.
- .2 Provide fire labelled frames for openings requiring fire protection ratings. Test products in

conformance with CAN/ULC-S104, CAN/ULC-S106 or NFPA 252 and listed by a nationally recognized agency having factory inspection services.

2.4 MATERIALS

- .1 Interior Doors and Frames: Metallic coated steel sheets in accordance with ASTM A924/A924M, coated to ASTM A653/A653M, Commercial Steel (CS), Type B, ZF75 galvanized, stretcher levelled standard of flatness where used for face sheets.
- .2 Metallic Coated Steel Sheet Thickness: Minimum thickness in accordance with CSDMA, Recommended Specifications for Commercial Steel Door and Frame Products, Table 1 and Appendix 1 SDI-111.
- .3 Reinforcement Channels: To CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653/653M, ZF75.
- .4 Cast or Rolled Pure Sheet Lead: To ASTM B29, ASTM B749, weight: 14.6 kg/m², thickness 1.2mm.
- .5 Composites: Balance of core materials used in conjunction with lead, in accordance with manufacturer's proprietary design.

2.5 DOOR CORE MATERIALS

- .1 Honeycomb: Structural small cell, maximum 25mm kraft paper, minimum 36kg weight per ream, minimum 16.5kg/m³ density, and sanded to required thickness.
- .2 Fibreglass with Vertical Steel Stiffeners: To CAN/ULC-S702, loose batt, semi-rigid type, density 24 kg/m³, face sheets laminated, spot welded to each face sheet at 150 mm on centre.
- .3 Expanded Polystyrene: To CAN/ULC-S701.1 type 4, rigid extruded board, closed cell, fire retardant treated, density 16 to 32 kg/m³, RSI 0.8/25 mm, to UL 2985: Thermal Insulation Materials

2.6 ADHESIVES

- .1 Honeycomb Core and Steel Component Adhesive: Heat resistant, spray grade, polyurethane, resin reinforced polychloroprene.

2.7 ACCESSORIES

- .1 Touch-up Primer: To CAN/CGSB-1.181 or CAN/CGSB 1.132
- .2 Interior Top Caps: Steel
- .6 Door Bottom Seal: Undercut
- .7 Door Silencers/Bumpers: Single stud neoprene type, black colour. Self-adhesive type silencers are not acceptable.
- .8 Metallic Paste Filler: To manufacturer's standard.
- .9 Fire Labels: Metal riveted
- .10 Site-Applied Sealant at Frame Perimeter: as indicated in Section 07 92 00 – Joint Sealants.
- .11 Glazing Stops: Formed steel having 1.0 mm metal core thickness, screw attached. Accurately fit and butt at corners, glazing trim and stops, locate on secure side of door or facing interior of room.
- .12 Glazing: as indicated in Section 08 80 00 – Glazing.
- .13 Floor Anchors and Channel Spreaders: 1.60-mm nominal tee anchors, 1.19-mm wall stud anchors, and provide anchors appropriate to site conditions, as follows:
 - .1 Exterior Locations: Hot-dipped, zinc-coated
 - .2 Interior Locations: Wipe coat galvanized
 - .3 At Masonry: Corrugated, galvanized tee anchors or heavy gauge galvanized wire ties
 - .4 Drilled stud anchors for wire tie to studs
 - .5 At Existing Concrete Openings: Lag bolts, shields and bushing

- .14 Exposed Fasteners: Type 316 stainless steel to ASTM A167.

2.8 FABRICATION - FRAMES

- .1 Fabricate frames in accordance with CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames SDI-111.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Interior Frames: 1.6 mm welded type construction.
 - .1 Provide minimum 16mm stop height for factory-sealed double-glazed units.
- .4 Blank, reinforce, drill, and tap frames for mortised, templated hardware, and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface-mounted hardware.
- .6 Protect mortised cut-outs with steel guard boxes.
- .7 Reinforce frames for surface-mounted hardware.
- .8 Prepare door openings for door silencers:
 - .1 Three silencers on strike jamb for single door openings.
 - .2 Two silencers on heads for double door openings.
- .9 Provide fire labelled frame products for openings requiring fire protection ratings, as scheduled. Test products in conformance with CAN/ULC-S104, CAN/ULC-S106, NFPA 252 and list by a nationally recognized agency having factory inspection services and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

2.9 FRAME ANCHORAGE

- .1 Provide anchorage to floor and wall construction.
- .2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
- .3 Provide 2 anchors for rebate opening heights up to 1520 mm, and one additional anchor for each additional 760 mm of height or fraction thereof.
- .4 Locate anchors for frames in previously placed concrete, masonry or structural steel a maximum 150mm from top and bottom of each jamb and intermediate anchors at a maximum 660 mm on centre.

2.10 FRAMES - WELDED TYPE

- .1 Perform welding to CSA W59.
- .2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.
- .3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails, and sills.
- .4 Grind welded joints and corners to flat plane, fill with metallic paste, and sand to uniform smooth finish.
- .5 Securely attach floor anchors to inside of each jamb profile.
- .6 Weld in two temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.11 FABRICATION – FRAMES, KNOCKED-DOWN TYPE

- .1 Ship knocked-down type frames unassembled.
- .2 Provide frames with mechanical joints which interlock securely and provide functionally satisfactory performance when assembled and installed in accordance with CSDMA Guide Specification for Installation and Storage of Hollow Metal Doors and Frames SDI-122.
- .3 Securely attach floor anchors to inside of each jamb profile.

2.12 FABRICATION - FRAMES, SLIP-ON TYPE

- .1 Ship slip-on type frames unassembled.
- .2 Provide frames in accordance with SDI-122 and manufacturer's instructions.
- .3 Provide slip-on frames with manufacturer's proprietary design of wall anchorage comprising single, adjustable tension type per jamb, and provision for a secure attachment of each jamb base to stud runners.

2.13 FABRICATION – DOORS, GENERAL

- .1 Doors: Swing type, flush, with provision for glass and louvred openings as indicated.
- .2 Interior doors: Honeycomb or laminated core construction.
- .3 Laminated Core Doors:
 - .1 Form both face sheets from a sheet of 16 gauge steel.
- .4 Factory-prepare 12.7-mm diameter holes and larger on-site at time of hardware installation, except for mounting and through-bolt holes.
- .5 Prepare doors for semi-mortised mounting of automatic door bottoms where scheduled in Section 08 71 00 – Door Hardware.
- .6 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
- .7 Provide fire labelled doors for openings requiring fire protection ratings, as scheduled. Test such products in conformance with CAN/ULC-S104 or NFPA 252, listed by a nationally recognized agency having factory inspection services, and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.
- .13 Manufacturer's nameplates on doors are not permitted. Nameplates on hinge edge are acceptable.

2.14 FABRICATION – DOORS, HONEYCOMB AND INSULATED CORE

- .1 Form face sheets for interior doors from 1.2mm sheet steel with honeycomb core laminated under pressure to face sheets.

2.15 FABRICATION – DOORS, REINFORCED STEEL

- .1 Form face sheets for interior doors from 1.2mm sheet steel.
- .2 Reinforce doors with vertical stiffeners, securely welded to face sheets at a maximum 150 mm on centre.
- .3 Fill voids between stiffeners of exterior doors with fibreglass core.
- .4 Fill voids between stiffeners of interior doors with fiberglass or honeycomb core.

2.17 FABRICATION - GLAZING STOPS FOR DOORS AND FRAMES

- .1 Make provisions for louvres and glazing as indicated and provide necessary glazing stops.
 - .1 Provide stainless steel glazing stops for use with glazing tapes and compounds and secured with countersunk stainless steel screws dry glazing of snap-on type.
 - .2 Fabricate glazing stops as a formed channel that is a minimum 16mm high, accurately fitted, butted at corners and fastened to frame sections with countersunk oval head tamperproof sheet metal stainless steel screws.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: Verify conditions of substrates previously installed under other Sections

or Contracts are acceptable for steel doors and frames 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.

3.2 INSTALLATION - GENERAL

- .1 Install doors and frames to CSDMA Guide Specification for Installation and Storage of Hollow Metal Doors and Frames SDI-122.
- .2 Install fire-rated doors and frames in accordance with NFPA 80.
- .3 Isolate steel from direct contact with dissimilar metals, concrete, and masonry.

3.3 INSTALLATION - FRAMES

- .1 Set frames plumb, square, level, and at correct elevation.
- .2 Secure anchorages and connections to adjacent construction.
- .3 Brace frames rigidly in position until built-in:
 - .1 Remove temporary jamb spreaders.
 - .2 Provide temporary wood spreaders at third points of frame rebate height to maintain frame width until adjacent building-in work completed.
 - .3 Provide vertical support at centre of head for openings exceeding 1200 mm in width.
 - .4 Remove wood spreaders after frames have been built-in.
- .4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.
- .5 Install door silencers.
- .6 Install louvres supplied under Section 08 90 00 - Louvres and Vents in accordance with manufacturer's instructions.

3.4 INSTALLATION – DOOR HARDWARE

- .1 Install hardware in accordance with manufacturer's instructions and Section 08 71 00 - Door Hardware, using manufacturer's door hardware templates.

3.5 INSTALLATION - GLAZING

- .1 Install glazing in doors and frames in accordance with Section 08 80 00 – Glazing.

3.6 SITE QUALITY CONTROL

- .1 Tolerances: Provide even margins between doors and jambs, and doors and finished floor and thresholds as follows.
 - .1 Hinge Side: 1.0 mm
 - .2 Latch Side and Head: 1.5 mm
 - .3 Finished floor, non-combustible sill and thresholds: Maximum 19 mm

3.7 ADJUSTING

- .1 Use primer to touch-up finishes damaged during installation.
- .2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to uniform, smooth finish.
- .3 Repair damage to zinc coatings in accordance with ASTM A780/A780M.

- .4 Repair damage to adjacent materials caused by metal doors and frames installation.
- .5 Adjust operable parts for correct function.

3.8 CLEANING

- .1 Progress Cleaning: Perform in accordance with Section 01 74 00 - Cleaning, and as follows:
 - .1 Remove traces of primer, sealants, epoxy, and filler materials. Clean doors and frames.
 - .2 Clean glass and glazing materials with approved non-abrasive cleaner.
- .2 Final Cleaning: Perform in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

3.9 PROTECTION

- .1 Protect installed products and components from damage during construction. Install temporary protective covering to exposed components.
- .2 Protect thresholds, hardware, frames, doors, and glass from damage. Lock operative door bottom in up position.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

1.2 REFERENCE STANDARDS

- .1 Aluminum Association (AA):
 - .1 AA DAF 45, Designation System for Aluminum Finishes
- .2 ASTM International (ASTM):
 - .1 ASTM A36/A36M, Specification for Carbon Structural Steel
 - .2 ASTM A123/A123M, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - .3 ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
 - .4 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .5 ASTM B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - .6 ASTM B221, Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - .7 ASTM C864, Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
 - .8 ASTM E283, Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 - .9 ASTM E330/E330M, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls, by Uniform Static Air Pressure Difference
 - .10 ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference
 - .11 ASTM E413, Classification for Rating Sound Insulation
 - .12 ASTM E547, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference
 - .13 ASTM E779, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
 - .14 ASTM E1105, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference
- .3 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-12.20, Structural Design of Glass for Buildings
- .4 CSA Group (CSA):
 - .1 CSA A440.6, High exposure fenestration installation
 - .2 CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .3 CAN/CSA S136, North American Specification for the Design of Cold Formed Steel Structural Members
 - .4 CAN/CSA-S157/S157.1, Strength Design in Aluminum/Commentary on CAN/CSA-S157-, Strength Design in Aluminum
 - .5 CSA W59.2, Welded Aluminum Construction

- .5 Fenestration & Glazing Industry Alliance (FGIA) (formerly American Architectural Manufacturers Association (AAMA)):
 - .1 AAMA CW-10, Care and Handling of Architectural Aluminum from Shop to Site
 - .2 AAMA CW-11, Design Wind Loads and Boundary Layer Wind Tunnel Testing
 - .3 AAMA T1R-A1, Sound Control for Fenestration Products
 - .4 AAMA 501, Methods of Test for Exterior Walls
 - .5 AAMA 501.2, Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems
 - .6 AAMA 502, Voluntary Specification for Field Testing of Newly Installed Fenestration Products
 - .7 AAMA 611, Voluntary Specifications for Anodized Finishes Architectural Aluminum
 - .8 AAMA 612, Voluntary Specifications, Performance Requirements, and Test Procedures for Combined Coatings of Anode Oxide and Transparent Organic Coatings on Architectural Aluminum
 - .9 AAMA 1503, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections
 - .10 AAMA 2603, Voluntary Specification Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix)
 - .11 AAMA 2604, Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix)
 - .12 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix)
- .6 Green Seal Environmental Standards (GS):
 - .1 GS-11, Paints and Coatings
- .7 Master Painters Institute (MPI):
 - .1 Architectural Painting Specification Manual
- .8 National Research Council Canada (NRC):
 - .1 National Building Code of Canada (NBC)
- .9 Society for Protective Coatings (SSPC):
 - .1 SSPC - Paint 20, Zinc Rich Coating, Inorganic and Organic
 - .2 SSPC - Paint 25, BCS, Zinc Oxide, Alkyd, Linseed Oil and Primer for Use Over Hand Cleaned Steel Type 1 and Type 2
- .10 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards:
 - .1 SCAQMD Rule 1113, Architectural Coatings
 - .2 SCAQMD Rule 1168, Adhesives and Sealants Applications
- .11 Underwriters Laboratories (UL):
 - .1 UL 2761, Sustainability for Sealants and Caulking Compounds
 - .2 UL 2768, Sustainability for Architectural Surface Coatings

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: coordinate work of this Section with installation of air barrier, vapour retarder, flashing, ductwork to rear of louvers.
- .2 Preinstallation Meetings: Convene pre-installation meeting one week before beginning the 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 installation and substrate conditions.
- .3 Discuss coordination with other Subcontractors, and
- .4 Review manufacturer's installation instructions and warranty requirements.
- .5 Review existing site conditions adjacent to demolition areas.

1.4 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 curtain wall components, anchorage and fasteners, glass and infill, and internal drainage details and include product characteristics, performance criteria, physical size, finish and limitations and water flow diagrams.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
 - .2 Indicate system dimensions, framed opening requirements and tolerances, adjacent construction, anchor details anticipated deflection under load, affected related work, weep drainage network, expansion and contraction joint location and details, and site welding required.
- .4 Samples:
 - .1 Submit for review and acceptance of each type of unit.
 - .2 Samples will not be returned for inclusion into work.
 - .3 Submit two samples 300 x 300mm in size illustrating prefinished aluminum surface, finish, colour, texture, specified glass units, insulated infill panels, glazing materials illustrating edge and corner.
- .5 Delegated Design Submittals:
 - .1 Include framing member structural and physical characteristics, calculations, dimensional limitations, special installation requirements.
- .6 Test Reports: When requested, submit engineering data and previous test results by independent laboratory which meet specified performance criteria.

1.5 CLOSEOUT SUBMITTALS

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

1.6 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Stock Materials:
 - .1 Supply extra stock materials of glass units in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Supply 2 extra sealed glass units of each size required.
 - .3 Supply 2 extra insulated infill panels of each size required.
 - .4 Supply protected and packaged in wood crates suitable for storage. Clearly identify each crate.

- .5 Deliver extra stock materials to HWDSB, upon completion of work of this Section.
- .6 Store as directed by HWDSB.

1.7 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Company specializing in manufacturing the systems specified in this Section with minimum ten years documented manufacturing experience, with projects of similar scope installed in Ontario, of the Place of the Work.
- .2 Installer Qualifications: Company specializing in performing the work of this Section with minimum 10 years documented experience or approved by manufacturer.
- .3 Mock-ups: Construct mock-ups in accordance with Section 01 43 00 - Quality Assurance.
 - .1 Construct 1000 x 1000 mm mock-up including intermediate mullion, corner mullion, column cover, vision glass light, and insulated infill panel.
 - .2 Mockup to include sloped glazed system and junction with vertical curtain wall and other vertical work mullions, muntins, structural member covers, vision glass lite, and insulated panel.
 - .3 Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.
 - .4 HWDSB will require 48 hours minimum to review the mock-up.
 - .5 Mock-up may not remain as part of finished work.

1.8 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with manufacturer specifications.
- .2 Storage and Handling Requirements:
 - .1 Handle work of this Section in accordance with AAMA CW-10.
 - .2 Store materials off ground in a dry ventilated indoor location and in accordance with manufacturer's recommendations.
 - .3 Store and protect glazed aluminum curtain wall components from nicks, scratches, deformation, and damages.
 - .4 Protect prefinished aluminum surfaces with wrapping or strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.9 AMBIENT CONDITIONS

- .1 Install sealants when ambient and surface temperature is above 5°C minimum.
- .2 Maintain this minimum temperature during and for 48 hours minimum after installation of sealants.

1.10 WARRANTY

- .1 Manufacturer's warranty: Provide manufacturer's standard materials and fabrication warranty for 15 years beginning at Substantial Performance.
 - .1 Sealed glass units: Seal failure, misting and dusting for 10 years.
 - .2 Aluminum Finishes: Failure of finishes not attributed to normal weathering for 15 years.

2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- .1 Conform to applicable code for glass strength requirements.

2.2 MANUFACTURERS

- .1 Basis-of-Design Product:
 - .1 Kawneer Company Inc.
 - .2 Kawneer Series AA®6400/6500/6600 Windows
- .2 Alternatives: Refer to Substitutions Section for procedures and submission requirements.
 - .1 Pre-Contract Bidding Period Substitutions: Submit written requests ten (10) days prior to bid date.
 - .2 Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid window installation and construction delays.
 - .3 Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
 - .4 Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for window system performance criteria, and (2) has been engaged in the design, manufacture and fabrication of aluminum windows for a period of not less than ten (10) years. (Company Name)
 - .5 Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
 - .6 Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.
- .3 Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.3 MATERIALS

- .1 Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.8) wall thickness at any location for the main frame and sash members.
 - .1 Recycled Content: Shall have a minimum of 50% mixed pre- and post-consumer recycled content.
 - .1 Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
 - .2 Indicate relative dollar value of recycled content product to total dollar value of product included in project.
 - .3 Indicate location recovery of recycled content.
 - .4 Indicate location of manufacturing facility.
- .2 Thermal Barrier: The thermal barrier shall be consisting of two parallel glass fiber-reinforced nylon strips installed continuously and mechanically bonded to the aluminum.
- .3 Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.
- .4 Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- .5 Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- .6 Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.4 WINDOW SYSTEM

- .1 Kawneer Series AA®6400/6500/6600 Windows

2.5 GLAZING

- .1 Glass and Glazing Materials: Refer to Section 08 80 00 – Glazing for glass units and glazing requirements applicable to glazed aluminum window units.
- .2 Glazing System: Glazing method shall be a wet/dry type in accordance with manufacturer's standards. Exterior glazing shall be TPE gasket. Interior glazing shall be snap-in type glazing beads with an interior gasket in accordance with AAMA 702 or ASTM C864.

2.6 HARDWARE

- .1 General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows, and sized to accommodate sash weight and dimensions.
- .2 Projected Window Typical Hardware:
 - .1 Typical Hardware:
 - .1 Locking
 - .1 Single Handle Multi-Point Locks (Standard) Project-In
 - .2 Dual Handle Multi-Point Locks (Standard) Project-Out
 - .3 Cast White Bronze Cam Locks (Project-Out)
 - .4 Access Control Locks (Project-Out)
 - .2 Hinging
 - .1 4-Bar Hinges (Standard)
 - .2 Limit Stop
 - .3 Other
 - .1 Roto Operator (Project-Out)
 - .2 Pole Ring
 - .3 Pole

2.7 ACCESSORIES

- .1 Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, non-migrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.
- .2 Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.
- .3 Sealants and joint fillers for joints at perimeter of window system as specified in Division 7 Section "Joint Sealants".
- .4 Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
- .5 Optional interior Trims: Extruded aluminum, 6063-T6 alloy and temper, extruded to profiles and details indicated.
- .6 Interior Trims: The interior face trim minimum wall thickness shall be 0.062" (1.57 mm). The face trim shall snap-fit onto concealed mounting clip. Exposed fasteners shall not be accepted. The mounting clip shall be extruded aluminum of 6063-T6 alloy and temper. The minimum wall thickness shall be 0.062" (1.57 mm). The trim clips shall be provided in 4" (101.6 mm) lengths and spaced a maximum of 18" (457.2 mm) center to center.
- .7 Coupling Mullions: Shall be extruded aluminum of 6063-T6 alloy and temper of profile and

dimensions indicated on drawings. Mullions shall provide structural properties to resist wind pressure required by performance criteria and standards.

- .8 Optional Insect Screens: Extruded aluminum frames, 6063-T6 alloy and temper, joined at corners: 18 x 16 mesh fiberglass screen cloth; frames finished to match aluminum windows; splines shall be extruded vinyl, removable to permit rescreening.

2.8 FABRICATION

- .1 Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - .1 Profiles that are sharp, straight, and free of defects or deformations.
 - .2 Accurately fit joints; make joints flush, hairline and weatherproof.
 - .3 Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 - .4 Physical and thermal isolation of glazing from framing members.
 - .5 Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - .6 Provisions for field replacement of glazing.
 - .7 Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- .2 Window Vent and/or Vent Frame Joinery: Mitered and Mechanically clipped and/or staked. Factory sealed vent and /or vent frame and corner joints.
- .3 Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- .4 Fabricate aluminum windows that are re-glazable without dismantling sash or framing.
- .5 Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact. Thermal barriers shall be designed in accordance with AAMA TIR A8.
- .6 Thermal Barrier: The thermal barrier shall be Kawneer consisting of two parallel glass fiber-reinforced nylon strips installed continuously and mechanically bonded to the aluminum.
- .7 Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match frame.

2.9 ALUMINUM FINISHES

- .1 Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- .2 Factory Finishing:
 - .1 Kawneer Permanodic® AA-M10C21A44, AAMA 611, Architectural Class I Color Anodic Coating
 - .2 Kawneer Permanodic® AA-M10C21A41, AAMA 611, Architectural Class I Clear Anodic Coating (Color #14 Clear)
 - .3 Kawneer Permanodic® AA-M10C21A31, AAMA 611, Architectural Class II Clear Anodic Coating (Color #17 Clear)
 - .4 Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating.
 - .5 Kawneer Permadize® (50% PVDF), AAMA 2604, Fluoropolymer Coating.
 - .6 Kawneer Permacoat™ AAMA 2604, Powder Coating.

3 EXECUTION

3.1 EXAMINATION

- .1 Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight window installation.
 - .1 Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
 - .2 Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76.2 mm) of opening.
 - .3 Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
 - .4 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- .1 Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- .2 Install aluminum framed window system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- .3 Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
- .4 Install aluminum framed window system and components to drain condensation, water penetrating joints, and moisture migrating within system to the exterior.
- .5 Separate aluminum from dissimilar materials to prevent corrosion or electrolytic action at points of contact.

3.3 FIELD QUALITY CONTROL

- .1 Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
 - .1 Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- .2 Testing Services: Testing and inspecting of installed windows shall take place as follows:
 - .1 Testing Methodology: Testing Standard shall be per AAMA 502 including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 for Water Penetration Test.
 - .1 Air Infiltration Test: Conduct test in accordance with ASTM E 783 at a minimum uniform static test pressure of 1.57 psf (75 Pa) for CW or 6.24 psf (300 Pa) for AW. The maximum allowable rates of air leakage for field testing shall not exceed 1.5 times the project specifications.
 - .2 Water Infiltration Test: Water penetration resistance tests shall be conducted in accordance with ASTM E 1105 at a static test pressure equal to 2/3 the specified water test pressure.
 - .2 Testing Extent: Architect shall select window units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present.
 - .3 Test Reports: Shall be prepared according to AAMA 502.

3.5 ADJUSTING

- .1 Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

3.6 CLEANING

- .1 Progress Cleaning: Clean frames and glazing in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove temporary protective material from prefinished aluminum surfaces.
 - .2 Clean aluminum surfaces promptly after installation. Exercise care to avoid damage to coatings.
 - .3 Ensure curtain wall drainage system (weepers, drainage holes, channels, etc.) are unobstructed and free of dirt and sealants.
- .2 Final Cleaning: Perform in accordance with Section 01 74 00 - Cleaning.
 - .1 Wash exposed surfaces with mild solution of detergent and warm water, using soft, clean wiping cloths. Remove dirt from corners. Wipe surfaces clean.
 - .2 Clean glass and glazing materials with approved non-abrasive cleaner.

3.7 PROTECTION

- .1 Protect installed products and components from damage during construction. Mark glass which may be subject to accidental breakage by Subcontractors. Use temporary markings that after removal do not stain or otherwise leave a perceptible effect.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

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

1.2 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 Preamsembled 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

1.3 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.

1.4 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 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.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with 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.

1.6 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.

1.7 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.

1.8 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

2.1 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.
- .10 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.
- .11 Astragal: Adjustable, extruded aluminum frame with vinyl insert, finish to match door.
- .12 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.

2.2 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.

2.3 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.

2.4 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

3.1 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.

3.2 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.

3.3 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.

3.4 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.

3.5 PROTECTION

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

3.6 DOOR HARDWARE SCHEDULE

- .1 Refer to Drawings.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI):
 - .1 ANSI Z97.1, Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test
- .2 ASTM International (ASTM):
 - .1 ASTM C542, Standard Specification for Lock-Strip Gaskets
 - .2 ASTM C1503, Standard Specification for Silvered Flat Glass Mirror
 - .3 ASTM D790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 - .4 ASTM D1003, Standard Test Method for Haze and Luminous Transmittance of Plastics
 - .5 ASTM D1929, Standard Test Method for Determining Ignition Temperature of Plastics
 - .6 ASTM D2240, Standard Test Method for Rubber Property - Durometer Hardness
 - .7 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials
 - .8 ASTM E330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
 - .9 ASTM F1233, Standard Test Method for Security Glazing Materials and Systems
- .3 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-12.1, Safety Glazing
 - .2 CAN/CGSB-12.2-M, Flat, Clear Sheet Glass
 - .3 CAN/CGSB-12.3-M, Flat, Clear Float Glass
 - .4 CAN/CGSB-12.4-M, Heat Absorbing Glass
 - .5 CAN/CGSB-12.6-M, Transparent (One-Way) Mirrors
 - .6 CAN/CGSB-12.8, Insulating Glass Units
 - .7 CAN/CGSB-12.9-M, Spandrel Glass
 - .8 CAN/CGSB-12.10-M, Glass, Light and Heat Reflecting
 - .9 CAN/CGSB-12.12-M, Plastic Safety Glazing Sheets
 - .10 CAN/CGSB-12.13-M, Patterned Glass
- .4 CSA Group (CSA):
 - .1 CSA A460, Bird-Friendly Building Design
- .5 National Glass Association with GANA (NGA):
 - .1 GANA Glazing Manual
 - .2 Laminated Glazing Reference Manual
- .6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards:
 - .1 SCAQMD Rule 1168, Adhesives and Sealants Applications
- .7 Underwriters Laboratories (UL):
 - .1 UL 752, Standard for Bullet-Resisting Equipment
 - .2 UL 2761, Sealants and Caulking Compounds

- .8 ULC Standards (ULC):
 - .1 CAN/ULC S102, Test for Surface Burning Characteristics of Building Materials and Assemblies
 - .2 CAN/ULC S104, Standard Method of Fire Tests for Door Assemblies
 - .3 CAN/ULC S106, Standard Method of Fire Tests of Windows and Glass Block Assemblies
- .9 United States Consumer Product Safety Commission (CPSC):
 - .1 CPSC 16 CFR 1201 – Safety Standard for Architectural Glazing Materials

1.3 ADMINISTRATIVE REQUIREMENTS

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

1.4 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 glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish, and limitations.
 - .2 Submit WHMIS SDS.
- .3 Shop Drawings: Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
- .4 Samples:
 - .1 Submit for review and acceptance of each type of unit.
 - .2 Samples will not be returned for inclusion into Work.
 - .3 Submit duplicate 300 mm size samples of glass and sealant material.
 - .4 Submit duplicate manufacturer samples of surface-applied glazing films.
- .5 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .6 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
 - .1 Submit testing and analysis of glass under provisions of Section 01 43 00 - Quality Assurance.
 - .2 Submit shop inspection and testing for glass.

1.5 CLOSEOUT SUBMITTALS

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

1.6 QUALITY ASSURANCE

- .1 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .2 Mock-ups: Construct mock-ups in accordance with Section 01 43 00 - Quality Assurance.
 - .1 Construct mock-up to include glass glazing.
 - .2 Mock-up will be used:
 - .1 To judge quality of work, substrate preparation, and material application.
 - .3 HWDSB will require minimum 24 hours to review the mock-up.
 - .4 Approved mock-up may not remain as part of finished Work.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors in a clean dry location and in accordance with manufacturer's recommendations.
 - .2 Store and protect glazing from nicks, scratches, and edge damage.
 - .3 Protect prefinished aluminum surfaces with wrapping or strippable coating.
 - .4 Replace defective or damaged materials with new.

1.8 AMBIENT CONDITIONS

- .1 Ambient Requirements:
 - .1 Install glazing when ambient temperature is 10°C minimum. Maintain ventilated environment for 24 hours after application.
 - .2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.
 - .3 Refer to manufacturer's instructions for minimum ambient temperature for application of bird deterrent glazing film.

2 PRODUCTS

2.1 MATERIALS

- .1 Design Criteria:
 - .1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:
 - .2 Utilize inner lite of multiple lite sealed units for continuity of air and vapour seal.
 - .3 Size glass to withstand wind loads, dead loads and positive and negative live loads acting normal to plane of glass to design pressure of 8 kPa to ASTM E330.
 - .4 Limit glass deflection to 1/200 or flexural limit of glass with full recovery of glazing materials.
 - .5 Exterior glazing design and materials: to CSA Standard A460 for bird-friendly design.
- .2 Flat Glass:
 - .1 Float glass: to CAN/CGSB-12.3, glazing quality, 10 mm thick.
 - .2 Sheet glass: to CAN/CGSB-12.2, AA-special selected, 10 mm thick.
 - .3 Safety glass: to CAN/CGSB-12.1, transparent, 10 mm thick.
 - .1 Type 1-laminated or 2-tempered.

- .2 Class B-float.
- .3 Category 1 or 11.
- .4 Edge treatment.
- .12 Wired glass: to ANSI Z97.1 and CPSC 16 CFR 1201 Cat. I and II, with surface applied safety film.
 - .1 Thickness: 10 mm.
 - .2 Wire mesh style: square.
- .16 Low emissivity (LOW E) glass, 10 mm thick.
 - .1 Metallic coating: soft, sputtered.
 - .2 Light transmittance: to be reviewed with manufacturer
 - .3 Solar heat gain coefficient (SHGC): to be reviewed with manufacturer
 - .4 Shading co-efficient: to be reviewed with manufacturer
 - .5 U-Value: to be reviewed with manufacturer
- .3 Insulating Glass Units:
 - .1 Insulating glass units: to CAN/CGSB-12.8, double unit, 25 mm overall thickness.
 - .1 Glass: to CAN/CGSB-12.3, CAN/CGSB-12.1, CAN/CGSB-12.2, CAN/CGSB-12.4, and CAN/CGSB-12.10.
 - .2 Glass thickness: 10 mm each lite.
 - .3 Inter-cavity space thickness: 5mm with low conductivity spacers.
 - .4 Glass coating: surface number 4, low "E"
 - .5 Inert gas fill: argon or krypton.
 - .6 Bird deterrent treatment: in accordance with CSA A460, provide glass with bird deterrent patterns of ceramic frit on full area of Surface No. 1 (exterior).
 - .1 Visual pattern size: minimum of 4 mm diameter for individual elements/dots, and minimum 2 mm wide by 8 mm long for linear elements.
 - .2 Spacing: no more than 50 mm vertically and horizontally between visual markers or other patterns.
 - .3 Contrast: dots or other visual marker pattern are to be high contrast between dots and other visual marker pattern to the colour/tint of the glazing material.
 - .4 Sealant: in accordance with Section 07 92 00 - Joint Sealants.

2.3 ACCESSORIES

- .1 Setting blocks: neoprene, 80-90 Shore A durometer hardness to ASTM D2240, length of 25 mm for each square metre of glazing.
- .2 Spacer shims: neoprene, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.
- .3 Glazing tape:
 - .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D2240.
 - .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2%, designed for compression of 25%, to effect an air and vapour seal.
- .4 Glazing splines: resilient polyvinyl chloride, silicone or EPDM, extruded shape to suit glazing channel retaining slot.
- .5 Lock-strip gaskets: to ASTM C542.

- .6 Mirror attachment accessories:
 - .1 Stainless or plated steel, J-shaped profile, adjustable, sized to match thickness of mirror.
 - .2 Plastic rosettes.
 - .3 Mirror adhesive, chemically compatible with mirror coating and wall substrate.
 - .4 Mirror frames: Aluminum.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: Verify conditions of substrates previously installed are acceptable for beginning glazing installation in accordance with manufacturer's instructions.
 - .1 Verify that openings for glazing are correctly sized and within tolerance.
 - .2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
 - .3 Visually inspect substrates.
 - .4 Inform HWDSB of unacceptable conditions immediately upon discovery.
 - .5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from HWDSB.

3.2 PREPARATION

- .1 Clean contact surfaces with solvent and wipe dry.
- .2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- .3 Prime surfaces scheduled to receive sealant.
- .4 Preparation - Glazing films:
 - .1 Clean glazing before beginning installation using neutral cleaning solution.
 - .2 Ensure no deleterious material adheres to glazing.
 - .3 Ensure dust, grease, and chemical residue are removed from surface of glazing before installation of film.
 - .4 Examine glazing under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate or cause vision transparency or distortion problems.

3.3 INSTALLATION: EXTERIOR - DRY METHOD (PREFORMED GLAZING)

- .1 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.
- .3 Cut glazing tape or spline to length; install on glazing lite. Seal corners by butting tape, spline and sealing junctions with sealant.
- .4 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
- .5 Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- .6 Install removable stops without displacing glazing tape, spline. Exert pressure for full continuous contact.
- .7 Trim protruding tape edge.

3.4 INSTALLATION: EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

- .1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.
- .2 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.
- .3 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.
- .4 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
- .5 Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of lite or glass unit.
- .6 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line.
- .7 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.
- .8 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.5 INSTALLATION: EXTERIOR - WET METHOD (SEALANT AND SEALANT)

- .1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.
- .2 Place setting blocks at ¼ points and install glazing lite or unit.
- .3 Install removable stops with glazing centred in space by inserting spacer shims both sides at 600 mm intervals, 6 mm below sight line.
- .4 Fill gaps between glazing and stops with sealant to depth of bite on glazing, maximum 9 mm below sight line to ensure full contact with glazing and continue air and vapour seal.
- .5 Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.6 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE)

- .1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.
- .2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.
- .3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
- .4 Rest glazing on setting blocks and push against tape for full contact at perimeter of lite or unit.
- .5 Place glazing tape on free perimeter of glazing in same manner described.
- .6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- .7 Knife trim protruding tape.

3.7 INSTALLATION: INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

- .1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.
- .2 Cut glazing tape to length and install against permanent stops, projecting 1.6 mm above sight line.
- .3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
- .4 Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of lite or unit.
- .5 Install removable stops, with spacer shims inserted between glazing and applied stops at 600 mm intervals, 6 mm below sight line.

- .6 Fill gaps between lite and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.
- .7 Trim protruding tape edge.

3.8 INSTALLATION: INTERIOR - WET METHOD COMPOUND AND COMPOUND

- .1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.
- .2 Install glazing resting on setting blocks. Install applied stop and centre lite by use of spacer shims at 600mm centres, 6mm below sight line.
- .3 Locate and secure glazing lite using glazers' clips.
- .4 Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.

3.11 INSTALLATION: BIRD-DETERRENT TREATMENT

- .1 If there are green roofs or rooftop vegetation adjacent to glazing, follow CSA A460 for specific installation requirements.
- .2 Refer to manufacturer's instructions for minimum ambient temperature for application of bird deterrent glazing film.
- .3 Bird deterrent treatment to be installed from ground to 16 m or to the height of the adjacent mature tree canopy, whichever is greater.
- .4 Bird deterrent treatment to be applied to glass corners for 5 m in each direction.

3.12 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove traces of primer and sealants.
 - .2 Remove glazing materials from finish surfaces.
 - .3 Remove labels.
 - .4 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.
- .2 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

3.13 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 After installation, mark each lite with an "X" by using removable plastic tape or paste.
 - .1 Do not mark heat absorbing or reflective glass units.
- .3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

1.2 REFERENCE STANDARDS

- .1 The Aluminum Association Inc. (AA):
 - .1 AA DAF-45, Designation System for Aluminum Finishes
- .2 Air Movement and Control Association International (AMCA):
 - .1 AMCA 500-D, Laboratory Methods of Testing Dampers for Rating
 - .2 AMCA 500-L, Laboratory Methods of Testing Louvers for Rating
 - .3 AMCA 501, Application Manual for Air Louvers
 - .4 AMCA 511, Certified Ratings Program for Air Control Devices
- .3 American National Standards Institute (ANSI):
 - .1 ANSI H35.1/H35.1M, Alloy and Temper Designation Systems for Aluminum
- .4 ASTM International (ASTM):
 - .1 ASTM A240/A240M, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 - .2 ASTM A653/A653 M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .3 ASTM A1008/A1008M, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable
 - .4 ASTM B32, Standard Specification for Solder Metal
 - .5 ASTM B209/B209M, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - .6 ASTM B221M, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
 - .7 ASTM B370, Standard Specification for Copper Sheet and Strip for Building Construction
 - .8 ASTM D523, Standard Test Method for Specular Gloss
 - .9 ASTM D822/D822M, Standard Practice for Filtered Open-Flame Carbon-Arc Exposure of Paint and Related Coatings
 - .10 ASTM E2886/E2886M, Standard Test Method for Evaluating the Ability of Exterior Vents to Resist the Entry of Embers and Direct Flame Impingement
- .5 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-1.213, Etch Primer (Pretreatment Coating of Tie Coat) for Steel and Aluminum
 - .2 CAN/CGSB-93.1, Sheet Aluminum Alloy, Prefinished, Residential
- .6 Public Services and Procurement Canada (PSPC)/ Public Works and Government Services Canada (PWGSC):
 - .1 MD 15000, Mechanical Environmental Standard for Federal Office Buildings

1.3 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 datasheet and include product characteristics, performance criteria, physical size, finishes, and limitations.
 - .2 Submit WHMIS SDS - Safety Data Sheets.

- .3 Shop Drawings: Indicate fabrication and erection details, including anchorage, accessories, and finishes.
- .4 Samples:
 - .1 Submit duplicate samples of each type of louvre and vent showing colour and finish.
 - .2 Show frame detail, screening and finish.
 - .3 Where colour is not indicated, submit manufacturer's standard colours on actual metal substrate for HWDSB's selection.
- .5 Manufacturer Instructions: Submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
- .6 Closeout Submittals: Submit operation and maintenance data for manually operated or motorized louvres and incorporate into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Protect louvres from nicks, scratches, and blemishes.

2 PRODUCTS

2.1 MATERIALS

- .1 Weather resistant louvres, with bird screens made to withstand a wind load of not less than 1.44 kilopascals.
- .2 Wall louvers: complete with AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D, AMCA 500-L and AMCA 511.
- .3 Ratings to indicate water penetration of 0.06 kilograms or less per square metre of free area at free velocity of 244 meters per minute.
- .4 Galvanized steel sheet: commercial quality to ASTM A653/A653M with Z275 zinc coating.
- .5 Steel sheet: commercial quality to ASTM A1008/A1008M with Class I matte finish.
- .6 Aluminum sheet: to ASTM B209/B209M, 3003-H14 alloy for painted applications and 5005-H32 alloy for anodized applications
- .7 Aluminum extrusions: to ASTM B221M alloy 6063-T5 or T52.
- .13 Nails and fasteners: same material as fabricated items.
- .14 Gaskets: vinyl.
- .15 Primer: to CAN/CGSB-1.213 for steel and aluminum surfaces.
- .18 Screens:
 - .1 Insect screens: fibreglass 18 x 14 mesh, minimum 60% free area, secured to aluminum frame.
 - .2 Birdscreens: intercrimped aluminum wire cloth secured to minimum 1.4 mm thick extruded aluminum frame mitered at corners and secured with corner locks, 16 x 16 mm size mesh, minimum 1.27 mm diameter wire with minimum 60% free area.
- .22 Door louvres:
 - .1 Construct door louvres from aluminum extrusions
 - .1 Minimum free area of 35%.
 - .2 Provide fasteners to suit louvre material.
 - .2 Use standard operating blades.

- .3 Provide separate adjustable trim member for clamping louvre in opening.
- .4 Miter frame and trim members at corners and secure rigidly with corner brackets.
- .5 Secure interior frame with countersunk tamperproof screws.
- .23 Louvred penthouses:
 - .1 Construct penthouse louvres from extruded aluminum stormproof blades of minimum 3 mm thickness.
 - .2 Continuously Heliarc weld at corners sills, blades and head members: support by structural aluminum angles on interior as indicated.
 - .3 Provide one piece weatherproof roof of 2 mm thick aluminum sheet reinforced with 50 x 50 x 6 mm aluminum angles at 1200 mm on centre.
 - .1 Insulate underside of roof with minimum 6 mm thick sound deadening and anti-condensation coating.

2.2 FINISHES

- .1 Finish exposed surfaces of aluminum components in accordance with AA DAF-45 and ANSI H35.1/H35.1M for Aluminum Finishes.
 - .1 As fabricated or mill finish: To AA DAF-45
 - .2 Clear anodic finish: To AA DAF-45
 - .3 Integral colour anodic finish: To AA DAF-45, colour to match HWDSB sample.
 - .4 Impregnated colour anodic finish: designation AA DAF-, colour to match HWDSB sample.
 - .5 Electrolytically deposited colour anodic finish: designation AA DAF-45, colour to match HWDSB sample.
- .2 Appearance and properties of anodized finishes designated by the Aluminum Association as Architectural Class 1, Architectural Class 2, and Protective and Decorative.

3 EXECUTION

3.1 INSTALLATION

- .1 Install louvres and vents where indicated.
- .2 Set adjustable louvre blades for uniform alignment in open and closed positions.
- .3 Adjust louvres so moving parts operate smoothly.
- .4 Attach bird and insect screen to inside face of louvre or vent.
- .5 Repair damage to louvres and vents to match original finish.
- .6 Install wall louvers using stops, mouldings, flanges, strap anchors, jamb fasteners as appropriate for wall construction and in accordance with manufacturer's recommendations.

3.2 CLEANING

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.

3.3 PROTECTION

- .1 Paint copper or copper-bearing alloys in contact with dissimilar metal with heavy-bodied bituminous paint or separate with inert membrane.
- .2 Where aluminum contacts metal other than zinc, paint dissimilar metal with primer and two coats of aluminum paint.
- .3 Paint metal in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

- .4 Paint wood or other absorptive materials that may become repeatedly wet and in contact with metal with two coats of aluminum paint or coat of heavy-bodied bituminous paint.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 07 92 00 - Joint Sealants.

1.2 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, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - .2 CAN/CGSB-71.25, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.
- .3 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

1.3 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 C840 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.

1.4 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 C840:
 - .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.

1.5 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

2.1 MATERIALS

- .1 Standard board: to ASTM C1396/C1396M 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, regular, 12.7 mm thick and Type X, 15.9 mm thick, 1200 mm wide x maximum practical length.
- .3 Backing board and coreboard: to ASTM C1396/C1396M, regular, 12.7 mm thick squared edges.
- .4 Water-resistant board: to ASTM C1396/C1396M, regular, 12.7 mm thick and Type X, 15.9 mm thick, 1200 mm wide x maximum practical length.
- .5 Nails: to ASTM C514
- .6 Steel drill screws: to ASTM C1002
- .7 Stud adhesive: to CAN/CGSB-71.25, ASTM C557.
- .8 Laminating compound: as recommended by manufacturer, asbestos-free.
- .9 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.
- .10 Shadow mould: 35 mm high, snap-on trim, of 0.6 mm base steel thickness galvanized sheet pre-finished in satin enamel, white colour.

- .11 Vinyl mouldings: mouldings for joint treatment of vinyl-faced gypsum board, as supplied by gypsum board manufacturer.
- .12 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.
- .13 Polyethylene: to CAN/CGSB-51.34, Type 2
- .14 Joint compound: to ASTM C475, asbestos-free

2.2 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 EXECUTION

3.1 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..

3.2 ERECTION

- .1 Do application and finishing of gypsum board to ASTM C840 except where specified otherwise
- .2 Do application of gypsum sheathing to ASTM C1280
- .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, 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.

3.3 APPLICATION

- .1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.
- .2 Apply single layer gypsum board to 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
 - .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.
- .4 Apply water-resistant gypsum board where wall tiles to be applied and adjacent to slop sinks and janitor closets. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.
- .5 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.
- .6 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.
- .7 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.
- .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.

3.4 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.

- .8 Install control joints straight and true.
- .9 Ensure that screws or nails are properly applied in process of attaching gypsum board to framing without damaging of gypsum board edges and ends.
- .10 Construct expansion joints, at building expansion and construction joints. Provide continuous dust barrier.
- .11 Install expansion joint straight and true.
- .12 Splice corners and intersections together and secure to each member with 3 screws.
- .13 Install access doors to electrical and mechanical fixtures specified in respective sections.
 - .1 Rigidly secure frames to furring or framing systems.
- .14 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.
- .15 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 0: no tapping, finishing or accessories required.
 - .2 Level 1: embed tape for joints and interior angles in joint compound. Surfaces free of excess joint compound; tool marks and ridges are acceptable.
 - .3 Level 2: embed tape for joints and interior angles in joint compound and apply one separate coat of joint compound over joints, angles, fastener heads and accessories; surfaces free of excess joint compound; tool marks and ridges are acceptable.
 - .4 Level 3: embed tape for joints and interior angles in joint compound and apply two separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.
 - .5 Level 4: 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; surfaces smooth and free of tool marks and ridges.
 - .6 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.
- .16 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.
- .17 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board, invisible after surface finish is completed.
- .18 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .19 Completed installation smooth, level or plumb, free from waves and other defects and ready for surface finish.
- .20 Apply one coat of white primer sealer over surface to be textured. When dry apply textured finish in accordance with manufacturer's instructions.
- .21 Mix joint compound slightly thinner than for joint taping.
- .22 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.
- .23 Allow skim coat to dry completely.
- .24 Remove ridges by light sanding or wiping with damp cloth.

3.5 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.

3.6 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 09 21 16 – Gypsum Board Assemblies

1.2 REFERENCE STANDARDS

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

1.3 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.

1.4 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 and Waste Reduction Workplan in accordance with Section 01 74 19 - Waste Management and Disposal.

2 PRODUCTS

2.1 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

3.1 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..

3.2 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.

3.3 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 Wall Furring:
 - .1 Install steel furring as indicated.
 - .2 Frame openings and around built-in equipment, cabinets, access panels, on four sides, with channels. Extend furring into reveals.
 - .1 Check clearances with equipment suppliers.
 - .3 Construct bulkheads and boxed-in duct shafts, for beams, columns, pipes and around exposed services where indicated.
 - .1 Install 19 mm channels at corners and at 300 mm on centre.
 - .4 Fir ends and edges closely, but not forced together, stagger end joints in succeeding courses.
 - .5 Build in hollow metal frames in plastered furred walls.
 - .6 On exterior walls, install asphalt felt protection strip between furring channel and wall.
- .4 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.
 - .10 Provide continuous polyethylene air seal behind and across expansion/contraction joints.
 - .11 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.
 - .12 Install expansion joints straight and true.
 - .13 Install rings and frames for electrical and mechanical fixtures.
 - .14 Rigidly secure rings and frames to furring and lathing systems.

3.4 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.

3.5 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 07 92 00 - Joint Sealants

1.2 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.

1.3 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.

1.4 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.

1.5 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

2.1 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).
- .4 Metal channel stiffener: 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.
- .5 Acoustical sealant: in accordance with Section 07 92 00 - Joint Sealants.
- .6 Sealants: VOC limit 30g/L maximum.
- .7 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

3.1 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.

3.2 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.

3.3 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.

3.4 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

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, vinyl composition floor tile, static, dissipative floor tile, rubber tile flooring, resilient wall bases, and resilient accessories for transition strips and area dividers.

1.1 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

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
 - .2 ASTM F1066, Standard Specification for Vinyl Composition Floor Tile
 - .3 ASTM F1344, Standard Specification for Rubber Floor Tiles
 - .4 ASTM F1482, Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
 - .5 ASTM F1516, Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended)
 - .6 ASTM F1700, Standard Specification for Solid Vinyl Floor Tile
 - .7 ASTM F1861, Standard Specification for Resilient Wall Base
 - .8 ASTM F1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
 - .9 ASTM F2169, Standard Specification for Resilient Stair Treads
 - .10 ASTM F2873, Standard Practice for the Installation of Self-Leveling Underlayment and the Preparation of Surface to Receive Resilient Flooring
- .2 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-25.20, Surface Sealer for Floors
 - .2 CAN/CGSB-25.21, Detergent-Resistant Floor Polish
- .3 CSA Group (CSA):
 - .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
 - .2 CSA A126.5, Resilient Wall Base
 - .3 CSA B651, Accessible Design for the Built Environment

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Preconstruction Meetings: Arrange a preconstruction meeting in accordance with Section 01 31 19 – Project Meetings attended by Subcontractor, Contractor, HWDSB and JASON FUNG ARCHITECT INC.
 - .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 resilient floor surfaces are installed flush with adjacent floor finishes coordinate the following:
 - .1 Coordinate type and style of resilient transition strips to be used between adjacent floor finishes.

1.4 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 Shop Drawings; Submit shop drawings indicating the following:
 - .1 Each resilient floor tile type, installation method, locations of building movement joints.
 - .2 Drawing details of stair treads, risers, and landings.
 - .3 Locations and types of edge strips and reducer strips at flooring penetrations.
- .4 Samples for Initial Selection: Submit samples of the following:
 - .1 Full-size samples of each type of resilient tile flooring.
 - .2 Small samples of resilient base.
 - .3 Small samples of stair nosing.
 - .4 Small samples of stair treads and risers.
 - .5 Samples of accessories where exposed to view.
- .5 Samples for Verification: Submit duplicate full-size samples of resilient tile flooring, and 300 mm long base, nosing, treads, risers, reducer strips and edge strips.
- .6 Test and Evaluation Reports: Submit floor substrate test results before beginning resilient tile flooring installation. Include a comparison to the resilient flooring manufacturer's minimum acceptable conditions.
- .7 Manufacturer's Instructions: Submit manufacturer's storage, handling, and installation instructions.
- .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.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Operation and Maintenance Data: Submit maintenance, repair, and cleaning recommendations for resilient tile flooring and incorporate into manual.
- .3 Record Documentation: Submit list of materials installed, including adhesives, wall base, and accessories. Indicate manufacturers, products, types, patterns, and colour names and numbers.

Indicate room/area where installed.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- .1 Operations and Maintenance Data: Submit manufacturer's cleaning and repair recommendations in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Submit Subcontractor's maintenance bond.
- .3 Warranty Documentation: Submit manufacturer's warranties.
- .4 Extra Materials: Supply extra materials for maintenance use in accordance with Section 01 78 00 – Closeout Submittals.
 - .1 Supply a minimum of one box of each resilient tile type, pattern, and colour installed, or an area equal to 5% of the area installed, or a minimum 4 m² of each resilient tile, whichever is greater.
 - .2 Supply a minimum 10 m of the length installed of the resilient base in a continuous roll for each type, colour, and height. Manufacturer's standard maximum lengths are acceptable instead of rolls.
 - .3 Supply a sufficient amount of each adhesive to install maintenance materials in manufacturer's standard containers.
 - .4 Supply extra materials from same production run as installed materials.
 - .6 Label each box of resilient floor tile, each base, and each container of adhesive with manufacturer's name, product name, and room/area where installed.

1.7 QUALITY ASSURANCE

- .1 Installer Qualifications:
 - .1 Five years of experience and successful completion of similarly installed area, materials, and complexity.
 - .2 Member in good standing throughout the performance of the Work of Resilient Flooring Contractor's Association of Ontario (RFCAO).
- .2 Mock-Ups: Assemble mock-up in accordance with Section 01 43 00 - Quality Assurance, and as follows:
 - .1 Mock-Up Size: 1000 mm x 1000 mm of each resilient tile type flooring. Mock-up to demonstrate:
 - .1 Installation pattern.
 - .2 Installation workmanship at walls and doorways.
 - .3 Inside corner and outside corner of wall base.
 - .4 Edge strips and reducer strips.

1.8 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 Protect adhesives, fillers, and sealants from freezing.
- .2 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, in dry location and in clean, temperature controlled, well-ventilated area.
 - .2 Store and protect specified materials from nicks, scratches, and blemishes.
 - .3 Coordinate delivery of materials with scheduled installation to allow minimum conditioning time on site.
- .3 Packaging Waste Management: Perform in accordance with Section 01 74 19 – Waste Management and Disposal.

1.9 AMBIENT CONDITIONS

- .1 Unless otherwise stated in manufacturer's instructions, maintain site conditions to occupancy service conditions for a minimum 48 hours before installation, during installation, and a minimum 48 hours after installation. Site conditions include:
 - .1 Ambient, substrate and material temperatures between 18C and 29C. Temperatures may be reduced to 13C 72 hours after installation.
 - .2 Subfloor surface temperature for adhesive application between 16C and 29C.
 - .3 Relative humidity (RH) between 40% and 60% with temperature at 18C and 29C.
- .2 Ventilation: Provide temporary ventilation where existing systems are not available or are inadequate to meet minimum requirements as follows:
 - .1 Provide high ventilation rate with maximum outside air 24 to 48 hours before, during installation, and 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through air distribution system. Continue high ventilation rate for at least four weeks after building occupation.
 - .2 Coordinate operation of existing ventilation system with HWDSB.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Acceptable Manufacturers:
 - .1 Johnsonite
 - .2 Armstrong Flooring
 - .3 Altro Flooring
- .2 Substitutions: Permitted, subject to review by HWDSB and JASON FUNG ARCHITECT INC.
- .3 Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 MATERIAL

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

2.3 RESILIENT TILE FLOORING MATERIALS

- .1 Vinyl Composition Floor Tile (VCT): To ASTM F1066, Composition 1 – non-asbestos, straight, sharp, and square edges, and as follows:
 - .1 Class: Class 2 – through pattern tile
 - .2 Surface: Plain

- .3 Thickness: 3 mm
- .4 Size: 305 x 305 mm nominal
- .5 Colour: As selected by HWDSB and JASON FUNG ARCHITECT INC. from manufacturer's standard range

2.4 RESILIENT WALL BASE

- .1 Resilient Base (RB): To ASTM F1861, same dye lot for entire Project, and as follows:
 - .1 Type: TS – Rubber, vulcanized thermoset
 - .2 Group: 1 – Homogeneous
 - .3 Style: B – Coved
 - .4 Thickness: 3 mm
 - .5 Height: 100 mm
 - .6 Lengths: 120 foot continuous coiled or 4 foot straight lengths
 - .7 Colour: As selected by HWDSB and JASON FUNG ARCHITECT INC. from manufacturer's standard range to match existing .

2.5 RESILIENT TRANSITION AND EDGE STRIPS

- .1 Resilient Transition and Edge Strips: Meeting CAN/CSA B651 for height and slope.
 - .1 Extruded vinyl shapes meeting or exceeding ADA Recommendations for change of level transitions for transition between floor finishes having different levels.
 - .2 Colour: As selected by HWDSB and JASON FUNG ARCHITECT INC. from manufacturer's standard range

2.6 RESILIENT STAIR ACCESSORIES

- .1 Resilient Stair Covering: To ASTM F2169, and as follows:
 - .1 Type: TS – Thermoset
 - .2 Stair Nosing: Square nose profile, 3 mm thickness, 50 mm vertical face, 70 mm horizontal surface, double lock for butting to resilient flooring, ribbed, slip resistant profile
 - .3 Stair Tread: Square nose profile, 4mm overall thickness, 50 mm vertical face, width and depth to suite tread, ribbed profile with colour contrasting strip at nosing, complete with integral riser
 - .4 Colour: As selected by HWDSB and JASON FUNG ARCHITECT INC. from manufacturer's standard range

2.7 ACCESSORIES

- .1 Primer: Where recommended by resilient tile floor manufacturer for site conditions and application.
- .2 Concrete Moisture Emission Reducer Coating: Moisture insensitive, epoxy modified, forming a permanent moisture barrier, water vapour permeability less than 6 ng/Pa•s•m when tested to ASTM E96/96M (wet method). Other test methods will be considered.
- .3 Adhesives: Waterproof, where recommended by flooring manufacturer for substrate; above, on, or below grade.
- .4 Sub-floor filler and leveler: White pre-mix latex requiring water only to produce cementitious paste and leveler as recommended by sheet flooring manufacturer for use with their product.
- .5 Metal Transition and Edge Strips: Meeting CAN/CSA B651 for height and slope, extruded aluminum with lip to extend under sheet flooring, shoulder flush with top of adjacent floor finish.
- .1 Colour: As selected by HWDSB and JASON FUNG ARCHITECT INC. from manufacturer's standard range

- .6 Edging to Floor Penetrations: Aluminum, profile recommended by resilient tile floor manufacturer.
- .7 Sealer and wax: As recommended by resilient tile floor manufacturer

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions:
 - .1 Verify concrete floors are free of cracks, ridges, depressions, scale, foreign materials, paint, varnish, dust, oils, release agents, waxes, and sealers, and that curing and hardening compounds have been removed.
 - .2 Verify substrate tolerances are within resilient tile flooring manufacturer's recommendations.
 - .3 Verify concrete surface profile is within resilient tile flooring manufacturer's recommendations.
 - .4 Verify that work by other Subcontractors affecting the flooring installation is acceptable.
 - .5 Report defective conditions affecting installation to HWDSB and JASON FUNG ARCHITECT INC. in writing immediately upon discovery and before beginning installation.
 - .6 Proceed with installation only after defective surfaces and conditions have been remedied.
- .2 Pre-installation Testing: Perform tests to verify concrete floors are dry, with moisture vapour emission rate, and alkalinity within the manufacturer's recommendations.

3.2 PREPARATION

- .1 Protection of In-Place Conditions: Protect face of doors, door frames, and walls from marring due to installation of resilient tile flooring.
- .2 Surface Preparation:
 - .1 Remove or treat old adhesives to prevent residual, old flooring adhesives from bleeding through to new flooring and interfering with the bonding of new adhesives.
 - .2 Remove pen and marker lines completely from concrete surfaces.
 - .3 Prepare substrate in accordance with ASTM F3010.
 - .4 Clean floor of dust, mould, mildew, alkaline salts, laitance, concrete film-forming curing compounds, paint, solvents, wax, oil, grease, residual adhesive, adhesive removing compounds, sealants, soap, and other foreign material.
 - .5 Apply filler as required, prohibit traffic until filler is cured.
 - .6 Prime concrete slab to resilient tile flooring manufacturer's recommendations.

3.3 INSTALLATION – RESILIENT TILE

- .1 Install resilient tile flooring and accessories using tools, materials, methods, and sequence of work to manufacturer's recommendations.
- .2 Mix and apply adhesive uniformly in accordance with manufacturer's instructions, using manufacturer-recommended trowel notching, spread, coverage rate, open times, and safety precautions. Do not spread more adhesive than can be covered by flooring before initial set.
- .3 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width, but not less than 150 mm wide.
- .4 Install flooring to square grid pattern.
- .5 Cut resilient tile and fit neatly around fixed objects.
- .6 Cut resilient tile to fit tightly in pan type floor access covers and to frames, using hardware cut-outs.
- .7 Install resilient tile flooring in areas which will be under built-in furniture.

- .8 Install resilient tile flooring through areas to receive movable type partitions without interrupting floor pattern.
- .9 Install resilient tile flooring through doorways and scribed to fit projections and vertical surfaces.
- .10 Terminate flooring under centreline of door, in openings where adjacent floor finish material or colour are dissimilar.
- .11 During and after installation, roll flooring in two directions with minimum weighted roller to achieve full adhesion and prevent visible adhesive or trowel marks, unless otherwise indicated by flooring manufacturer.
- .12 Install edge strips at floor penetrations, and edge strips at unprotected and exposed edges where flooring terminates to suit conditions. Securely bond to substrate and in a straight line.
- .13 When necessitated by material size, locate cross seams and seams at doors and pivot points in accordance with accepted shop drawings.
- .14 Apply waterproof sealant at edge of linoleum abutting walls, millwork bases, and other projections in wet areas.

3.4 INSTALLATION – WALL BASE

- .1 Lay out resilient base with minimum number of joints.
- .2 Clean substrate and prime with one coat of adhesive.
- .3 Set resilient base against wall and floor surfaces tightly by using 3-kg hand roller.
- .4 Install straight and level to variation of 1:1000.
- .5 Scribe, cut, and fit wall base to door frames and other obstructions.
- .6 Cope wall base at internal corners. Install formed straight wall base for external corners. Install formed straight wall base for non-90 degree corners.

3.5 INSTALLATION – STAIR COVERINGS

- .1 Scribe and tightly fit to stair profile and wall surfaces. Cut to align with base on landings. Securely bond stringer to substrate in a straight line.
- .2 Apply adhesive evenly to back of stair coverings at a rate sufficient to bond and to completely fill gaps between treads and risers. Set firmly in position tight to nosing and roll.
- .3 Install stair nosings in one piece for full width of stair. Fully adhered to tread edge with adhesive.
- .4 Install tactile warning strips at stair landings where indicated on Drawings, width of stair x 750 mm deep, set back from front edge of stair one tread depth.
- .5 Install stair treads and nosings flush with surfaces of floor covering

3.6 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:

3.7 CLEANING

- .1 Progress Cleaning: In accordance with Section 01 74 00 - Cleaning. Remove excess adhesive before cured.
- .2 Final Cleaning: In accordance with Section 01 74 00 – Cleaning.

- .3 Waste Management: Perform in accordance with Section 01 74 19 – Waste Management and Disposal.

3.8 PROTECTION

- .1 Protect flooring with non-marring temporary coverings until Work has been approved by JASON FUNG ARCHITECT INC.
- .2 Prohibit traffic on resilient tile flooring for a minimum 48 hours after installation.
- .3 Protect resilient tile flooring from heavy rolling loads during construction with plywood, hardboard, or other protection method recommended by resilient tile flooring manufacturer.
- .4 Allow a minimum 24 hours for site-applied finishes to dry before permitting foot traffic and a minimum 7 days before placing furniture and similar heavy objects.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and installation of the indoor resilient multipurpose surfacing, application of the game lines, and references for the correct construction and preparation of concrete slabs to receive resilient flooring.

1.2 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

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
 - .2 ASTM F1516, Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended)
 - .3 ASTM F1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
 - .4 ASTM F2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes
 - .5 ASTM F2772, Standard Specification for Athletic Performance Properties of Indoor Sports Floor Systems
 - .6 ASTM F2873, Standard Practice for the Installation of Self-Leveling Underlayment and the Preparation of Surface to Receive Resilient Flooring
- .2 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-25.20, Surface Sealer for Floors
 - .2 CAN/CGSB-25.21, Detergent-Resistant Floor Polish
- .3 CSA Group (CSA):
 - .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
 - .3 CSA B651, Accessible Design for the Built Environment

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Preconstruction Meetings: Arrange a preconstruction meeting in accordance with Section 01 31 19 – Project Meetings attended by Subcontractor, Contractor, HWDSB and JASON FUNG ARCHITECT INC.
 - .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 resilient floor surfaces are installed flush with adjacent floor finishes coordinate the following:
 - .1 Coordinate type and style of resilient transition strips to be used between adjacent floor finishes.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: Submit manufacturer's promotional brochures, specifications and installation instructions.
- .3 Manufacturer Certifications:
 - .1 Certification that accurately identifies the Original Equipment Manufacturer (OEM) of flooring furnished for this project including manufacturer's name, address, and factory location.
 - .2 Suppliers of private label flooring for this project must identify themselves as such and fully disclose the OEM information listed above.
 - .3 All "manufacturer" requirements in these specifications must be complied with by the OEM, including warranties, certifications, qualifications, product data, test results, environmental requirements, performance data, etc.
- .4 Shop Drawings; Submit shop drawings produced by the manufacturer.
- .5 Samples for Initial Selection:
 - .1 Submit for selection and approval three sets of the indoor resilient multipurpose surfacing, manufacturer's brochures, samples or sample boards of all of the available colours, textures, and styles.
 - .2 Submit colour samples of all the available game line paint colours for selection and approval.

1.6 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Operation and Maintenance Data: Submit three copies of the indoor resilient multipurpose surfacing and manufacturer's maintenance instructions.
- .3 Record Documentation: Submit list of materials installed, including adhesives and accessories. Indicate manufacturers, products, types, patterns, and colour names and numbers. Indicate room/area where installed.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- .1 Operations and Maintenance Data: Submit manufacturer's cleaning and repair recommendations in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Submit Subcontractor's maintenance bond.
- .3 Warranty Documentation: Submit manufacturer's warranties including:
 - .1 Special Limited Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace sports flooring including labour that falls within specified warranty period.
 - .2 Material Warrant must be direct from the original manufacturer or division thereof. Private label warranties from distributors or brokers are not valid. Supply original point of manufacturing upon request.
 - .3 Failures include, but are not limited to, the following:
 - .1 Material manufacturing defects.
 - .2 Surface wear and deterioration to the point of wear-through of wear layer per ASTM

F410/ASTM F1303.

- .3 Failure due to substrate moisture exposure exceeding 92% relative humidity when tested according to ASTM 2170.
- .4 Warranty Period: For material defects and surface wear-through:
 - .1 25 years from date of Substantial Completion.
- .5 Installer's Limited Warranty:
 - .1 Installer's standard form in which installer agrees to repair or replace sports flooring that fails due to poor workmanship or fault installation within the specified warranty period.
 - .2 Warranty Period: 2 years from date of Substantial Completion.
- .4 Extra Materials: Supply extra materials for maintenance use in accordance with Section 01 78 00 – Closeout Submittals.
 - .1 Supply to the owner additional materials and associated adhesives containing a total of at least 5% of each different colour or design of the indoor resilient athletic surfacing used on the product.
 - .2 Material to be from same production run as material installed.

1.8 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 The indoor resilient multipurpose surfacing shall have been actively marketed for a minimum of ten (10) years.
 - .2 The indoor resilient multipurpose surfacing shall be manufactured in an ISO 9001 certified plant.
 - .3 The indoor resilient multipurpose surfacing shall be manufactured in an ISO 14001 certified plant.
 - .4 The indoor resilient multipurpose surfacing supplier shall be an established firm, experienced in the field, and competent in the techniques required by the manufacturer.
 - .5 The installer of the indoor resilient multipurpose surfacing shall have a minimum of five (5) years of experience in the field installing indoor resilient multipurpose surfacing and have worked on at least five (5) projects of similar size, type, and complexity.
- .2 Certifications:
 - .1 Installer to submit the indoor resilient athletic surfacing manufacturer's or distributor's certification attesting that they are an approved installer of the indoor resilient multipurpose surfacing.
 - .2 The indoor resilient multipurpose surfacing manufacturer to submit official ISO 9001 certification for the facility in which the indoor resilient multipurpose surfacing is manufactured.
- .3 Testing:
 - .1 Tests shall be relative for multi-purpose use with certificates from independent testing resources to be made available upon request. Test results shall be performed according to ASTM standard testing procedures including ASTM F2772 "Standard Specification for Athletic Performance Properties of Indoor Sports Floor Systems".
- .4 Mock-Ups: Assemble mock-up in accordance with Section 01 43 00 - Quality Assurance.

1.9 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements:
- .2 Delivery:

- .1 Material shall not be delivered until all related work is in place and finished and/or proper storage facilities and conditions can be provided and guaranteed stable according to manufacturer recommendations
- .3 Storage and Handling Requirements:
 - .1 Store the material in a secure, clean and dry location for three days prior to installation in area of installation to achieve temperature stability.
 - .2 Maintain temperature between 13C to 30C.
 - .3 Store the indoor resilient athletic surfacing rolls in an upright position on a smooth flat surface immediately upon delivery to jobsite.
 - .4 Rolls shipped in rigid protective cardboard containers can be laid horizontally prior to unpacking and installation.
- .3 Packaging Waste Management: Perform in accordance with Section 01 74 19 – Waste Management and Disposal.

1.10 AMBIENT CONDITIONS

- .1 Unless otherwise stated in manufacturer's instructions, maintain site conditions to occupancy service conditions for a minimum 72 hours before installation, during installation, and a minimum 48 hours after installation. Site conditions include:
 - .1 Ambient, substrate and material temperatures between 20C and 30C. Temperatures may be reduced to 13C 72 hours after installation.
 - .2 Subfloor surface temperature for adhesive application between 16C and 29C.
 - .3 Relative humidity (RH) between 40% and 60% with temperature at 18C and 29C.
- .2 Ventilation: Provide temporary ventilation where existing systems are not available or are inadequate to meet minimum requirements as follows:
 - .1 Provide high ventilation rate with maximum outside air 24 to 48 hours before, during installation, and 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through air distribution system. Continue high ventilation rate for at least four weeks after building occupation.
 - .2 Coordinate operation of existing ventilation system with HWDSB.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Basis-of-Design Product:
 - .1 Tarkett Sports – Omnisports Multi-Use
- .2 Acceptable Alternatives:
 - .1 Gerflor – Taraflex Sport M
 - .2 Polyflor – Sport 67
 - .3 Caliber Sport Systems – Vsport 710
- .3 Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 MATERIAL

- .1 Omnisports Multi-Use – Prefabricated sport surface 6.2 mm with wood flooring design, single surface embossing and Extreme Three (3) Layers technology (X3LT) as supplied by Tarkett.
 - .1 Embossing of wood design and solid colours must be the same; varying embossing or surface textures will not be allowed.

- .2 Printing of wood design shall closely resemble standard wood strip flooring in size, colour, board length, and grain appearance.
- .3 Surface embossing combined with TopClean XP must offer proper balance of surface friction per the ASTM F2772.
- .4 Surface embossing combined with TopClean XP must provide resistance to stains and scratches. Surface profile must not incorporate linear embossing.
- .5 The wood design shall be protected by a clear layer of pure PVC (Polyvinyl Chloride) and TopClean XP, a factory-applied UV cured urethane treatment.
- .6 Extreme Three (3) Layers technology (X3LT) includes Omnisports XCS cushion, glass veil and calendared sheet must offer improved shock absorbing comfort while providing better indentation recovery.
- .7 The XCS cushion force reduction layer shall be high-density closed cell PVC foam with honeycomb embossing, and is applied in one continuous manufacturing process.
- .8 Laminated or adhered foam layers will not be allowed.
- .9 Field constructed products will not be accepted.
- .2 Physical properties of the indoor resilient athletic surfacing shall conform to the following minimums:

Width	-	6'-5" (2 m)
Length	-	85' (26 m) approx.
Wear Layer	-	2 mm
Total Thickness	-	6.2 mm
Wear Layer	Type 1 – Grade 1	ASTM F1303/F410
Vertical Deformation	PASSED	ASTM F2772
Rolling Load	PASSED	≤0.50 mm (EN 1569 {11/1999})
Surface Finish Effect	PASSED	ASTM F2772 (80-110)
Chemical Resistance	Excellent	ASTM F925
Impact Resistance	PASSED	EN 1717
Abrasion Resistance	PASSED	0.10 (EN ISO 5470-1 {06/1999})
Static Load Limit	PASSED	ASTM F970 – Load 175 lbs
Sound Insulation	Excellent	+/- 19 dB (ISO 717/2)
In-Room Sound Insulation	Excellent	65dB (NF S31-074)
Ball Rebound	PASSED	ASTM F2772 > 90%
Force Reduction	PASSED	ASTM F2772 Class 2
Fire Rating	PASSED	ASTM E648 Class 1
Microbial Assays Test	No Growth	G21 ASTM – Backing
Asthma and Allergy Friendly	ASP: 05-01/101	Certified Compliant
VOC	<10ug/m ³	ASTM D5116 (small chamber)

Phthalate-free technology	-	YES
REACH Compliant	-	YES
Heavy Metals	-	NO
ISO 9001	-	YES
ISO 14001	-	YES

- .1 Colour: As available from the indoor resilient athletic surfacing manufacturer's standard range.
- .2 Hardwood Design Series: High definition printing for a realistic wood surface appearance as available from the indoor resilient athletic surfacing manufacturer's standard range.
- .3 Texture: Texture to remain consistent between solid colours and wood design when blending colours.
- .3 Welding Rod: As supplied by the indoor resilient athletic surfacing manufacturer or supplier.
 - .1 Colour to blend with the indoor resilient athletic surfacing colour or design.
 - .2 All seams shall be welded to create a monolithic and impermeable surface.
- .4 Adhesive: As approved by the indoor resilient athletic surfacing manufacturer.
- .5 Game Line Paint and Primer: As approved by the indoor resilient athletic surfacing manufacturer.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions:
 - .1 Verify concrete floors are free of cracks, ridges, depressions, scale, foreign materials, paint, varnish, dust, oils, release agents, waxes, and sealers, and that curing and hardening compounds have been removed.
 - .2 Verify substrate tolerances are within the manufacturer's recommendations.
 - .3 Verify concrete surface profile is within the manufacturer's recommendations.
 - .4 Verify that the area in which the indoor resilient athletic surfacing will be installed is dry and weather tight. Verify that permanent heat, light, and ventilation are installed and operable
 - .5 Verify that work by other Subcontractors affecting the flooring installation is acceptable.
 - .6 Verify that there is a stable room temperature of at least 18C.
 - .7 For GreenLay™ Installation to Concrete Subfloor: moisture content less than 92% RH when tested as per ASTM F2170.
 - .8 Follow manufacturer installation recommendations.
 - .9 Do not average the results of the tests. Report all field test results in writing to the Contractor, HWDSB and JASON FUNG ARCHITECT INC. prior to installation.
 - .10 Verify that the concrete subfloor surface pH level is within the 7-10 range.
 - .11 Report defective conditions affecting installation to HWDSB and JASON FUNG ARCHITECT INC. in writing immediately upon discovery and before beginning installation.
 - .12 Proceed with installation only after defective surfaces and conditions have been remedied.
- .2 Pre-installation Testing: Perform tests to verify concrete floors are dry, with moisture vapour emission rate, and alkalinity within the manufacturer's recommendations.

3.2 PREPARATION

- .1 Protection of In-Place Conditions: Protect face of doors, door frames, and walls from marring due to installation of resilient athletic flooring.
- .2 Surface Preparation:
 - .1 Sand the entire surface of the concrete slab.
 - .2 Sweep the concrete slab so as to remove all dirt and dust. If a sweeping compound is to be used it must be a sweeping compound that does not contain oil or other items that may inhibit the adhesive bond.
 - .3 Slab must be dust free. In the event that dust impairs adhesive bond, priming the slab prior to application of adhesive may be necessary. Follow installation guidelines.
 - .4 Follow OSHA guidelines.

3.3 INSTALLATION

- .1 The installation area shall be closed to all traffic and activity for a period to be set by the indoor resilient athletic surfacing installer. The indoor resilient athletic surfacing installation shall not begin until the installer is familiar with the existing conditions.
- .2 All necessary precautions should be taken to minimize noise, smell, dust, the use of hazardous materials and any other items that may inconvenience others.
- .3 Install the indoor resilient athletic surfacing in strict accordance with the indoor resilient athletic surfacing manufacturer's written instructions.
- .4 Install the indoor resilient athletic surfacing minimizing cross seams. Provide a seam diagram during the submittal process for approval prior to installation. Vinyl Sheet Flooring Seams: Comply with ASTM F1516. Rout joints and heat weld to permanently and seamlessly fuse sections together.
- .5 Paint game lines using approved game line paint primer and game line paint in strict accordance with the game line paint manufacturer's instructions.
- .6 Install appropriate threshold plates or transition strips where necessary.

3.4 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:

3.5 CLEANING

- .1 Progress Cleaning: In accordance with Section 01 74 00 - Cleaning. Remove excess adhesive before cured.
- .2 Final Cleaning: In accordance with Section 01 74 00 – Cleaning. Remove all unused materials, tools, and equipment and dispose of any debris properly. Clean the indoor resilient athletic surfacing in accordance with the manufacturer's instructions.
- .3 Waste Management: Perform in accordance with Section 01 74 19 – Waste Management and Disposal.

3.6 PROTECTION

- .1 Protect flooring with non-marring temporary coverings until Work has been approved by JASON FUNG ARCHITECT INC.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Not Used.

1.2 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, MPI Green Performance Standard.
 - .3 Standard GPS-2, 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, Systems and Specifications Manual.

1.3 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.

1.4 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.

1.5 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.

1.6 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.

1.7 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Contractor: to have a minimum of 5 years proven satisfactory experience. When requested, provide list of last 3 comparable jobs including, job name and location, specifying authority, and project manager.
 - .2 Conform to latest MPI requirements for exterior painting work including preparation and priming.
 - .3 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.
 - .4 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by HWDSB.
 - .5 Standard of Acceptance:

- .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
- .2 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 24 hours 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.

1.8 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.

1.9 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

2.1 PERFORMANCE REQUIREMENTS

- .1 Environmental Performance Requirements:
 - .1 Provide paint products meeting MPI "Environmentally Friendly" E3 ratings based on VOC (EPA Method 24) content levels
 - .2 Green Performance in accordance with MPI Standard GPS-2.

2.2 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 E3 "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" E3 ratings based on VOC (EPA Method 24) content levels.
- .6 Use MPI listed materials having minimum E3 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.

2.3 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 5 colours
- .3 Where specific products are available in restricted range of colours, selection based on limited range.
- .4 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.
- .5 For deep and ultra deep colours; 4 coats may be required.

2.4 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.

2.5 GLOSS/SHEEN RATINGS

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

Gloss Level	Description	Gloss @ 60 degrees	Sheen @ 85 degrees

Gloss Level	Description	Gloss @ 60 degrees	Sheen @ 85 degrees
G1	Matte Finish (flat)	Max. 5	Max. 10
G2	Velvet-Like Finish	Max.10	10 to 35
G3	Eggshell Finish	10 to 25	10 to 35
G4	Satin-Like Finish	20 to 35	min. 35
G5	Traditional Semi-Gloss Finish	35 to 70	
G6	Traditional Gloss	70 to 85	
G7	High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as indicated.

2.6 INTERIOR PAINTING SYSTEMS

- .1 Paint interior surfaces in accordance with MPI Architectural Painting Specification Manual requirements.
- .2 Concrete vertical surfaces: including horizontal soffits:
 - .1 INT 3.1M - Institutional low odour/ VOC G3 (over W.B. primer sealer) finish.
- .3 Concrete horizontal surfaces: floors and stairs:
 - .1 INT 3.2F – Concrete floor sealer.
- .4 Clay masonry units: pressed and extruded brick:
 - .1 INT 4.1M - Institutional low odour/ VOC G3 (over W.B. primer sealer) finish.
- .5 Concrete masonry units: smooth and split face block and brick:
 - .1 INT 4.2E - Institutional low odour/ VOC G3 (over latex block filler) finish.
- .6 Structural steel and metal fabrications: columns, beams, joists:
 - .1 INT 5.1S - Institutional low odour/ VOC G3, G6 (over W.B. rust-inhibitive primer) finish.
- .7 Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts.
 - .1 INT 5.3M – High performance architectural latex G6 (over W.B. galvanized primer) finish.
 - .2 INT 5.3N - Institutional low odour/ VOC G3 (over W.B. galvanized primer) finish.
- .8 Dressed lumber: including doors, door and window frames, casings, mouldings:
 - .1 INT 6.3A – High performance architectural latex G6 (over latex primer) finish.
- .9 Wood paneling and casework: partitions, panels, shelving, millwork:
 - .1 INT 6.4C – Semi-Transparent stain, S.B. finish.
- .10 Wood floors and stairs: including hardwood flooring:
 - .1 INT 6.5B – Polyurethane varnish G4 (over S.B. stain).
- .11 Plaster and gypsum board: gypsum wallboard, drywall, “sheet rock type material”, and textured finishes):
 - .1 INT 9.2B – High performance architectural latex G3 (over latex primer/sealer) finish.
- .12 Painting of interior game line layouts with colours as noted on approved game line layout drawing on interior resilient gymnasium flooring to be by others in accordance with Section 09 65 66.

3 EXECUTION

3.1 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.

3.2 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.

3.3 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%.

3.4 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

3.5 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%.

3.6 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.

3.7 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.

3.8 SITE TOLERANCES

- .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

- .2 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.

3.9 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 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
 - .2 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.
- .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

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and installation of chalkboards, whiteboards, control panels, and tackboards, otherwise known as visual display units.

1.2 RELATED REQUIREMENTS

- .1 Section 06 20 00 – Finish Carpentry

1.3 REFERENCE STANDARDS

- .1 ANSI/NEMA LD 3, High-Pressure Decorative Laminates.
- .2 ASTM E84, Standard Test for Surface Burning Characteristics for Building Materials.
- .3 ASTM B221, Standard Specification for Aluminum and Aluminum Alloy
- .4 PEI-1002, Manual and Performance Specifications for Porcelain Enamel Writing Surfaces.
- .5 GREENGUARD Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishing.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Preconstruction Meetings: Arrange a preconstruction meeting in accordance with Section 01 31 19 – Project Meetings attended by Subcontractor, Contractor, HWDSB and JASON FUNG ARCHITECT INC.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: Submit manufacturer's promotional brochures, specifications and installation instructions.
- .3 Shop Drawings:
 - .1 Include plans, elevations, sections, and attachment details
 - .2 Include sections of typical trim members.
- .4 Samples for Initial Selection:
 - .1 Submit for selection and approval two samples of facings for each visual display panel type, indicating colour and texture.
 - .2 Actual factory-finish colour samples, applied to aluminum substrate.
 - .3 Include accessory Samples to verify colour selected.
- .5 Samples for Verification:
 - .1 Visual Display Panel: Not less than 215 by 280 mm, with facing, core, and backing indicated for final Work. Include one panel for each type, colour, and texture required.
 - .2 Trim: 150mm long sections of each trim profile
 - .3 Display Rail: 150 mm long sections
 - .4 Accessories: Full-size Sample of each type of accessory.

1.6 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Operation and Maintenance Data: Submit three copies of the visual display board manufacturer's maintenance instructions.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- .1 Operations and Maintenance Data: Submit manufacturer's cleaning and repair recommendations in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Warranty Documentation: Submit manufacturer's warranties including:
 - .1 Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer agrees to provide materials to replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period under normal usage and maintenance and when installed in accordance to manufacturer's written instructions.
 - .1 Failures include, but are not limited to, the following:
 - .1 Surfaces lose original writing and erasing qualities.
 - .2 Surfaces exhibit crazing, cracking, or flaking.
 - .2 Warranty Period:
 - .1 Life of the building.

1.8 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Engage an experienced installer who is an authorized representative of visual display board manufacturer for both installation and maintenance of the type of products required for this Project.

1.9 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements:
- .2 Delivery:
 - .1 Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.
- .3 Packaging Waste Management: Perform in accordance with Section 01 74 19 – Waste Management and Disposal.

1.10 AMBIENT CONDITIONS

- .1 Do not deliver or install visual display units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintain ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

2 PRODUCTS**2.1 MANUFACTURERS**

- .1 Approved Manufacturers:
 - .1 Architectural School Products Ltd.
 - .2 Claridge Products and Equipment Inc.
 - .3 C.P. Distributors Ltd.
 - .4 Crestway Systems Ltd.
 - .5 Egan Visual Inc.
 - .6 Malem Architectural Specialties Ltd.

- .7 Shanahan's Ltd.
- .8 Moyer Vico Corporation
- .9 Clark Porcelain.
- .2 Substitutions: Permitted, subject to review by HWDSB and JASON FUNG ARCHITECT INC.
- .3 Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 MATERIALS AND PRODUCTS

- .1 Aluminum: Extruded Alcan 6063 alloy, T5 Temper aluminum, clear anodized finish.
- .2 Porcelain-Enamel Face Sheet: PEI-1002, with face sheet manufacturer's standard two- or three-coat process.
- .3 Fibreboard: ASTM C208 cellulosic fibre insulating board.

2.3 WHITEBOARDS

- .1 Porcelain-enamel whiteboard panel: Balanced, high-pressure, factory-laminated whiteboard assembly of three-ply construction, consisting of rear balancing sheet, core material, and porcelain-enamel face sheet with low-gloss finish. Laminate panels under heat and pressure with manufacturer's standard, flexible waterproof adhesive. Provide panels designed to resist warpage and float within framing system without requiring installation adhesives.
 - .1 Face Sheet thickness: 22 gauge, double-coated steel sheet.
 - .2 Fibreboard Core: 11.1 mm thick; with .305 mm thick, stretcher-leveled, galvanized steel rear balancing sheet.
 - .3 Laminating Adhesive: Manufacturer's standard moisture-resistant thermoplastic type.

2.4 DISPLAY BOARD UNIT

- .1 Assembly: Whiteboard
- .2 Corners: Rounded
- .3 Width: 1220 mm
- .4 Height: 915 mm
- .5 Mounting Method: Z-track support system.
- .6 Chalk or Marker Tray: Manufacturer's standard; continuous

3 EXECUTION

3.1 EXAMINATION

- .1 Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- .2 Examine walls and partitions for proper preparation and backing for visual display units.
- .3 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- .1 Comply with manufacturer's written instructions for surface preparation.
- .2 Clean substrates of substances, such as dirt, mould, and mildew, that could impair the performance of and affect the smooth, finished surfaces of visual display units.

- .3 Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.

3.3 INSTALLATION

- .1 Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- .2 Attach manufacturer's standard concealed clips, hangers, and grounds to wall surfaces and to visual display board units with fasteners at not more than 400 mm o.c.. Secure tops and bottoms of boards to walls.
- .3 Mounting Heights: Install visual display units at mounting heights indicated on Drawings, or if not indicated, at heights indicated below:
 - .1 Mounting Height for Grades K-3: 610 mm above finished floor to top of marker tray.
 - .2 Mounting Height for Grades 4-6: 711 mm above finished floor to top of marker tray.
 - .3 Mounting Height for Grades 7+: 914 mm above finished floor to top of marker tray.

3.4 CLEANING

- .1 Clean visual display units in accordance with manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.
- .2 Cover and protect visual display units after installation and cleaning.
- .3 At completion and continuously as Work proceeds, remove all surplus materials, debris and scrap.

3.8 PROTECTION

- .1 After installation, visual display units shall be suitably protected and handed over free of scratches and in first class condition.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and installation of electrically operated, surface mounted, front projection screens and associated controls.

1.2 RELATED REQUIREMENTS

- .1 Section 05 50 00 – Miscellaneous Metal Fabrications
- .3 Section 26 00 00 - Electrical

1.3 REFERENCE STANDARDS

- .1 NFPA 701, Fire Tests for Flame-Resistant Textiles and Films.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Location and confirmation of projection screen on site.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: Manufacturer's data sheets on each product to be used including:
 - .1 Preparation instructions and recommendations
 - .2 Storage and handling requirements and recommendations.
 - .3 Installation methods.
- .3 Wiring Diagram for electrically operated units
- .4 Shop Drawings:
 - .1 Location of screen centerline.
 - .2 Location of wiring connections.
 - .3 Seams in viewing surfaces.
 - .4 Detailed drawings for concealed mounting.
 - .5 Connections to suspension systems.
 - .6 Anchorage details.
 - .7 Accessories.
- .5 Samples for Initial Selection:
 - .1 Submit for selection and approval two sets of colour chips representing manufacturer's full range of available colours and patterns.
- .5 Samples for Verification:
 - .1 For each finish product specified, two complete sets of colour chips representing manufacturer's full range of available colours and patterns.

1.6 QUALITY ASSURANCE

- .1 Single Source Responsibility: Obtain each type of projection screen required from a single manufacturer as a complete unit, including necessary mounting hardware and accessories.
- .2 Coordination of Work: Coordinate layout and installation of projection screens with other construction supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression systems, and partitions.

1.7 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Operation and Maintenance Data: Submit three copies of the manufacturer's maintenance and operation instructions.
- .3 Warranty Documentation: Submit manufacturer's material and fabrication warranty.

1.8 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements:
- .2 Delivery:
 - .1 Material shall not be delivered until all related work is in place and finished and/or proper storage facilities and conditions can be provided and guaranteed stable according to manufacturer recommendations
- .3 Storage and Handling Requirements:
 - .1 Store the material in a secure, clean and dry location in manufacturer's unopened packaging until ready for installation.
 - .2 Label packages and crates with manufacturer's name, model number, quantity, and shipment date.
 - .3 Protect screens from damage during delivery, handling, storage, and installation.
- .3 Packaging Waste Management: Perform in accordance with Section 01 74 19 – Waste Management and Disposal.

1.9 WARRANTY

- .1 Manufacturer limited warranty: 5 years from date of purchase.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Basis-of-Design Product:
 - .1 Draper Inc. – Targa XL
- .2 Substitutions: Permitted, subject to review by HWDSB and JASON FUNG ARCHITECT INC.
- .3 Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 MOTORIZED SURFACE- MOUNTED, FRONT PROJECTION SCREEN

- .1 Targa XL: Electric motor operated, metal case. Cases consist of a curved front and L-shaped back/top cover fabricated of extruded aluminum, with endcaps forming ceiling hanging bracket. Case size 172 mm high x 172 mm deep. White scratch resistant textured finish.
 - .1 Motor mounted inside screen roller on rubber isolation insulators. Motor UL certified, rated 110-120V AC, 60 Hz, three wire, instantly reversible, lifetime lubricated with pre-set accessible limit switches.
 - .2 System Options:
 - .1 Case finished black
 - .2 Matt White XT1000E – On Axis gain of 1.0. 180 degree viewing cone. Washable surface. GREENGUARD Gold certified. 4K ready.

- .3 Viewing Area H x W:
 - .1 16:10 Format, Black masking borders standard.
 - .1 5029 mm diagonal, 2667 mm x 4776 mm
- .4 Provide an extra screen drop with a black masking top border. Overall screen drop to be determined on site.

2.3 FRONT PROJECTION SCREEN CONTROLS

- .1 General: All controls are UL Certified.
 - .1 Single station control rated 115V AC, 60 Hz with 3-position rocker switch with cover plate to stop or reverse screen at any point.
 - .2 Locking switch cover plate for limited access to three position switch.
 - .3 Motor shall be left mounted (standard) unless dictated otherwise by site conditions.

3 EXECUTION

3.1 EXAMINATION

- .1 Verify substrates have been properly prepared.
- .2 Report defective conditions affecting installation to HWDSB and JASON FUNG ARCHITECT INC. in writing immediately upon discovery and before beginning installation.
- .3 Proceed with installation only after defective surfaces and conditions have been remedied.

3.2 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.

3.3 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Install front projection screens with screen cases in position and relationship to adjoining construction as indicated, securely anchored to supporting substrate, and in manner that produces a smoothly operating screen with plumb and straight vertical edges and plumb and flat viewing surfaces when screen is lowered.
- .3 Test electrically operated units to verify that screen, controls, limit switches, closure and other operating components are in optimum functioning condition.

3.4 DEMONSTRATION

- .1 Test and verify that installed products function properly and smoothly.
- .2 Installer to adjust and correct deficiencies prior to handover.

3.5 PROTECTION

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

3.5 CLEANING

- .1 Progress Cleaning: In accordance with Section 01 74 00 - Cleaning.
- .2 Final Cleaning: In accordance with Section 01 74 00 – Cleaning.
- .3 Waste Management: Perform in accordance with Section 01 74 19 – Waste Management and Disposal.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and installation of the indoor resilient multipurpose surfacing, application of the game lines, and references for the correct construction and preparation of concrete slabs to receive resilient flooring.

1.2 RELATED REQUIREMENTS

- .1 Section 05 50 00 – Miscellaneous Metal Fabrications
- .3 Section 06 10 00 – Rough Carpentry

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - .2 ASTM A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - .3 ASTM A1008/A1008M, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required hardness, Solution Hardened, and Bake Hardenable
 - .4 ASTM B221M, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - .5 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .2 CSA Group (CSA):
 - .1 CSA G40.20, General Requirements for Rolled or Welded Structural Quality Steel
 - .2 CSA G40.21, Structural Quality Steel
- .3 National Fire Protection Association (NFPA):
 - .1 NFPA 701, Methods of Fire Tests for Flame Propagation of Textiles and Films
- .4 Underwriters Laboratories of Canada (ULC):
 - .1 CAN/ULC-S109, Standard Method for Flame Tests of Flame-Resistant Fabrics and Films

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Location and size of stage curtains based on existing conditions.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: Submit manufacturer's product information including, but not limited to, Certificate of Flame Resistance, surface burning characteristics test results, fire testing, flame testing, etc.
- .4 Shop Drawings; Submit shop drawings produced by the manufacturer.
- .5 Samples for Initial Selection:
 - .1 Submit for selection and approval three sets, 300 x 300 mm size, samples of curtain fabric, illustrating weight, knap, and available colours.

1.6 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Operation and Maintenance Data: Submit three copies of the manufacturer's maintenance and operation instructions.

- .3 Warranty Documentation: Submit manufacturer's material and fabrication warranty.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements:
- .2 Delivery:
 - .1 Material shall not be delivered until all related work is in place and finished and/or proper storage facilities and conditions can be provided and guaranteed stable according to manufacturer recommendations
- .3 Storage and Handling Requirements:
 - .1 Store the material in a secure, clean and dry location.
 - .2 Label packages and crates with manufacturer's name, model number, quantity, and shipment date.
- .3 Packaging Waste Management: Perform in accordance with Section 01 74 19 – Waste Management and Disposal.

1.8 AMBIENT CONDITIONS

- .1 Maintain site conditions to occupancy service conditions as per manufacturer's written instructions.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Acceptable Manufacturers:
 - .1 Edwards Door Systems Ltd.
 - .2 Northeast Stage.
 - .3 Quality Stage Drapery Ltd.
 - .4 Rose Brand Textile Fabrics.
- .2 Substitutions: Permitted, subject to review by HWDSB and JASON FUNG ARCHITECT INC.
- .3 Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 REGULATORY REQUIREMENTS

- .1 Fabric: Flame-proof and fire-retardant when tested to NFPA 701 and CAN/ULC-S109.
- .2 Drapery Panels: Provide on each panel a sewn on label next to the flame test swatches, clearly indicating:
 - .1 Manufacturer's Name.
 - .2 Material Used.
 - .3 Material Colour.
 - .4 Fabrication Date.
 - .5 Flame Resistance Compliance.
 - .6 Finished Panel Size.
- .3 Each drapery panel shall have a minimum of six 40 mm wide x 130 mm long flame test swatches sewn to an offstage, bottom corner, made from the same fabric used to construct the drape and used for flame testing purposes.

2.3 MATERIALS

- .1 Backdrop Fabric: 543 g/m² 100 percent cotton, black colour.
- .2 Replacement carriers, hooks, operating chord and pulleys.
- .3 Extruded Aluminum: To ASTM B221, 6061 alloy, T5 temper.
- .4 Sheet Steel: To ASTM A1008/A1008M, Commercial Steel (CS) Types A,B, and C; cold-rolled sheet steel.
- .5 Steel Shapes: To CSA G40.20 and CSA G40.21, Grade 300W, galvanized, profiles and sizes as indicated.

2.4 COMPONENTS

- .1 Front Main Stage Drapery:
 - .1 Two main drape panels, coloured curtain fabric, sewn with 25% fullness; heading to have a flat fold pleat reinforced with a minimum 75 mm jute webbing.
 - .2 #2 black brass grommets installed 22 mm in from each end with additional grommets equally spaced at 300 mm O.C., 150 mm lead hem and a 25 mm double side hem sewn with upholstery thread to match fabric colour, panels sewn together with a 5 thread heavy duty serger.
 - .3 Half and full panels only, with no horizontal seams, 125 mm double stitched hem, with continuous jack chain.
 - .4 Stage opening is approximately 5640 mm wide. Verify exact dimensions on site.
 - .5 Each drapery panel shall have a minimum of six 200 x 200 mm size flame test swatches sewn to an offstage, bottom corner, made from the same fabric used to construct the drape and use for flame testing purposes.
 - .6 Provide on each panel a sewn label next to the flame test swatches clearly indicating the following:
 - .1 Manufacturer's name.
 - .2 Material used.
 - .3 Material colour.
 - .4 Fabrication date.
 - .5 Flame resistance compliance.
 - .6 Finished panel size.
- .2 Stage Valance (Top Teaser):
 - .1 One valance panel, coloured curtain fabric, sewn with 150 % fullness, heading to have 3 fold pinch pleat, panels sewn together with serger, bottom hem 75 mm double-stitched, pin on hooks inserted in top of drapery 38 mm from top of valance.
 - .2 Size to fit stage opening approximately 5640 mm wide and 610 mm height. Verify exact dimensions on site.
- .3 Replacement Drapery Carriers, Hooks, Operating Chords and Pulleys:
 - .1 Replacement components to be suitable and sized to fit existing re-used curtain tracks and to reconfiguration of curtains to suit modifications to existing Stage.
 - .2 Carriers to be plated steel construction, with two nylon wheels held to a block by a corrosion-resistant nickel-plated rivet, each wheel rolling on two separate parallel thread.
 - .3 Free moving plate swivel complete with trim chain attached to accommodate replacement curtain s-hook.
 - .4 Provide two master carriers complete with trim chains, end stops for placement at each track end, end pulleys equipped with ball bearing wheels, and adjustable floor pulley, complete with 6 mm O.D. fiberglass reinforced, stretch resistant operating cord in locations as directed by HWDB.

- .5 Drapery Fabric: minimum 543 g/m² weight.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions:
 - .1 Verify existing substrate and equipment can be maintained and re-used. Allow for replacement material where existing are found damaged or missing.
 - .2 Report defective conditions affecting installation to HWDSB and JASON FUNG ARCHITECT INC. in writing immediately upon discovery and before beginning installation.
 - .3 Proceed with installation only after defective surfaces and conditions have been remedied.

3.2 INSTALLATION

- .1 Install specified products level, true, and tightly fitted to adjacent surfaces, for long life under hard use.
- .2 Install drapery panels on replacement track carriers using replacement S-hooks, where necessary.
- .3 Install drapery panels to hang between 5 mm and 25 mm from the stage floor when in playing position. Use trim chain with S-hooks on carriers as required.

3.3 DEMONSTRATION

- .1 Test and verify that installed products function properly and smoothly.
- .2 Installer to adjust and correct deficiencies prior to handover.

3.4 CLEANING

- .1 Progress Cleaning: In accordance with Section 01 74 00 - Cleaning.
- .2 Final Cleaning: In accordance with Section 01 74 00 – Cleaning.
- .3 Waste Management: Perform in accordance with Section 01 74 19 – Waste Management and Disposal.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and installation of the gymnasium equipment indicated on the Drawings and specified herein.

1.2 RELATED REQUIREMENTS

- .1 Section 03 30 00 – Cast-in-Place Concrete (concrete work, cutting, and coring)
- .2 Section 04 20 00 – Unit Masonry (concrete fill, installation and positioning of through wall bolts)
- .2 Section 05 50 00 – Metal Fabrications (metal backing and reinforcing)
- .3 Section 06 10 00 – Rough Carpentry (supply and installation of wood blocking items)
- .4 Section 09 91 23 – Painting (field painting of metal framework, backboards, and backboard targets)
- .6 Section 26 00 00 – Electrical (supply and installation of electrical power, conduits, field wiring, and connections)

1.3 REFERENCE STANDARDS

- .1 CAN/CSA G40.21, Structural Quality Steels
- .2 CAN/CGSB-1.40, Primer, Structural Steel, Oil Alkyd Type
- .3 CAN/CGSB-1.132, Zinc Chromate Primer, Low Moisture Sensitivity

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Preconstruction Meetings: Arrange a preconstruction meeting in accordance with Section 01 31 19 – Project Meetings attended by Subcontractor, Contractor, HWDSB and JASON FUNG ARCHITECT INC.
 - .1 Roughing dimensions and locations.
 - .2 Mechanical and electrical connections.
 - .3 Substrate and backing surface requirements.
 - .4 Concerns associated with site conditions.
 - .5 Installer's or manufacturer's representative's concerns associated with as-constructed conditions.
- .2 Coordination:
 - .1 Items specified herein shall be under direct control of Contractor, who shall be responsible for purchase, installation, expediting, and general coordination as required. Where it is normal practice for manufacturer to install an item, it shall be clarified with Contractor before submitting tenders.
 - .2 Coordinate location of floor anchors on site with the Owner and Consultant.
 - .3 Coordinate layout and installation of overhead supported gymnasium equipment and suspension system components with other construction including, but not limited to, light fixtures, HVAC equipment, fire suppression system components, and partition assemblies.
 - .4 Coordinate wiring requirements and electrical characteristics with building electrical system for electrically powered equipment.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: Submit product data for each type of product specified including, but not limited to, assembly, disassembly, and storage instructions for removable equipment, characteristics, and mounting arrangements.

- .3 Shop Drawings; Submit shop drawings produced by the manufacturer.
 - .1 Show complete details, mounting, and clearance dimensions, mounting details, and any additional backing required for proper mounting
 - .2 Submit necessary templates and instructions where supports or anchors are to be built in by other Section.
- .4 Maintenance Information: Submit three copies of the care and maintenance information for incorporation into the Project Maintenance Manuals.
- .5 Structural Analysis Data: Submit analysis signed and sealed by the qualified professional engineer responsible for their preparation including loads, point reactions, and locations for attachment of gymnasium equipment to structure.
- .6 Coordination Drawings: Submit coordination drawings indicating court layout plans coordinated with Drawings, drawn to scale, and coordinating floor inserts, game lines, and markers applied to finish flooring.
- .7 Product Certificates: Submit product certificates signed by manufacturer for each type of gymnasium equipment indicating compliance with referenced standards, requirements of the Authorities Having Jurisdiction, and requirements of the Owner.

1.6 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Operation and Maintenance Data: Submit three copies of the manufacturer's maintenance instructions for each type of product specified.
- .3 Record Documentation: Submit list of materials installed, including adhesives and accessories. Indicate manufacturers, products, types, patterns, and colour names and numbers. Indicate room/area where installed.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- .1 Operations and Maintenance Data: Submit manufacturer's cleaning and repair recommendations in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Warranty Documentation: Submit manufacturer's standard form of warranty indicating that manufacturer agrees to repair or replace components of gymnasium equipment that fail in materials or workmanship for a period from date of Substantial Performance for the Project.

1.8 QUALITY ASSURANCE

- .1 Manufacturer Certifications:
 - .1 WSIB registered and safety certified at time of bid
 - .2 DWB certified under CSA standard W47.1 "Certification of Companies for Fusion Welding of Steel".
 - .3 Established firm experienced in the field of gymnasium equipment and approved by the manufacturer.
 - .4 No less than five (5) years experience, dating from the bid date set for this project and have satisfactorily completed no less than 5 installations similar in complexity to that required here-in.
- .2 Obtain each type of gymnasium equipment through one source from a single manufacturer having experience with the type of installation and complexity indicated in this Section.

1.9 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements:
- .2 Delivery:

- .1 Material shall not be delivered until all related work is in place and finished and/or proper storage facilities and conditions can be provided and guaranteed stable according to manufacturer recommendations
- .3 Storage and Handling Requirements:
 - .1 Store materials in original, undamaged condition. Handle and store in accordance with manufacturer's and supplier's directions.
- .4 Packaging Waste Management: Perform in accordance with Section 01 74 19 – Waste Management and Disposal.

1.10 AMBIENT CONDITIONS

- .1 Unless otherwise stated in manufacturer's instructions, maintain site conditions to occupancy service conditions for a minimum 72 hours before installation, during installation, and a minimum 48 hours after installation. Site conditions include:
 - .1 Ambient, substrate and material temperatures between 20C and 30C. Temperatures may be reduced to 13C 72 hours after installation.
 - .2 Subfloor surface temperature for adhesive application between 16C and 29C.
 - .3 Relative humidity (RH) between 40% and 60% with temperature at 18C and 29C.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Basis-of-Design Products: Equipment specified is by Gymnasium & Health Equipment Ltd, alternates will be considered in accordance with Section 01 23 00 – Alternates.
- .2 Acceptable Manufacturers:
 - .1 Gymnasium & Health Equipment Ltd.
 - .2 Forum Athletic
 - .3 Sheridan Seating Inc.
 - .4 Porter Athletic
- .3 Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 MATERIAL

- .1 Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, and as follows:
 - .1 Extruded Bars, Profiles and Tubes: ASTM B221 (ASTM B221M).
 - .2 Cast Aluminum: ASTM B179.
 - .3 Flat Sheet: ASTM B209 (ASTM B209M).
- .2 Steel: Type and shape recommended by manufacturer for use indicated and as follows:
 - .1 Steel Plates, Shapes, and Bars: ASTM A36/36M.
 - .2 Steel Tubing: ASTM A500 or ASTM A513, cold formed.
 - .3 Steel Sheet: ASTM A1011/A1011M.
- .3 Support Cable and Fittings: 6 mm diameter 7x19 galvanized steel aircraft cable in accordance with ASTM A1023 and having minimum breaking strength of 3175 kg, and correctly sized fittings in quantity recommended by manufacturer to suit installation.
- .4 Support Chain and Fittings: Grade 80 hardened alloy steel chain rated for overhead lifting in accordance with ASTM A391/A391M, having commercial quality, zinc plated steel connectors and

hangers.

- .5 Castings and Hangers: Malleable iron, ASTM A47/A47M, grade required for structural loading.
- .6 Equipment Wall Mounting Board: Wood, neutral colour painted, finish, size, and quantity as required to mount gymnasium equipment in accordance with manufacturer's written instructions.
- .7 Anchors, Fasteners, Fittings, and hardware: Manufacturer's standard corrosion resistant or non-corrodible materials; concealed; tamperproof, vandal and theft resistant design.
- .8 Grout: Non-shrink, non-metallic, premixed, factory packaged, non-staining, non-corrosive, non-gaseous grout in accordance with ASTM C1107 having minimum compressive strength recommended in writing by gymnasium equipment manufacturer.

2.3 MAIN COURT BASKETBALL UNIT – CEILING MOUNTED

- .1 Ceiling Mounted, Single Mast, Front Folding, Front Braced Backstop (BB-17C) by Gymnasium & Health Equipment Ltd, or other approved manufacturer.
- .2 Mast: Constructed of 168 mm O.D. x 3.4 mm (10 ga) wall thickness @ 4.213 Kgs/ft. E.R.W. (Electric Resistance Welded) tube with custom length. A 102 mm channel @ 2.45 Kg's/ft. shall be part of the constructed mast frame which is welded to the 168 mm O.D. tubing c/w side braces for lateral support. Diagonal Side Sway Braces constructed of HSS Section tubing of 3 mm wall, 50.8 mm square custom length in a "L" shape are welded to the mast channel and 168 mm O.D. tubing. ASTM-G40.17 GRADE 50, or A-500 TYPE B material shall be used for the side braces. Forces are transformed laterally into anti-sway braces which are welded to the mast boom and cross channel.
- .3 Brace: Backstop shall be braced to the rear and folds up to the front. The telescopic back brace shall be constructed of a male tube 50.8 mm O.D. x 2.1 mm wall ERW and the female tube 44 mm O.D. x 2.1 mm wall E.R.W. that fits inside each other. A simple back brace stop locks the bracing in position for play, and is disengaged automatically by the movement of raising the backstop to its stored position in a forward motion.
- .4 Support: The backstop shall be supported by 89 mm O.D. pipe and securely anchored to roof framing members by specially designed and tested beam clamps. Each beam clamp can support a static load of 4132 Kg force. All 89 mm O.D. pipes exceeding 4267 mm in length shall be reinforced with special bridge trussing.
- .5 Goal: The goal shall be directly mounted through the bank and into heavy duty structural steel weldments that are clamped to the vertical main mast 168 mm O.D. This eliminates any strain on the bank should a player hang on the front of a mounted goal.
- .6 Operation: The main mast shall be suspended from two (2) custom adjustable hangers. Offsets in the position of the hinges places the center of gravity forward of the hinged point to ensure that the unit locks into playing position. A hoist cable shall be 6.35mm ϕ , ASTM-475 STD. 7 strands / 19 wires galvanized with a breaking strength of 3175 Kg. Electric (TW-2000) or manual operated winch (TW-700) is designed to raise and lower the (BB-17) basketball unit. Where required swivel style pulleys shall be used, with steel sheaves and maintenance free oil impregnated bushings to route the hoisting cable to the winch.
- .7 Finish: All metal parts shall be painted with one (1) coat of black, white or royal blue semi-gloss rust-inhibitive enamel. Custom colours are available upon request at an extra cost.
- .9 Operator Controls: Key-operated 30position control (up-stop-down), flush wall-mounted design.
- .10 Coordinate with Structural, for overhead connection, and Electrical.
- .11 Accessories:
 - .1 Height Adjustable Adapter Framing (BB-3)
 - .2 Tempered Glass Backboard (BB-29-RG2)
 - .3 Cushion Edge Padding (BB-44A), Colour TBD
 - .4 Breakaway Goal (BB-33) with
 - .5 Nylon Net (BB-41)

2.4 MAIN COURT BASKETBALL UNIT – WALL MOUNTED

- .1 Wall Mounted, Side Swing Basketball Unit (BB-10RG) by Gymnasium & Health Equipment Ltd, or other approved manufacturer.
- .2 Wall Brackets and Frame: The wall brackets shall be constructed of 6 mm thick steel plate 102 mm X 381 mm in length, with (2) two slots provided for mounting. Offset extensions mounted on these wall brackets on opposite sides, allow for the unit to swing to one side or the other. The framework of the BB-10 shall be constructed of 3 mm wall, 51 mm square and 5 mm wall 51 mm X 76 mm rectangular E.R.W. (Electric Resistance Welded) HSS tubing. Either steel front board holders or a height adjustable BB-3 frame (optional at extra cost) can accommodate this unit. These units can come in 889 mm or 1600 mm horizontal centers and 508 mm or 914 mm vertical centers. A swivel pulley assembly along with aircraft cable shall be mounted above the wall brackets for added safety and support. The aircraft cable is 6.35mm Ø, ASTM-475 STD. 7 strands / 19 wires galvanized, with a breaking strength of 7000 lbs. ASTM-G40.17 GRADE 50, or A-500 TYPE B material shall be used for wall brackets, frame, and extensions. All hardware shall be of Grade #5 quality.
- .3 Support: The backstop shall be supported by three (3) through wall anchors: 457 mm in length or three (3) Hilt HY-20 epoxy anchors on each wall bracket and installed to Hilti specifications using Hilti anchors.
- .4 Goal: The goal shall be directly mounted through the bank and onto steel board holders. This eliminates any strain on the bank should a player hang on the front of a mounted goal.
- .5 Operation: This is a main or side court type basketball unit. A locking arm provides the flexibility so that the unit can side swing to one side but also lock in position for game play. In order to have a properly operating side swing unit the extension from the wall to the face of the backboard shall not be less than 914 mm or greater than 2743 mm.
- .6 Finish: All metal parts shall be painted with one (1) coat of black, white or royal blue semi-gloss rust-inhibitive enamel. Custom colours are available upon request at an extra cost.
- .7 Coordinate with Structural, wall anchorage requirements.
- .8 Accessories:
 - .1 Height Adjustable Adapter Framing (BB-3)
 - .2 Tempered Glass Backboard (BB-29-RG2)
 - .3 Cushion Edge Padding (BB-44), Colour TBD
 - .4 Breakaway Goal (BB-33) with
 - .5 Nylon Net (BB-41)

2.5 HEIGHT ADJUSTABLE ADAPTER FRAMING

- .1 Height Adjustable Adapter Framing (BB-3) by Gymnasium & Health Equipment Ltd, or other approved manufacturer.
- .2 Height adjustable adapter framing shall be manufactured of 38 mm square HSS tubing and shall be screw driven to raise or lower the goal from 3048 mm to 2438 mm. Screw drive shall be a 19 mm ACME threaded rod. The screw drive shall have a loop welded to the bottom to allow attachment of the awning style crank. The operation of raising and lowering the BB-3 is from the floor with the supplied crank handle.

2.6 TEMPERED GLASS BACKBOARD

- .1 Tempered Glass Backboard (BB-29-RG2) by Gymnasium & Health Equipment Ltd., or other approved manufacturer
- .2 13 mm tempered glass set in durable extruded aluminum frame.
- .3 Official border and target area fired into glass.
- .4 Official size 1067 mm x 1829 mm.
- .5 Glass mounting holes standard 127 mm horizontal and 102 mm vertical centres.

- .6 Vinyl shock absorbing material shall insulate glass from frame.
- .7 Acrylic cushioning pad shall be used between steel mounting plate and glass to protect against possible breakage.

2.7 BACKBOARD CUSHION EDGE PADDING

- .1 Pro-mold Backboard Padding (BB-44) by Gymnasium & Health Equipment Ltd., or other approved manufacturer.
- .2 High density polyurethane foam with tough exterior skin and solid colours.
- .3 Attach to metal framing on regulation sized glass backboards.
- .4 Padding to meet NCAA, NBA, and NFHS specifications.
- .5 Indoor use only.
- .6 Colour to be selected by HWDSB and JASON FUNG ARCHITECT INC. from manufacturer's standard colour range.

2.8 BREAKAWAY GOAL

- .1 Collegiate Breakaway Goal (BB-33) by Gymnasium & Health Equipment Ltd., or other approved manufacturer.
- .2 Goal shall be constructed with an enclosed positive lock mechanism to hold rim in solid playing position. Goal shall be designed so that any possible entrapment areas have been eliminated.
- .3 Goal shall have official size 18" ring of 5/8" diameter steel with continuous no-tie net attachment, full wing brace design, and a durable orange powder coated finish. Anti-whip net and hardware shall be included. 4" x 5" hole spacing. Universal back plate shall accommodate most 42" and 48" rectangular and fan shape backboards.
- .4 Goal shall meet NCAA and high school specifications.

2.9 NYLON NET

- .1 Anti-whip Basketball Net (BB-41) by Gymnasium & Health Equipment Ltd., or other approved manufacturer.
- .2 120 count nylon, hour glass design to fit all 12 loop no-tie goals
- .3 Stiffened upper loops help keep net from whipping up through goal

2.10 ELECTRIC WINCH

- .1 Torkwinch Electric Winch (TW-2000) by Gymnasium & Health Equipment Ltd., or other approved manufacturer.
- .2 Winch: designed to lift an 820 kg backstop assembly with a safety line stall pull of 1000 kg at a speed of 3.5 m per minute on the first layer.
 - .1 Employs a double worm reduction system.
 - .2 Available cable travel is 7.5 m on 1 layer. A second layer for 13.5 m total may be wound on if required.
- .3 Motor: 1 HP / 0.64 kW low maximum current draw design, instant reverse torque motor, providing immediate direction reversing, and a 3 wire control system.
 - .1 Duty cycle: Standard: 10 minutes on, 20 minutes off.
 - .2 Designed to stall at 18 amps and has an automatic thermal overload feature to protect the system against overload and misuse
- .4 Braking: Uni-directional worm brake, together with self-locking composite worm drive.
- .5 Cable Drum: Manufactured from hard anodized aluminum alloy and is directly supported at the cable winding diameter for maximum strength and rigidity.

- .1 Drum to be helically grooved for proper spooling of the cable and ensure excellent repeatability of stop positions.
- .2 Drum equipped with a pressure roller, with torsion spring tensioning, to ensure that the cable tracks in the grooves even under slack rope conditions.
- .3 Drum is supported in composite ball bearings to provide long life, smooth operation and no requirement for lubrication.
- .6 Main frame: All components to be powder-coated and all exposed sub-components are plated, for maximum corrosion protection.
- .7 Weight: 29 kg

2.11 POSILOCK SAFETY BELT

- .1 Posilock Safety Strap (BB-49) by Gymnasium & Health Equipment Ltd., or other approved manufacturer
- .2 Fail-safe, self-checking, checks speed of rotating reel 6 times per revolution and will lock if the trip speed is exceed under any condition.
- .3 Maximum weight of suspended load: 450 kg
- .4 Tripping speed-sudden free-fall: 0.6 m per second.

2.12 BADMINTON POSTS

- .1 Badminton/Pickleball End Post, 38 mm diameter (BN-93B) by Gymnasium & Health Equipment Ltd., or other approved manufacturer.

2.13 VOLLEYBALL POSTS

- .1 Combination Steel 60 mm O.D. Post with Pulleys and Eye Hooks (VB-92P) by Gymnasium & Health Equipment Ltd., or other approved manufacturer.
- .2 Posts are made from 60 mm O.D. 12 gauge tubing.
- .3 Posts are drilled to receive (WN-150) or (WN-170) winches.
- .4 Can be used for Volleyball or Badminton.

2.14 HANDLE RATCHET

- .1 Fold-away Handle Ratchet (WN-150) by Gymnasium & Health Equipment Ltd., or other approved manufacturer.
- .2 1 per volleyball post, refer to Drawings for quantities.

2.15 BADMINTON NET

- .1 Badminton Net 20' Length (BN-250) by Gymnasium & Health Equipment Ltd., or other approved manufacturer.
- .2 800 x 6100 mm knotless heavy black nylon netting, fully taped, with cable top.

2.16 VOLLEYBALL NET

- .1 Volleyball Net 30' Length (VBN-750/30) by Gymnasium & Health Equipment Ltd., or other approved manufacturer.
- .2 3 mm braided nylon netting, 9144 mm long.

2.17 VOLLEYBALL POST PADDING

- .1 Sport Post Padding (219) by Gymnasium & Health Equipment Ltd., or other approved manufacturer.

- .2 18 oz vinyl and shock absorbing 1-1/4" polyethylene foam.
- .3 Padding wraps around standard and is secured with Velcro tabs.
- .4 Padding covers all protruding parts of the post.
- .5 1 per volleyball post, refer to Drawings for quantities.

2.18 FLOOR SOCKETS

- .1 Fixed Floor Socket (FS-2) by Gymnasium & Health Equipment Ltd., or other approved manufacturer.
- .2 Brass floor socket with lid for 60 mm O.D. posts.
- .3 Manufactured to ISO 9000 Standards.
- .4 Refer to Drawings for quantities and locations.

2.19 FLOOR SOCKET ADAPTER

- .1 Adapter Bushing (AD-93BAB) by Gymnasium & Health Equipment Ltd., or other approved manufacturer.
- .2 To be used in conjunction with floor socket (FS-2) to allow Badminton Posts (BN-93B) or Volleyball Uni-Posts (VB-755).
- .3 1 per badminton floor socket, refer to Drawings for quantities.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions:
 - .1 Examine substrates, areas, and conditions for compliance with requirements for play court layout, alignment of mounting substrates, installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance.
 - .2 Verify critical dimensions.
 - .3 Examine supporting structure and subgrade, subfloors and footings below finished floor.
 - .4 Examine wall assemblies, where reinforced to receive anchors and fasteners, to verify that locations of concealed reinforcements have been clearly marked. Locate reinforcements and mark locations.
 - .5 Report defective conditions affecting installation to HWDSB and JASON FUNG ARCHITECT INC. in writing immediately upon discovery and before beginning installation.
 - .6 Proceed with installation only after defective surfaces and conditions have been remedied.

3.2 PREPARATION

- .1 Protection of In-Place Conditions: Protect affected surfaces.
- .2 Surface Preparation: As required by manufacturer's written instructions.

3.3 INSTALLATION

- .1 Install and assemble products in accordance with manufacturer's written instructions and competition rules indicated for each type of gymnasium equipment.
- .2 Install gymnasium equipment after other finishing operations, including painting, have been completed.
- .3 Permanently Affixed Gymnasium Equipment and Components:

- .1 Install rigidly in place, straight, level, and plumb. Anchor securely to supporting structures, positioned at locations and elevations indicated on Shop Drawings, in proper relation to adjacent construction, and aligned with court layout.
- .2 Coordinate location of floor inserts with application of game lines and markers, and core drill floor for inserts after game lines have been applied.
- .3 Coordinate floor insert elevation heights with installation of floor finish and type of floor plate.
- .4 Floor Insert Setting:
 - .1 Position sleeve in oversized, recessed voids in concrete slabs.
 - .2 Clean voids of debris.
 - .3 Fill void around sleeves with grout, mixed and placed to comply with grout manufacturer's written instructions.
 - .4 Protect portion of sleeve above subfloor from splatter.
 - .5 Verify that sleeves are set plumb, aligned, and at correct height and spacing. Hold in position during placement and finishing operations until grout is sufficiently cured.
 - .6 Set insert so top surface of completed unit is flush with finished flooring surface.
- .5 Use anchors and fasteners where necessary for securing built-in and permanently placed gymnasium equipment to structural support and for properly transferring load to in-place construction.
- .6 Suspend ceiling-mounted backstop from supplementary structural supports clear of light fixtures.
- .7 Coordinate installation with works of trades providing adjacent construction as required.

3.4 SITE QUALITY CONTROL

- .1 Manufacturer Services:
 - .1 Arrange for periodic site visits by manufacturer's design Engineer for inspection of product installation in accordance with manufacturer's instruction and accepted Shop Drawings.
 - .2 Prepare Manufacturer's Report confirming completed installation conforms to accepted Shop Drawings.

3.4 DEMONSTRATION

- .1 Demonstrate operations and maintenance of gym equipment.

3.5 CLEANING

- .1 Progress Cleaning: In accordance with Section 01 74 00 - Cleaning.
- .2 Final Cleaning: In accordance with Section 01 74 00 – Cleaning.
- .3 Waste Management: Perform in accordance with Section 01 74 19 – Waste Management and Disposal

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes, but is not limited to, supply and installation of roller window shades and motor operators and controls for roller window shades, including wireless technology.

1.2 RELATED REQUIREMENTS

- .1 Section 06 10 00 – Rough Carpentry (blocking for support of window shade hardware)
- .2 Section 07 92 00 – Joint Sealants (sealants for perimeter of shade system)
- .3 Section 09 21 16 – Gypsum Board Assemblies
- .4 Section 26 00 00 – Electrical

1.3 REFERENCE STANDARDS

- .1 AAMA 611, Voluntary Specification for Architectural Anodized Aluminum
- .2 ANSI/WCMA A100.1, Safety of Corded Window Covering Products.
- .3 UL 20, General Use Switches, Plug Load Controls
- .4 UL 924, Standard for Emergency Lighting and power Equipment
- .5 CAN/ULC S109, Flame Tests of Flame-Resistant Fabrics and Films

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Preconstruction Meetings: Arrange a preconstruction meeting in accordance with Section 01 31 19 – Project Meetings attended by Subcontractor, Contractor, HWDSB and JASON FUNG ARCHITECT INC.
 - .1 Line and Low voltage wiring requirements and responsibilities
 - .2 Separation of power and low voltage.
 - .3 Wire labeling.
 - .4 Control locations.
 - .5 Connections to other equipment.
 - .6 Installer responsibilities.
 - .7 Pocket and/or mounting conditions.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: Submit manufacturer's data sheets including:
 - .1 Preparation instructions and recommendations
 - .2 Installation and maintenance instructions.
 - .3 Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - .4 Storage and handling requirements and recommendations.
 - .5 Mounting details and installation methods.
 - .6 Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.
- .3 Shop Drawings; Submit shop drawings produced by the manufacturer including plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.

- .4 Samples for Initial Selection:
 - .1 For each finished product specified, two complete sets of shadeband material options and aluminum finish colour samples representing manufacturer's full range of available colours and patterns.
- .5 Samples for Verification:
 - .1 For each finished product specified, two complete sets of shade components demonstrating compliance with specified requirements. Shadeband material sample and aluminum finish sample as selected, representing actual product, color, and patterns. Mark face of material to indicate interior faces.
- .6 Maintenance Data: Manufacturer maintenance and operation instructions.
- .7 Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Operation and Maintenance Data: Submit three copies of the manufacturer's maintenance and operation instructions.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- .1 Operations and Maintenance Data: Submit manufacturer's cleaning and repair recommendations in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Warranty Documentation: Submit manufacturer's executed warranty documentation:
- .3 Extra Materials: Supply extra materials for maintenance use in accordance with Section 01 78 00 – Closeout Submittals.
 - .1 Furnish extra maintenance material from same production run as material installed. Package with protective covering for storage and identify with labels describing contents.

1.8 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Company specializing in design and manufacturing of manual and motorized shading systems and distributed lighting control systems with a minimum of 25 years documented experience.
- .2 Installer Qualifications: Company certified by the manufacturer and specializing in installation of networked lighting control products with minimum 3 years documented experience.
- .3 System Components: Demonstrate that individual components have undergone quality control and testing prior to shipping.
- .4 NFPA Flame-Test: Passes NFPA 701. Materials tested shall be identical to products proposed for use.
- .5 Motor operators, controls, and controllers shall be certified by a Nationally Recognized Testing laboratory (NRTL) to provide UL or ETL recognized or listed wired AC and DC powered motors and components.
- .6 Demonstrate that motors operators, controls, and controllers provided can connect to the internet with an acceptable level of security and ensure that that devices that allow for communication between the controls system hierarchy or the internet is certified by ioXt Alliance and listed on the ioXt website's current Certified Product Page.
- .7 Mock-Up: Provide a mock-up of one of each type roller shade assembly specified for evaluation of mounting, appearance and accessories. Assemble mock-up in accordance with Section 01 43 00 - Quality Assurance.
 - .1 Locate mock-up in window(s) designated by Architect.
 - .2 Do not proceed with remaining work until mock-up is accepted by Architect.

- .3 Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements:
- .2 Delivery:
 - .1 Deliver products in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.
- .3 Storage and Handling Requirements:
 - .1 Store fabric, tube, and motor units flat, on a flat horizontal surface to prevent sagging and deformation/twisting of contents, until ready for installation.
 - .2 Store products in a clean and dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.
- .4 Packaging Waste Management: Perform in accordance with Section 01 74 19 – Waste Management and Disposal.

1.10 AMBIENT CONDITIONS

- .1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- .2 Do not install shade units until interior painting, wet work, ceilings, window pockets, and mechanical/electrical work above window site is complete before installation.

2 PRODUCTS

2.1 MANUFACTURERS

- .1 Basis-of-Design Product:
 - .1 Legrand – ES Motorized Shades System
- .2 Acceptable Alternatives:
 - .1 Elite Pro Shading
 - .2 Mecho Shade Systems Inc.
 - .3 Altex, Inc.
 - .4 Somfy Systems Inc.
- .3 Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 WINDOW SHADE SYSTEM

- .1 Quiet motorized family of roller shades, brackets, tubes, specialized mounting brackets; couplers, fascia and closure, side channels, pockets, motors, and related components/accessories.
- .2 Product Types and Maximum Sizes: Provide shade product family, type and maximum sizes applicable to the products specified and indicated on the Drawing. Height and width limitations shall be as follows:
 - .1 Single Roller Shade Bracket: 4 inch shade system capable of supporting a maximum width of 330 cm by height 508 cm when using Opaque (blackout) shade band fabric material as a single roller shade on one bracket.
- .3 Operation: Motorized operation of a roller shade within the shade tube and shade assembly shall include a drive system controlled by a motor with specified controls for remote operation of the

shade with a quiet operation less than 38 dba at 1m and be operated via line-voltage power supplied by branch circuits located near the top of the window.

- .1 Communication with the motor is intended to be either via data wiring using different protocols or remote controlled via RF signals. The actual motor selected is based on control criteria, sizing of window, weight of fabric, project requirements for large shades, and/or need for quiet operation.
- .2 Control shall allow for single shade or groups of shades to be operated remotely with customizable stopping points besides full up and down.
- .3 Shade versatility options shall include: interconnection to different control systems such as third-party manufacturers' control/integration systems, building automation systems for increasing energy efficiency and occupant comfort; lighting control systems, wall switches, and/or handheld remotes as required by project Architect.
- .4 Manufacturer shall provide line voltage motors with sufficient lifting capacity for specified shade and capable of either Dry-Contact, RS 485, or RF control to meet project requirements.
- .4 Assembly:
 - .1 Provide field assembled shade tube and shade assembly consisting of end brackets, appropriately sized motor installed as required, shade tube, extruded aluminum fascia, hembar, shade fabric material, regular or reverse roll of shade material, and attachment brackets for on-site installation.
 - .2 Attachment Brackets: Provide with a variety of conventional and specialty brackets to match the different sizes of shade series within the motorized shade family. Provide roller shade assembly ready for installation using attachment brackets to match motor drive selection. Provide with brackets sized for either the 4 inch series or the 5 and 6 inch series of roller shades. Specialty brackets for unique installations and monumental shades and blackout channels for blackout shades shall also be available.
- .5 Shade Tube: Extruded T5 6005 aluminum shade tube is 1.52 mm thick, complete with continuous screw fins 4.82 mm high, for strength. Fins shall be spaced equidistant on tube and placed according to the weight and sizing characteristics necessary for the intended shade to be supported. Manufacturer shall select tube with sufficient thickness and diameter size so deflection caused by weight of shade material and shade size is not visible and good performance is assured.
- .6 Fascia and end caps: extruded T6 6063 or 6360 aluminum fascia with front towards room interior, shall be 1.7 mm thick, complete with two continuous screw flutes, anodized, powder coated or custom painted. Fascia shall be suitable for regular or reverse roll. Reverse fascia towards window, is available as an option.
 - .1 Finish: As selected by HWDSB and JASON FUNG ARCHITECT INC. from manufacturer's standard range of finish and colours
- .7 Hembar: extruded T6 6360 aluminum with plastic end finials, attached in factory to shadebar material (fabric). Exposed hembar and shadeband wrapped and sealed hembars are supplied with both ends of hembar sealed.
 - .1 Style: As selected by HWDSB and JASON FUNG ARCHITECT INC.
 - .2 Colours: As selected by HWDSB and JASON FUNG ARCHITECT INC. from manufacturer's standard range.
 - .3 Finish: As selected by HWDSB and JASON FUNG ARCHITECT INC. from manufacturer's standard range.
- .8 Shadeband Material Attachment: Attach shadeband material to roller shade tube in factory. Manufacturer shall have capability for attachment via double sided tape for insuring shadeband material lays flat, or by hidden spline with lightweight small profile plastic extrusion attached to shadeband material and inserted into a groove machined into roller tube. Selection of attachment method can be determined by Specifier preference or depending on project requirements and size of finished shade fabric, tube and motor units. All finished shades must be fabricated with one

complete wrap of material, minimum to cover the attachment of the shade and material to the shade tube. This wrap length will vary due to size of shade and size of tube and factory assembly conditions.

- .9 Closure for pockets: Provide a matching trim plate of finished T6 6063 aluminum, to conceal most of the opening of the roller shade. Closure will be attached to the fascia via a secure continuous overlap/underlap fabricated groove. Closures are available for attachment to all fascia options offered by manufacturer. Manufacturer to offer width of closure based upon single or dual shade and regular or reverse roll as specified. Provide with connector plates to butt seams of closures together for tight and secure fit. Closure shall have a specific location for routing and attaching low-voltage cabling and plastic "zip" cable tie hold downs for effective cable management, when motorized shades are utilized.
- .10 Shade Fabrics: Sun control fabric, dimensionally stable shade fabric.
- .11 Motors:
 - .1 Motor lifting capacity shall be a minimum of 2Nm torque or greater for low voltage motors and a minimum of 4 Nm torque or greater for line voltage motors without the need for any external mechanical components (springs).
 - .2 Intelligent motors shall be available in both AC line voltage and DC low voltage power options, with wired and wireless communication options.
 - .3 Intelligent motors shall be rated for both interior and exterior applications.
 - .4 Each motor shall come equipped with a customizable length of power and communication wire featuring an optional disconnect plug.
 - .5 Each motor shall be compatible with industry standard hardware. Motor must be adaptable to varying tube diameters with snap-on adapters. Motors shall be field- interchangeable that can come out of the tube and replaced in opposite end of tube to easily adapt to wire locations.
 - .6 Digital encoder delivering precise alignment of plus or minus 2 mm accuracy.
 - .1 Systems using a "time function" for positioning are not acceptable.
 - .7 Operating sound level from 3 feet away rated at 44 dBA or better.
 - .8 Each motor shall have the ability to set 16 unique stopping points that are electronically set and locked into non-volatile memory.
 - .9 Each motor shall be capable of being positioned at fully-up, fully-down or any position between 0-100 percent in 0.5 percent increments.
 - .10 Each motor shall be UL, CUL recognized, and meet CSA standards.
 - .11 Each motor's electrical components shall be tested to withstand a 15 kV electrostatic discharge without damage or loss of memory.
 - .12 Motors shall have factory-assigned individual unique addresses and can be individually
 - .13 Configurable over the network without needing to physically access motor.
 - .14 Motor shall have an onboard communication port for bi-directional communication
 - .15 allowing for status updates, configuration and operation from a PC with the applicable system software.
 - 16 Each motor shall accept 16-user configurable group addresses that are electronically stored and locked into non-volatile memory.
- .12 Shade Drive Assembly: Factory installed motor, pre-tested, and with limits preset. Motors of different lifting capacity shall be available depending on shade material weight and size of window to be covered. Other shade motor drive assembly features include:
 - .1 Motor is placed inside a tube with all appropriate drive attachments and brackets so as to be a part of a complete fabric, tube and motor unit that is assembled in factory, inspected, tested, motor limits set, and shipped complete, ready for installation into the two attachment

- brackets fastened to building structure.
- .2 Motor family is a line voltage, 120VAC, 60 Hz powered type featuring quiet operation of less than 38dbA at three feet. Operation to be free of clicks and gear sounds during operation.
- .3 Motors have upper and limit presets with ability to be set by either: buttons on the motor if Dry-contact control capable, a limit setting device connected to motor if RS 485 capable and via handheld remote if RF controlled capable.
- .4 Motors have programmable intermediate shade positions allowing for customized and matching stop points of shade stored into memory.
- .5 Motors incorporate an encoder-based drive for precise positioning.
- .6 Motors have a built-in thermal limit protection of four minutes.
- .7 Motors have an IP 31 interior use rating and can operate within a temperature range of 32 degrees F to 140 degrees F (0 degrees C to 60 degrees C).
- .8 RF controlled motors shall be SOMFY RTS type and have antenna built-into power cord, without use of external connection.
- .9 Dry-contact and RS 485 capable motors have a small connector on motor head for connection to control networks.
- .10 Motors shall have a power cord factory installed and integral to the tubular UL listed and tested motor.
- .11 Manufacturer shall provide standard power lead lengths with factory installed connectors and options for customizable lengths and different power connectors.
- .12 Motors shall be able to be installed left or right drive, inside shade tube.
- .13 Control of Shades:
 - .1 User Interface hard-wired switches:
 - .1 Hard-wired switches shall fit standard decorator type paddle switch plates and fit standard type junction boxes.
 - .2 Hard-wired switch shall have four buttons, an up, down, and preset 1 customizable and preset 2 customizable. The two preset buttons shall be customizable, though factory preset is for 33% and 65% of shade height based on lower limit.
 - .3 Hard-wired switch shall be available in White, and Ivory colors.
 - .2 Dry-contact motor control:
 - .1 Provide interconnection cable for use by others to control operation of dry contact shade motor via other system
 - 3. RF Controlled motors:
 - .1 Motors, defined above, shall be SOMFY RTS RF-controlled.
 - 4. RS 485 network controlled motors: Digital network controlled motors allow for interconnection to other systems, provide operational flexibility and control; and provide at a minimum the following features
 - .1 Individually addressable motors via the digital network,
 - .2 Digital network wiring topology allowing for "daisy-chaining",
 - .3 Bi-directional communication along RS 485 network,
 - .4 Interconnection with third party systems for control,
 - .5 Network interconnection with Building Automation and Lighting Control Systems via RS-485 or BACnet interfaces

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions:
 - .1 Verify substrates have been properly prepared.
 - .2 Examine areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, blocking.
 - .3 Identify locations of connections to building electrical system, and other conditions affecting performance of the Work.
 - .4 Report defective conditions affecting installation to HWDSB and JASON FUNG ARCHITECT INC. in writing immediately upon discovery and before beginning installation.
 - .5 Proceed with installation only after defective surfaces and conditions have been remedied.

3.2 PREPARATION

- .1 Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.
- .2 Coordinate requirements for blocking, construction of shade pockets, and structural supports to ensure adequate means for installation of window shades.
- .3 Coordinate requirements of Section 26 00 00 – Electrical for power supply conduit, and wiring required for window shade motors and controls.

3.3 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Install roller shades level, plumb, square, and true. Allow proper clearances for window operation hardware.
- .3 Install the following items to conceal roller and operating mechanism. Do not use exposed fasteners.
 - .1 Fascia.
 - .2 Closure panels.
 - .3 Endcaps.
- .4 Install headbox, side channels, and sill channel with sealant specified in Section 07 92 00 – Joint Sealants to eliminate light leaks at perimeter of shade system.
- .5 Position shades level, plumb, and at proper height relative to adjacent construction. Secure with fasteners recommended by manufacturer.

3.4 SITE QUALITY CONTROL

- .1 Manufacturer Services: Manufacturer's technical representative to conduct inspection of work at suitable intervals during application and at conclusion of Work to ensure the Work is correctly installed. When requested, submit manufacturer's inspection reports and verification that the work of this Section is correctly installed.

3.5 TESTING

- .1 Test motorized window shades to verify that controls, limit switches, interface to other building systems, and other operating components are functional. Correct deficiencies.
- .2 Test window shades to verify that operating mechanism, fabric retainer, and other operating components are functional. Correct deficiencies.
- .3 During daylight hours, lower shades and turn off interior lights. Verify that there are no light leaks at perimeter or within shade assembly. Correct deficiencies.

- .4 Demonstrate operation of shades to HWDSB and JASON FUNG ARCHITECT INC..

3.5 CLEANING

- .1 Progress Cleaning: In accordance with Section 01 74 00 - Cleaning.
- .2 Final Cleaning: In accordance with Section 01 74 00 – Cleaning. Clean roller shades, after installation, according to manufacturer's written instructions.
- .3 Waste Management: Perform in accordance with Section 01 74 19 – Waste Management and Disposal.

3.6 PROTECTION

- .1 Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- .2 Replace damaged roller shades that cannot be repaired, in a manner approved by HWDSB and JASON FUNG ARCHITECT INC., before time of Substantial Completion

END OF SECTION

1 GENERAL

1.1 SUMMARY

- .1 This section includes unenclosed, self-contained vertical platform wheelchair lift.

1.2 RELATED REQUIREMENTS

- .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 Division 26 - Electrical: Electrical power service panel and wiring connections.
- .6 Division 26 - Electrical: Concealed low voltage control wiring.
- .7 Division 26 - Electrical: Intercom and wiring.

1.3 REFERENCE STANDARDS

- .1 ASME A17.5 - Elevator and Escalator Electrical Equipment.
- .2 ASME A18.1a - 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 CSA C22.1 - Canadian Electric Code.
- .6 ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities.
- .7 NFPA 70 - National Electric Code.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .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 Include wiring diagrams for power, control, and signal systems.
 - .3 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.

1.5 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Firm with minimum 20 years documented experience in manufacturing of vertical platform wheelchair lifts, with evidence of experience with similar 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 without unreasonable loss of time in reaching project site.

1.6 REGULATORY REQUIREMENTS

- .1 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 C22.1 – Canadian Electric Code.

1.7 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.

1.8 PROJECT CONDITIONS

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

1.9 WARRANTY

- .1 Warranty: Manufacturer shall warrant the wheelchair lift materials and factory workmanship for two years following completion of installation.
- .2 Extended Warranty: Provide an extended manufacturer's warranty for the entire warranty period covering the wheelchair lift materials and factory workmanship for the following additional extended period beyond the initial one-year warranty. Preventive Maintenance agreement required.
 - 1. Five additional years.

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

2.1 MANUFACTURERS

- .1 Acceptable Manufacturers / Models:
 - .1 Savaria-Garaventa Lifts Inc., Brampton, ON, Hydraulic Vertical Platform Lift V1504-STD.
- .2 Acceptable alternates can only be considered during Bid Period and acceptance via Addenda; no post-Bid requests for consideration can be accepted.

2.2 UNENCLOSED VERTICAL WHEELCHAIR LIFT

- .1 Capacity: 750 lbs (340 kg) rated capacity.
- .2 Platform Size and Nominal Clear Platform Dimensions:
 - .1 Large 90 degree: 42 inches (1067 mm) by 60 inches (1524 mm) with 90-degree entry/exit configuration.
- .3 Platform Configuration:
 - .1 90 Degree: Front and side openings.
- .4 Landing Openings: Gates shall be self closing type.
 - .1 Gate Height: 42-1/8 inches (1070 mm).
 - .2 Platform Gate: Travels with platform and opens at lower landing.
 - .3 Upper Landing Gate: Installed at upper landing
- .5 Power Gate Operators:
 - .1 Location:
 - .1 Platform Gate: Travels with platform and opens lower landing.
 - .2 Upper Landing Gate.
 - .2 Automatically opens the gate when platform arrives at a landing. Will also open at landing by pressing call button.
 - .3 ADA Compliant and obstruction sensitive.
 - .4 Low voltage, 24 VDC with all wiring concealed.
- .6 Lift Components:
 - .1 Machine Tower: Aluminum extrusion.
 - .2 Base Frame: Structural steel.
 - .3 Platform Side Wall Panels: 16 gauge (1.5 mm) galvanized steel sheet.
 - .4 Side Guard Panels: 42-1/8 inches (1070 mm) high mounted on platform.
- .7 Base Mounting at Lower Landing:
 - .1 Pit Mount: Lift to be mounted in pit with dimensions to meet manufacturer's requirements for the platform size specified. Pit construction shall be in accordance to Section 03 30 00 – Cast-in-Place Concrete.
- .8 Hydraulic Drive:
 - .1 Drive Type: Chain Hydraulic
 - .2 Emergency Operation: Manual device to lower platform and battery auxiliary power to raise or lower platform.
 - .3 Safety Devices:
 - .1 Slack chain safety device.
 - .2 Shoring device.
 - .4 Travel Speed: 17 fpm (5.2 m/minute).
 - .5 Motor: 3.0 hp (2.2 kW); 24 volts DC.
 - .6 Power Supply:
 - .1 120 VAC single phase; 60 Hz on a dedicated 15-amp circuit.
 - .2 Powered by continuous building mains converted to 24 VDC, equipped with auxiliary power system capable of running lift up and down for a minimum of 5 trips with rated load.
- .9 Platform Controls: 24 VDC control circuit with the following features.

- .1 Direction Control: Illuminated tactile and continuous pressure elevator-style buttons with dual platform courtesy lights and safety light.
- .2 Illuminated and audible emergency stop switch shuts off power to lift and activates audio alarm with battery backup.
- .3 Keyed operations
- .10 Call Station Controls: 24 VDC control circuit with the following features.
 - .1 Direction Control: Illuminated tactile and continuous pressure elevator-style buttons with dual platform courtesy lights and safety light.
 - .2 Keyed operation.
 - .3 Call Station Mounting:
 - .1 Lower: Wall mounted surface.
 - .2 Upper: Frame mounted.
- .11 Safety Devices and Features:
 - .1 Grounded electrical system with upper, lower, and final limit switches.
 - .2 Tamper resistant interlock to electrically monitor that the gate is in the closed position and the lock is engaged before lift can move from landing.
 - .3 Electrical disconnect shall shut off power to the lift.
 - .4 Under platform safety pan with five waterproof safety switches to detect obstruction under platform.

3 EXECUTION

3.1 EXAMINATION

- .1 Do not begin installation until substrates have been properly prepared.
- .2 Verify shaft and machine space are of correct size and within tolerances.
- .3 Verify required landings and openings are of correct size and within tolerances.
- .4 Verify electrical rough-in is at correct locations.
- .5 If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 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.

3.3 INSTALLATION

- .1 Install platform lifts in accordance with applicable regulatory requirements including CSA B355, and 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.

3.4 FIELD QUALITY CONTROL

- .1 Perform tests in compliance with CSA B355 and required by authorities having jurisdiction.

- .2 Schedule tests with agencies and Architect, Owner, and Contractor present.

3.5 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings
- .2 Section 26 29 03 - Control Devices

1.2 DEFINITIONS

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.3 REFERENCE STANDARDS

- .1 CSA Group
 - .1 CSA C22.1, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
 - .2 CSA C235, Preferred voltage levels for AC systems up to 50 000 V.
- .2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122, The Authoritative Dictionary of IEEE Standards Terms.

1.4 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.

1.5 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.

1.6 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

2.1 DESIGN REQUIREMENTS

- .1 Operating voltages: to CSA 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.

2.2 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Material and equipment to be CSA certified.
- .3 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.
- .2 Control wiring and conduit: in accordance with Section 26 29 03 - Control Devices except for conduit, wiring and connections below 50 V which are related to control systems specified in mechanical sections and as shown on mechanical drawings.

2.4 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of authority having jurisdiction.
- .2 Decal signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.6 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with as per manufacturer and regulatory requirements.

2.7 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.

2.8 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.

Type	Prime	Auxiliary
Up to 250 V	Yellow	-
Up to 600 V	Yellow	Green
Up to 5 kV	Yellow	Blue
Up to 14 kV	Yellow	Red
Telephone	Green	-
Other Comm. Systems	Green	Blue
Fire Alarm	Red	-
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

2.9 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

3.1 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..

3.2 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise
- .2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise

3.3 NAMEPLATES AND LABELS

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed

3.4 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.

3.5 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.

3.6 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.

3.7 CO-ORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.8 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 1 - 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.

3.9 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

1 GENERAL

1.1 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.

1.2 RELATED REQUIREMENTS

- .1 Section 02 41 19 - Selective Demolition
- .2 Section 02 82 00 – Asbestos Abatement

1.3 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.

1.4 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA S350, Code of Practice for Safety in Demolition of Structures

1.5 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.

1.6 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.

1.7 QUALITY ASSURANCE

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

1.8 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.
- .2 Existing Hazardous Substances: PINCHIN LTD. has performed a hazardous building materials 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.
- .3 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in Work; immediately notify HWDSB, JASON FUNG ARCHITECT INC. and PINCHIN LTD. 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..

1.9 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

2.1 MATERIALS

- .1 General Patching and Repair Materials: Refer to 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

3.1 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.

3.2 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.

3.3 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 Disconnect and remove communication systems including associated conduits, boxes, cabling, and similar items unless specifically noted otherwise.

- .4 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.
- .5 Place weatherproof blank cover plates on exterior outlet boxes remaining after demolition and removal activities.
- .6 Remove existing conduits, boxes, cabling and wiring associated with removed luminaires, electrical devices and equipment.
- .7 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.
- .8 Seal open ends of conduit with silicone sealant and leave in place where they are inaccessible or cannot be removed without damaging adjacent construction.

3.4 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 Hazardous Building Materials Assessment prepared by PINCHIN LTD.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 26 05 00 – Acoustic Ceilings Suspension Assemblies.
- .2 Section 26 05 34 – Conduits Conduit Fastenings and Conduit Fittings.

1.2 REFERENCE STANDARDS

- .1 Not used.

1.3 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.

1.4 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

2.1 SUPPORT CHANNELS

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted or suspended.

3 EXECUTION

3.1 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 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..

3.2 INSTALLATION

- .1 Secure equipment to poured concrete with expandable inserts.
- .2 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.
- .3 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .4 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.
- .5 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.
- .6 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .7 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .8 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .9 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..
- .10 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

3.3 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

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 26 05 00 – Common Work Results for Electrical.

1.2 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.

1.3 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.

1.4 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

2.1 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.

2.2 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.

2.3 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.

2.4 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.

2.5 EXPANSION FITTINGS FOR RIGID CONDUIT

- .1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 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.

3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 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: 19 mm.
- .4 Bend conduit cold:
 - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .5 Mechanically bend steel conduit over 19 mm diameter.
- .6 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .7 Remove and replace blocked conduit sections.
 - .1 Do not use liquids to clean out conduits.
- .8 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
- .3 Run conduits in flanged portion of structural steel.

- .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.

3.4 CONCEALED CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Do not install horizontal runs in masonry walls.
- .3 Do not install conduits in terrazzo or concrete toppings.

3.5 CONDUITS IN CAST-IN-PLACE CONCRETE

- .1 Locate to suit reinforcing steel.
 - .1 Install in centre one third of slab.
- .2 Protect conduits from damage where they stub out of concrete.
- .3 Install sleeves where conduits pass through slab or wall.
- .4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed.
 - .1 Use cold mastic between sleeve and conduit.
- .5 Conduits in slabs: minimum slab thickness 4 times conduit diameter.
- .6 Encase conduits completely in concrete with minimum 25 mm concrete cover.
- .7 Organize conduits in slab to minimize cross-overs.

3.6 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

- .1 Run conduits 25 mm and larger below slab and encase in 75 mm concrete envelope.
 - .1 Provide 50 mm of sand over concrete envelope below floor slab.

3.7 CONDUITS UNDERGROUND

- .1 Slope conduits to provide drainage.
- .2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint..

3.8 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

1 GENERAL

1.1 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.
 - .2 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.

1.2 RELATED REQUIREMENTS

- .1 Not used.

1.3 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

1.4 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.
- .3 Cx Team: the commissioning team consists of project members that participate in the development, refinement and execution of the Cx Plan.

1.5 REFERENCE STANDARDS

- .1 CSA Group (CSA):
 - .1 CSA Z320, Building Commissioning

1.6 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.

1.7 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.
- .3 Commissioning Forms: Contractor to review and complete forms for documenting static verification and start-up activities.
 - .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.
- .4 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.
- .5 Site Quality Control Submittals: submit manufacturers certificates and reports demonstrating compliance of Work, as specified in the relevant Sections of Division 26.

1.8 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

2.1 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

3.1 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.

3.2 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.

3.3 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.

3.4 CX OF INTEGRATED SYSTEMS

- .1 Not used.

3.5 SITE QUALITY CONTROL

- .1 Manufacturer's Site Services: obtain certificates and reports from manufacturer verifying compliance of Work and submit Manufacturer's Site Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .1 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.

3.6 CLOSEOUT ACTIVITIES

- .1 Corrections: Provide equipment, materials and labor as required to correct installation and/or equipment deficiencies identified through the commissioning process.

END OF SECTION

1 GENERAL

1.1 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.
 - .3 Occupancy Sensors.

1.2 RELATED REQUIREMENTS

- .1 Section 26 05 00 - Common Work Results for Electrical
- .2 Section 26 50 00 - Lighting

1.3 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

1.4 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.
 - .2 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.

1.5 QUALITY ASSURANCE

- .1 Not used.

1.6 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

2.1 ENVIRONMENTAL

- .1 Not used.

2.2 MATERIALS

- .1 Control system: By one manufacturer and assembled from compatible components.

2.3 REMOTE CONTROL SWITCHES

- .1 Single pole, double throw, momentary contact, standard duty, 25 V, double push-button.

2.4 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.

2.5 CONTROL TRANSFORMER

- .1 Low voltage power Class 2, input 120 V, AC, 60 Hz, output 20 VA at 24 V.

2.6 RECTIFIER

- .1 Silicon type: 24 V, AC, 60 Hz input, 20 A intermittent duty output.

2.7 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.
- .2 Nine circuit manual dial-type master selector.
- .3 Twelve circuit manual dial-type master selector.

2.8 OCCUPANCY SENSOR LIGHTING DEVICES

- .1 Acceptable manufacturers: Hubbell, Leviton, Wattstopper, SensorSwitch, Pass & Seymour, Douglas
- .2 Digital PIR Occupancy Sensor
 - .1 Surface Mounted on wall / corner

- .2 24VDC rated
- .3 Viewing Angle: 110 degrees
- .4 Viewing Length: 12 m
- .5 LED Indicator
- .6 Time Delay as indicated
- .7 Sensitivity Adjustment: Automatic or Manual
- .8 CUL Listed
- .3 On/Off/Dimming Room Controller
 - .1 Input Voltage: 120V
 - .2 Output Voltage: 24VDC and 0-10VDC
 - .3 1, 2, or 3 Relays as Required
 - .4 CUL Listed
- .4 Digital Light Switch
 - .1 Input Voltage: 24 VDC
 - .2 1, 2, 3, or 4 Buttons as Indicated
 - .3 White Buttons and Cover Plate
 - .4 CUL Listed

3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Locate and install equipment in accordance with manufacturer's recommendations and as indicated.

3.3 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 1 - QUALITY ASSURANCE.

3.4 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

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 26 05 00 - Common Work Results for Electrical

1.2 REFERENCE STANDARDS

- .1 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).

1.3 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 [wiring devices] and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 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.

1.5 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

2.1 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.

2.2 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.

2.3 SPECIAL WIRING DEVICES

- .1 Not used.

2.4 WIRING DEVICES FOR COMPUTER ROOMS

- .1 Not used.

2.5 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.

2.6 SOURCE QUALITY CONTROL

- .1 Cover plates from one manufacturer throughout project.

3 EXECUTION

3.1 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..

3.2 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.

3.3 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.

3.4 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

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 26 09 24 – Lighting Control Devices, Low Voltage

1.2 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 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
 - .1 ASHRAE Standard 90.1, Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings
- .4 ASTM International (ASTM)
 - .1 ASTM F1137/F1137M, Standard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners
- .5 Illuminating Engineering Society (IES)
- .6 Interference-Causing Equipment Standard (ICES)
 - .1 ICES-005, Lighting Equipment
- .7 Underwriter's Laboratories (UL)
 - .1 UL 8753, Field-Replaceable Light Emitting Diode (LED) Light Engines
 - .2 UL 2388, Flexible Lighting Products

1.3 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.
 - .3 LED fixture shop drawings must indicate Driver Manufacturer and Model No. for each fixture.
 - .4 No light fixtures shall be ordered without the review and written approval of the Electrical Engineer. Shop drawings should indicate proposed mounting method and hardware to facilitate a complete and safe installation.
- .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.

1.4 QUALITY ASSURANCE

- .1 Provide mock-ups in accordance with Section 01 43 00 - Quality Assurance.

1.5 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

2.1 LUMINAIRES

- .1 Provide luminaires in accordance with Schedule of Luminaires found on drawings. Luminaires are to be CSA approved, ULC listed and labelled, or have special local electrical authority approval.
- .2 DLC listed/certified so that fixtures/bulbs are eligible for incentives through IESO's Save On Energy Retrofit Program.
- .3 Lenses:
 - .1 Plastic lenses in lighting fixtures shall be acrylic with minimum thickness of 3mm and, providing flame spread and smoke density ratings, complying with applicable Federal and Provincial Codes; Ontario Fire Marshal's Fire Safety Design Standard; and the Ontario Building Code (3.1.13.1(1)).
 - .2 Removable components of fixtures (louvres, lenses, wire guards, and the like) to be limited to maximum 1220 mm in length
- .4 Luminaires to be factory assembled and tested prior to delivery on site.
- .5 Confirm exact colours and finishes of luminaires with Consultant after award of contract but prior to ordering. Obtain information in time to meet installation schedule.
- .6 Products of same specified type to be of same manufacturer.

2.2 LEDS & DRIVERS

- .1 General features:
 - .1 CSA approved, ULC listed and labelled.
 - .2 DLC listed/certified so that fixtures/bulbs are eligible for incentives through IESO's Save On Energy Retrofit Program.
 - .3 Operating Temperature:
 - .1 Luminaires for applications in non-climate controlled area: operating temperature range through -40C to 60C.
 - .2 Luminaires for applications in climate controlled area: operating temperature range through -20C to 50C.
 - .4 With rapid and changing development of LED technology, provide most technically proven and most advanced and successfully tested LED technology at time of installation.
 - .5 Specification standards to meet requirements of IES LM-79 and LM-80.
 - .6 Be 100% compatible with connected dimmer controls to provide dimming down to 5%.
- .2 Light Emitting Diodes (LEDs) features to include:
 - .1 LEDs to be selected from same colour bin size for consistency in chromaticity and meet ANSI C78 377A as a minimum.
 - .2 Colour temperature: 4000K unless DLC listed then 3500K is acceptable
 - .3 Minimum CRI is greater than 80.
 - .4 A+ Capable Luminaire
 - .5 50,000 hours L70 lumen performance.
 - .6 Efficacy of >110 lumens per watt (LPW).

- .7 Angle beam light distribution is not required.
- .8 Glass lamps are not required.
- .9 Minimum of 5-year warranty.
- .3 Driver (ballast) features to include:
 - .1 Operate from 60 Hz input source of 120 VAC with sustained variations of $\pm 10\%$ (voltage and frequency) with no damage to drive.
 - .2 Output regulated to $\pm 5\%$ across load range.
 - .3 Power factor greater than 0.90.
 - .4 Total harmonic distortion less than 20%.
 - .5 Class A sound rating.
 - .6 Comply with ANSI C62.41 Category A for transient protection.

3 EXECUTION

3.1 INSTALLATION

- .1 Locate and install luminaires as indicated. Install products in accordance with manufacturer instructions to suite specific installation requirements.
- .2 Verify quantity requirements.
- .3 Review and verify ceiling types, finishes and construction details. Order luminaries to suit correct ceiling type.
- .4 Ensure that required mounting assemblies, frames, rings and similar features are included.
- .5 Confirm colours and finishes with Consultant prior to placing order.
- .6 Include for assembly and mounting of luminaires and lamps complete with:
 - .1 Wiring and connections.
 - .2 Fittings and hangers.
 - .3 Aligners.
 - .4 Box covers.
 - .5 Other accessories required for a complete, safe and fully operational assembly.
- .7 Provide adequate support to suit ceiling system.
- .8 Install ceiling fixtures in centre of tiles unless dimensioned otherwise of Reflected Ceiling Plans. Locate hangers on tile centres or intersections. Mount recessed downlights, troffers, and surface mounted luminaires in or on full tiles. Install fixtures in and on acoustical tile ceilings in alignment with tile joints.
- .9 Cut holes for recessed luminaires to exact size so that gaps are not visible or luminaire trims cover gaps.
- .10 Mount surface ceiling luminaires perfectly level or plumb, tightly to ceiling without showing a space or light leak between frame and ceiling.
- .11 Notify Consultant immediately and relocate if necessary as directed by Consultant, if:
 - .1 Fixture placement is in conflict with a structural beam, mechanical duct, plumbing pipe, etc.
 - .2 Space above ceiling is not sufficient.
 - .3 Any reason that a fixture cannot be located where it is dimensioned or shown on construction documents.

3.2 WIRING

- .1 Connect luminaires to lighting circuits:

- .1 Install flexible or rigid conduit for luminaires as indicated.

3.3 LUMINAIRE SUPPORTS

- .1 For suspended ceiling installations support luminaires independently of ceiling or support luminaires from ceiling grid in accordance with local inspection requirements.

3.4 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.

3.5 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.
- .3 Lamps to be new and intact when project is complete and ready for Handover. Replace damaged fixtures and bulbs as necessary.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings

1.2 REFERENCE STANDARDS

- .1 CSA Group (CSA):
 - .1 CSA C22.2 No.141, Emergency Lighting Equipment

1.3 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 emergency lighting and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

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

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store, and handle materials 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 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 01 74 19 - Waste Management and Disposal.

1.6 WARRANTY

- .1 For batteries in this Section 26 52 13.13 - Emergency Lighting, 12 months warranty period is extended to 120 months.

2 PRODUCTS

2.1 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.
- .6 Solid state transfer circuit.
- .7 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.
- .8 Signal lights: solid state, for 'AC Power ON' and 'High Charge'.
- .9 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.
- .10 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.
- .11 Finish: Factory White. Cube lens to be frosted.
- .12 Refer to manufacturer specification sheet and installation requirements.
- .13 Auxiliary equipment:
 - .1 Dust-tight relay.
 - .2 Voltmeter.
 - .3 Test switch.
 - .4 Time delay relay.
 - .5 Battery disconnect device.

2.2 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

3.1 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..

3.2 INSTALLATION

- .1 Install unit equipment and remote mounted fixtures.
- .2 Direct heads.
- .3 Connect exit lights to unit equipment.

3.3 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.

3.4 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

1 GENERAL

1.1 SUMMARY

- .1 This section includes exit signs units with battery back-ups or remote fixture mounting for ordinary location use.

1.1 RELATED REQUIREMENTS

- .1 Not used.

1.2 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)

1.3 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

1.4 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.

1.5 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

2.1 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.

2.2 MANUFACTURERS

- .1 Basis-of-Design Product: Lumacell - 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 certified.

3 EXECUTION

3.1 INSTALLATION

- .1 Installation shall be in accordance to the NEC, CEC and manufacturer's instructions.

3.2 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.

3.3 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

1 GENERAL

1.1 SUMMARY

- .1 This section includes supply and install of fire alarm systems and associated devices, facilities, and panels.

1.2 REFERENCE STANDARDS

- .1 Underwriters Laboratories, Inc. (UL):
 - .1 UL924, Standard for Safety of Emergency Lighting and Power Equipment
- .2 National Fire Prevention Association (NFPA):
 - .1 NFPA 72, National Fire Alarm Code
 - .2 NFA 90A, Installation of Air Conditioning and Ventilation Systems.
- .3 National Research Council Canada (NRC)
 - .1 National Building Code of Canada (NBC)
- .4 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524, Standard for the Installation of Fire Alarm Systems.
 - .2 CAN/ULC-S525, Audible Signal Device for Fire Alarm Systems.
 - .3 CAN/ULC-S526, Visual Signal Devices for Fire Alarm Systems.
 - .4 CAN/ULC-S527, Control Units.
 - .5 CAN/ULC-S528, Manual Pull Stations for Fire Alarm Systems.
 - .6 CAN/ULC-S529, Smoke Detectors for Fire Alarm Systems.
 - .7 CAN/ULC-S530, Heat Actuated Fire Detectors for Fire Alarm Systems.
 - .8 CAN/ULC-S531, Standard for Smoke Alarms.
 - .9 CAN/ULC-S536-S537, Burglar and Fire Alarm Systems and Components.

1.3 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
- .3 Certification:
 - .1 Submit final system testing and verification reports and certificates of approval from local governing inspection authority.

1.4 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.

1.05 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

2.1 EXISTING FIRE ALARM SYSTEM

- .1 Provide additional devices and work to extend existing system to serve additional and renovated areas. Additional devices to be 100% compatible with existing system. Include provision of necessary control panel and annunciator work of existing system to accommodate integration of additional devices.
- .2 Include for and engage Owner existing system manufacturer authorized technicians to provide and perform required system products and work.
- .3 Verify with existing fire alarm system manufacturer during Bid period, exact requirements needed to provide renovation work. Confirm and coordinate exact work responsibilities with system vendor. Items of clarification or proposed revisions to Bid Documents must be reviewed with Consultant during Bid Period.

2.2 ADDITIONAL FIRE ALARM SYSTEM WORK

- .1 System work to include, but not limited to, provision of following:
 - .1 Removal and relocation of existing head end equipment including provisions of additional device connection modules, zone modules, amplifiers and system reprogramming.
 - .2 Additional initiating devices (pull stations, heat/smoke/flame detectors).
 - .3 Additional alarm indicating devices (speakers, horns, strobes).
 - .1 All new horns sound patterns shall match sound pattern of existing-to-remain horns throughout the existing school.
 - .4 Additional interfaces and interconnections to auxiliary building systems.
 - .5 Review of existing battery backup capacity and amplifiers (as applicable) and increasing capacities to accommodate additional device loading and to meet applicable governing local code requirements.
 - .6 Additional wiring in conduit and/or fire rated cables.

2.3 MODIFICATIONS AND DEVICES

- .1 Modify control panels and annunciators to supervise and annunciate additional and relocated devices. Additional initiating devices shall be devices that are 100% compatible with existing controls and be ULC listed and labelled for connecting to respective control units. Include costs for manufacturer authorized representative to perform control panel/transponder work and to reprogram system software to accommodate renovation work. Provide additional zone modules as required and additional batteries as required to supply back-up battery capacity to the additional components.
- .2 Additional devices to be ULC listed and labelled devices suitable for fire alarm applications. Power supplies and other components to be CSA approved where required by local governing authorities and codes.
- .3 Exact type of device to be used in each area of installation to be as recommended by system manufacturer to suit specific applications and to be approved for such use as per ULC standards. Devices in non-climatic controlled areas to be weatherproof, corrosion resistant and ULC listed for use in below freezing temperatures. System manufacturer to be responsible for ensuring compliance with these requirements.
- .4 Devices:
 - .1 Smoke and Heat Detectors: To be of type and rating to suit specific application as per existing system manufacturer recommendations.
 - .2 Audible Devices: of type to match existing system standards.

- .3 Strobes and combinations strobes/audible devices: of type to match existing system standards; include additional strobes to meet latest governing building code requirements.
- .4 Addressable modules as required for connection of additional devices.
- .5 Ancillary devices as required to complete system.
- .6 Refer to drawings for additional device requirements.
- .5 End-Of-Line Resistors and Isolators:
 - .1 End-of-line resistors for standard alarm and signalling circuits to be sized to ensure correct supervisory current flows in each circuit.
 - .2 End-of-line resistors to be mounted on a stainless steel plate for mounting on a standard single gang box and bear ULC label.
- .6 Wiring:
 - .1 CSA approved and ULC listed wire and cable, approved for fire alarm circuits; with colour coded, insulated solid copper conductors; of type as per local governing electrical code and local governing fire authority requirements.
 - .2 Sized and installed in accordance with system Manufacturer instructions and local governing electrical code.
 - .3 Fire rated MI for wiring as required by local governing building code, local governing authorities and as noted on drawings, for connections and interconnections to equipment for life safety applications.
 - .4 To be mechanically protected to satisfaction of local fire authority.
 - .5 Pentair "Pyrotenax" type "MI" ULC listed and labelled, 2 hour fire rated, mineral insulated, copper sheathed, copper conductors for power, control and signal wiring to and between each transponder/control panel, and for other local code required or local governing authority required applications with regards to life safety equipment.

3 EXECUTION

3.1 INSTALLATION – GENERAL

- .1 Prior to start of Work as part of shop drawing submission process, review with system manufacturer the following:
 - .1 Device types to ensure that selected type is suitable for intended application on project;
 - .2 Locations of devices to ensure proper operation and coverage are in compliance with requirements of local fire authorities;
 - .3 Device mounting heights to ensure proper operation and coverage are in compliance with requirements of local fire authorities;
 - .4 Device back box requirements to ensure size and depth suit system manufacturer recommendations for specific devices;
 - .5 Types of system wiring and required sizing taking into consideration applications and voltage drop;
 - .6 System circuiting and device quantities per circuit while maintaining limitations in Specifications;
 - .7 Proposed revisions required to existing system sequence of operation.
- .2 Immediately advise Consultant of any requirements of above that may necessitate revisions to design documents.
- .3 Install fire alarm system components and connect complete.
- .4 Perform Work in conjunction with this installation to meet requirements of latest editions of local

governing building code, local governing electrical code, ULC Standards including Installation Standard CAN/ULC-S524, and any applicable local governing codes. If any requirements of these specifications are different, omitted or contrary to ULCS524 Standard, then ULC Standard governs and overrides these specifications, but in no instance will standards established by drawings and specifications be reduced by any of Codes referred to previously. Control units and annunciators to be in accordance to latest requirements of ULC Standard CAN/ULC-S527 "Control Units for Fire Alarm Systems.

- .5 In addition, work to meet Owner's standards, and recommendations and instructions from system manufacturer.
- .6 During work to existing fire alarm system, proposed time and duration of interruption to be approved by Consultant. At any time due to emergency situations, Owner may request by-passed zone(s) to be re-instated immediately. In all areas where renovation work requires shutdown of any part of fire alarm protection system, provide manual fire alarm protection (Fire Warden) by means of supervising area as approved by local governing authorities. At no time allow fire alarm system or any one (1) zone to be left inoperative overnight. Provide required bypass wiring and temporary wiring to maintain all parts of fire alarm system operative during construction and alterations.
- .7 Fire alarm system Manufacturer authorized technician to supervise control panel, transponder, and annunciator work.
- .8 Provide sequence of operation for fire alarm system as approved by local fire authority and reviewed by Consultant. Refer to additional requirements on drawings.
- .9 Demonstrate system to local Fire Department and obtain their approval for complete system.

3.2 INSTALLATION – CONTROL UNITS

- .1 Install required additional transponders, and make modifications to existing controls, panels, and annunciator.
- .2 Re-programme system to accommodate system modifications and to accommodate additional devices and zones, as required. Submit proposed software programming revisions to Consultant and local fire authority for review and approval prior to start of work.
- .3 Install units in accordance with Manufacturer instructions.
- .4 Connect transponders to dedicated 15A breakers in nearest emergency panel as shown or as scheduled. Ensure that room housing panels have fire rating to local governing code requirements. Provide fire rated conductors as required.
- .5 Properly ground and bond transponders to building ground. Conduit ground will not be acceptable. Provide green coloured grounding loop, a minimum #10 AWG insulated copper conductor run in conduit. Connect ground loop to main building ground system source. Do not run ground wire in same conduit as fire alarm and communication wiring.

3.3 INSTALLATION – DEVICES

- .1 Install required devices. Do not install devices in locations that may hamper proper operation of devices including adjacent devices.
- .2 Obtain required training from manufacturer representative on any special installation procedures. Install devices and perform work in accordance with Manufacturer instructions and requirements and in accordance to applicable codes of local governing authorities having jurisdiction.
- .3 Review device finishes with Consultant prior to ordering.
- .4 Install manual pull stations in boxes as required, recessed outlet boxes with plaster rings, except in unfinished areas where pull stations are surface mounted, in which case, install stations in surface mounted boxes. Comply with mounting height requirements for local governing building code barrier free access.

- .5 Install mounting plate of thermal detectors to ceiling mounted boxes as required. Secure detectors to plates. Refer to floor plans and drawing symbol list to determine rating of detectors in any given area. Generally, do not install rate-of-rise type detectors in areas subject to sudden changes in temperatures, such as entrance vestibules. Confirm application requirements with system manufacturer and ensure that devices are ULC listed for such applications and are approved by local fire authority for such use.
- .6 Secure base of each ceiling mounted products of combustion detectors to boxes as required, either flush or surface mounted as required. Secure detector heads to bases.
- .7 Install cross zoned connection of detectors and remote indicating devices for areas of raised floors or within accessible ceiling spaces or for applications detailed on drawings.
- .8 In application with hold open devices on doors, ensure compliance with NFPA regarding smoke detectors tied to hold open devices such that a signal received directly from smoke detector to cause release of door. Where electromagnetic locks are used on doors of egress, provide required automatic release of locks upon activation of fire alarm (i.e. via connection to auxiliary contact of adjacent pull station). Provide required conductors and connections to fire alarm system and to electromagnetic locks.
- .9 Wire speakers in Class B, 2 wire circuit configuration, terminating in end of line devices. Wire alternate speakers in same circuits with a minimum of 2 circuits per floor.
- .10 Generally, audible device locations are indicated on drawings, however, exact audible device quantities and locations to be in accordance with results of audibility device coverage site tests. Provide suitable sound detection metering and personnel to make necessary tests. Relocate audible devices and/or provide additional audible devices as required.
- .11 Install amplifiers sized as required to power additional speakers and include spare capacity as specified.
- .12 Typically, Install visual notification appliances 2400 mm (8') above floor or 300 mm (12") below finished ceiling line. Provide visual notification devices in areas subject to high ambient noise levels, such as mechanical equipment rooms, computer equipment rooms, parking garage, etc., and areas designated for hearing impaired as per local building code requirements. Provide minimum 2 circuits per floor and connect devices in alternating scheme.
- .13 Provide required additional devices and install existing devices as required. Circuit devices to existing standards and in compliance with local governing codes and authorities. Determine exact quantities of circuits based on requirements of governing codes and standards, and recommendations of system manufacturer.
- .14 Unless otherwise noted in Contract Documents, do not load device circuits more than 80% capacity.
- .15 Devices in non-climate controlled areas to be weatherproof, corrosion resistant, ULC listed for operation in below freezing temperatures, and as recommended by system manufacturer for use for each specific application. Where electronics are not recommended for cold temperature applications, include for Manufacturer recommendations and directions in remotely locating addressable modules in closest heated areas and connecting to respective device in non-climate controlled areas.

3.4 REQUIREMENTS FOR INTEGRATED SYSTEMS & EQUIPMENT

- .1 Perform required fire alarm system wiring connections to mechanical equipment and other building systems to perform required interrelated functions. Provide required wiring, relays and/or contactors between fire alarm system and various equipment to achieve automatic or manual control of equipment, to perform required integrated to fire alarm system functions. Provide shunt trip breakers as required. Provide fire rated conductors where required by local codes and local authorities.

- .2 Provision of fire alarm supervisory wiring connections to include but not be limited to following (where applicable):
 - .1 Fan equipment starters;
 - .2 Pumps;
 - .3 Door holders/releases and electromagnetic locks;
 - .4 Devices as shown on drawings

3.5 ADDITIONAL REQUIREMENTS

- .1 Provide required system wiring in accordance to requirements of applicable governing electrical code, other local governing code and standards requirements, system manufacturer's recommendations and based on specific applications and consideration of voltage drop.
- .2 Install wiring in conduit unless otherwise directed by Consultant. Perform wiring connections associated with fire alarm system on terminal strips in junction boxes and colour coded. Provide wiring colour coding consistent for entire length of each run. When pulling wires into conduit, use lubricant and run wires straight and not twisted or abraded. Neatly secure exposed wires in apparatus enclosures with approved supports or ties. Clearly identify wiring at each termination point. In addition, number wiring with Brady Ltd. or Electrovert Ltd. Z-type markers. Colour conductors for each part of system in accordance with system equipment Manufacturer recommendations. Paint conduit couplings red of paint type suitable for application to standards of Division 09.
- .3 Where existing devices are relocated and existing wiring is of insufficient length to connect to relocated position, provide replacement wiring and conduit of sufficient length.
- .4 Where required by local governing codes and/or local governing authorities, provide ULC listed, fire rated conductors (MI) for connections to and interconnections between equipment for life safety applications requiring fire rating. Install MI type conductors in accordance with manufacturer's instructions and requirements in Specification.
- .5 Run alarm indicating circuits (speakers) and alarm receiving circuits (pull stations, detectors) in separate conduits from each other.
- .6 Provide engraved Lamacoid identification nameplates for each equipment or wiring housing and secure to front of housing. Confirm exact wording designations and sizes to with Consultant prior to manufacture.
- .7 Review nomenclature of annunciator identification with Consultant prior to ordering.
- .8 Install end-of-line resistors to electrically supervise wiring. Generally, locate end-of-line resistors at ceiling lines above a pull station location. Provide isolators and install in accordance with ULC standards. Properly label and identify. Do not locate end-of-line resistors and isolators in concealed locations. Generally install in equipment rooms.
- .9 Refer to drawing riser diagram. Riser drawings are diagrammatic and are not to be used for determining quantities or lengths. Quantities of components to be as per floor plans. Determine exact quantities of circuits based on drawings information, connected devices, requirements of governing codes and standards, and recommendations of system manufacturer.
- .10 Review exact location of components prior to roughing-in.
- .11 Ground and bond system as required by local governing electrical code and authority and system manufacturer.

3.6 SYSTEM TESTING, VERIFICATION & CERTIFICATION

- .1 Include for fire alarm system manufacturer to inspect, test, verify and certify system components and wiring, individually and as a complete system, in accordance with requirements of CAN/ULC S537. Work to include but not be limited to provision of following:
 - .1 To ensure that type of equipment installed is that designated by Contract Documents;
 - .2 To ensure that wiring connections to equipment components show that installer observed ULC and CSA requirements;
 - .3 To ensure that equipment was installed in accordance manufacturer recommendations, and that signalling devices of whatever manufacture were operated or tested to verify their operation;
 - .4 To ensure that supervisory wiring of those items of equipment connected to a supervised circuit is operating and that governmental regulations, if any, concerning such supervisory wiring, have been met to satisfaction of inspecting officials;
 - .5 To ensure that sequence of operation is in accordance with existing sequence of operation and any modifications identified on documents and are approved by local fire authority;
 - .6 To ensure that devices are commissioned and operable.
- .2 System manufacturer to also be responsible for, but not be limited to, provision of following additional work to existing systems:
 - .1 Coordinate with local fire authority inspector and Electrical Division Contractor, required testing and verification work in order to obtain certification and meet local fire code and local fire authority requirements;
 - .2 Test system battery power supplies and demonstrate compliance with local governing building code and local fire authority requirements that battery supplies are capable of providing required 24 hours of supervisory power followed by local governing building code required time (or time directed by local fire authority) of full load power; exact method of testing to be approved by local fire authority, Consultant and Owner; confirm exact procedures with previously named parties prior to testing; include for sufficient sound measurement devices and personnel in order to successfully comply with this requirement;
 - .3 Full review, testing, and verification of operation of building ventilation and smoke exhaust system and its integrated operation with fire alarm system and various pieces of air handling equipment;
 - .4 Full review, testing and verification of operation of integrated systems such as elevators and their emergency sequence of operation, supervisory annunciation of sprinkler/standpipe monitor switches, pressure switches and flow switches, diesel genset alarms, security alarms, BAS alarms, release of door holders and electromagnetic locks, and any other integrated components; coordinate requirements with trades responsible for integrated components and systems who will be present at time of testing and verification work;
 - .5 Test that system audible devices provide alarm sound levels in areas as per local governing building code and local fire authority requirements; site adjust tap settings of audible devices as required to achieve required audibility levels; also test that emergency voice communication system meets or exceed intelligibility requirements of local governing building code and is approved by local fire authority;
 - .6 Assist in testing and verification of electromagnetic door locks to meet requirements of authorities having jurisdiction and to obtain overall approval of installation;
 - .7 Coordination with Electrical Divisions and local fire authority to provide requirements to obtain certificates of approvals from local fire authority;
 - .8 Provide full detailed test sheets of tested components and provide certification that system work has been fully tested, that devices have passed testing and that system is in proper work order in compliance to local governing code requirements and project documents; testing report documents to be additionally provided in electronic format as confirmed with Owner and Consultant.

- .3 Where project work is phased and Owner requires occupancy at various stages, include for providing system testing, verification and certification after completion of each phase of work, to approval of local governing authorities. Upon Substantial Performance of the Work, include for providing system testing, verification and certification of entire system work.
- .4 Contact local fire authority inspector and coordinate and arrange for Fire Inspector to perform required inspections. Integrate local fire authority inspection requirements with testing and verification work to extent as per Fire Inspector's directions. Obtain full approval and certification by local fire authority.
- .5 Local fire authority inspector, Consultant and Commissioning Agent to at their discretion test system or parts of system in their review of test reports. Correct/repair any failures or deficiencies found in system, whether or not identified in test reports of manufacturer. Re-test and re-verify until successfully passed, at no extra cost to Owner.
- .6 Obtain from local fire authority required certificate of approval of system and forward to Consultant.
- .7 Arrange for manufacturers to supply reasonable amounts of technical assistance with respect to any changes required to conform to paragraphs above. During period of inspection, testing and verification, make Electricians available to do any required correction work and to assist during this Work. Include for trades responsible for integrated components (i.e. exhaust fans, sprinklers, elevators, gensets, etc.) and systems to be present at time of testing and verification work.
- .8 On completion of verification, inspection and testing of system, obtain from manufacturer and forward to Consultant, a verification certificate together with detailed inspection reports listing each and every system component, its location in building and its acceptability. Verification certificate and inspection reports to be prepared and signed by certified testing technicians of manufacturer. Signed test reports to confirm that systems are installed and perform in accordance with requirements specified above.
- .9 Obtain from system manufacturer and testing agency and forward to Consultant a certificate of liability insurance of minimum amount of Two Million Dollars (\$2,000,000.00) that is to be registered for this project to show satisfactory proof of manufacturer liability coverage for both their product and personnel.
- .10 Include for re-verification of any failed device repaired or replaced, until successful testing and verification.
- .11 Unless approved in writing by Consultant and Owner, do not use open flame and/or smoke for testing.
- .12 Testing technician to be certified and approved for fire alarm system testing by Canadian Fire Alarm Association (CFAA) and or be a Certified Fire Alarm Electrician (CFAE) with Electrical Contractors Association of Ontario (ECAO) as deemed acceptable to Ontario Fire Marshall.
- .13 Additionally, refer to testing, coordination and verification requirements in Section titled Electrical Work Analysis and Testing and include applicable requirements.
- .14 The Electrical Contractor shall warrant that the components of the fire alarm system installed as part of this work shall remain in good working order for a period of one year from the date of verification. Should components of the system fail to perform as intended under normal operating conditions at any time during this one year period, the Client shall notify the Electrical Contractor in writing. The Electrical Contractor shall repair or replace the failed equipment/devices to maintain a fully operational fire alarm system.

3.7 MONITORING OF SYSTEMS

- .1 In areas that remain occupied and used by Owner during Work, daily monitor and supervise existing fire alarm system serving renovation/working areas. Ensure that system is left in proper operating condition at end of each working day. Include for but not be limited to performing following:
 - .1 Under presence of Owner representative, check each morning and evening (start and end of work) of each day, system to ensure that it is in proper working condition;

- .2 If portions of system are not in proper working order, provide temporary bypass wiring (if fire alarm system, must be subject to approval of local fire authority), and/or provide supervisory personnel to monitor systems for area affected;
 - .3 Document and sign off with Owner representative signing off also, each respective daily check condition;
 - .4 Ensure that work to system does not affect portion of system serving areas outside of renovation/working areas.
- .2 Maintain fire protection of areas which may include fire watch during temporary shutdowns of existing systems, in accordance with requirements of local governing code and local governing authorities.

3.8 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.

END OF SECTION



February 5, 2026

Hamilton-Wentworth District School Board
20 Education Court
Hamilton, ON

Re: Hazardous Building Materials Assessment (Preconstruction)
Gym Renovation Project
Yorkview Elementary School, 86 Cameron Ave, Dundas, ON
Pinchin File: 0352293.018

Hamilton-Wentworth District School Board (Client) retained Pinchin Ltd. (Pinchin) to conduct a hazardous building materials assessment at Yorkview Elementary School, located at 86 Cameron Ave, Dundas, ON.

Pinchin performed the assessment on January 20, 2026. The assessors were unaccompanied during the assessment. The assessed area was occupied at the time of the assessment.

The objective of the assessment was to identify specified hazardous building materials in preparation for building renovation. The proposed work as identified by the Client includes renovation of the Gym and Stage.

The results of this assessment are intended for use with a properly developed scope of work or performance specification.

The **assessed area** is limited to the portion(s) of the building to be renovated, as described by the Client, and identified in the drawings in Appendix I.

1.0 SUMMARY OF FINDINGS

- Asbestos:
 - Transite ceiling tiles (presumed)
 - Transite wall and ceiling panels
 - Floor mastic
- Lead:
 - Lead is present in paints and coatings.
 - Solid lead is present in batteries of emergency lights
- Crystalline silica is present in concrete and other materials such as masonry, mortar, talc, and plaster.



- Mercury vapour is present in lamp tubes.
- PCB-containing materials were not identified.
- No mould or water damage was identified.

2.0 RECOMMENDATIONS

2.1 General

Prepare scope of work or performance specifications for hazardous material removal required for the planned work. The specifications should include safe work practices, personal protective equipment, respiratory protection, and disposal of waste materials.

If suspected hazardous building materials are discovered during the planned work, which are not identified in this report, do not disturb, and arrange for further testing and evaluation.

Conduct further investigation of the following items, areas, or locations, which were not completed during this assessment:

- Above acoustic ceiling tiles in the Gym (Location ID 1032)
- Any materials listed as excluded prior to disturbance

Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.

Retain a qualified consultant to specify, observe and document the successful removal of hazardous materials.

Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials and any other relevant findings.

2.2 Remedial Work

Remedial work is not required.

2.3 Project Work

The following recommendations are made regarding renovation involving the hazardous materials identified.

2.3.1 Asbestos

Remove asbestos-containing materials (ACM) prior to renovation, alteration, or maintenance if ACM may be disturbed by the work.



If the identified ACM will not be removed prior to commencement of the work, any potential disturbance of ACM must follow asbestos precautions appropriate for the type of work being performed.

Asbestos-containing materials must be disposed of at a landfill approved to accept asbestos waste.

2.3.2 Lead

For lead-containing or lead-based paints (i.e., greater than the EACC guideline of 0.1% (1,000 mg/kg) for lead-containing paints, and 0.5% (5,000 mg/kg) for lead-based), construction disturbance may result in over-exposure to lead dust or fumes. The need for work procedures, engineering controls and personal protective equipment should be assessed on a site-specific basis to comply with applicable regulations, and/or guidelines.

For paints identified as having low levels of lead (i.e., equal to or above 0.009% (90 mg/kg) but less than or equal to the EACC guideline of 0.1% (1,000 mg/kg) for lead-containing paints) special precautions are not recommended unless aggressive disturbance (grinding, blasting, torching) is planned.

Exposure from construction disturbance of paints containing lead less than 0.009% (90 mg/kg) is assumed to be insignificant.

Items painted with paints containing elevated levels of lead may be a hazardous waste. Test lead-painted materials for leachable lead and other metals prior to disposal. Metallic components coated with lead paint do not require leachate testing and can be disposed of as non-hazardous construction and demolition (C&D) waste.

Lead-containing items should be recycled when taken out of service.

2.3.3 Silica

Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with applicable regulations and guidelines.

2.3.4 Mercury

Do not break lamps. Recycle mercury from fluorescent lamps when taken out of service. Mercury is classified as a hazardous waste and must be disposed of in accordance with applicable regulations.



3.0 BACKGROUND INFORMATION

3.1 Assessed Area Description Summary

Description Item	Details
Building Use	Elementary School
Year of Construction	1953
Structure	Structural steel, concrete block
Flooring	Vinyl floor tiles, wood, terrazzo
Wall and Ceiling Finishes	Plaster, concrete block, Transite

3.2 Existing Reports

3.2.1 Review of Previous Reports

Pinchin previously prepared the following report and included relevant results as appropriate:

- “Mechanical Upgrade Project, Yorkview Elementary School”, June 9, 2021, Pinchin File No. 286531.016

3.3 Inaccessible Locations

The following locations were not accessible during the assessment:

Location Number	Location Name	Reason
1032	Gym, above ceiling tiles	No access due to height

4.0 FINDINGS

Any quantities listed in this report or data tables are estimated based on visual approximations only and are subject to variation.

Photos of selected hazardous building materials are shown in the Photograph Report in Appendix VII.

4.1 Asbestos

The following table summarizes the materials evaluated for asbestos in the assessed area. For details on approximate quantities, condition, friability, accessibility, and locations of hazardous building materials; refer to the Hazardous Material Summary / Sample Log and All Data Report in Appendices V and VI.

Not all materials listed in the HMIS data reports are present within the assessed area. Refer to the findings below for materials that are present and specific to this project.



Sample Number	Material Description	Type of Asbestos	Hazard	Total Quantity Present	Material Specific Notes
S0013 ABC	Floor Mastic	Chrysotile	Yes	2500 SF	
S0015 ABC	Floor Vinyl Floor Tile 12x12 off white with grey fleck	None Detected	No		
S0028 ABCDEFGH	Other, Wall Paint	None Detected	No		
S0029 ABCD	Wall Plaster Smooth, Whiteboard	None Detected	No		
S0030 ABCD	Wall Texture Coat	None Detected	No		
S0039 ABC	Wall Cement Product	Chrysotile	Yes	1050 SF	
S0040 ABC	Other Caulking Grey	None Detected	No		
S0041 ABC	Wall Paint Metal	None Detected	No		
S0042 ABC	Other Caulking white, under silicone	None Detected	No		
S0043 ABC	Wall Masonry yellow fireproof brick	None Detected	No		
S0044 A	Dust open bag of Canada Talc Industries Ltd. (Talfil 325)	None Detected	No		
S0045 ABC	Wall Caulking	None Detected	No		
V9500	Ceiling Acoustic Tile Cement Product 24x24 perforated	Presumed Asbestos	Yes	2500 SF	1

Material Specific Notes:

1. Asbestos-containing pipe insulations may be present above ceiling tiles in the Gym (Location ID 1032).

General Notes:

Materials identified as Sample Number V9500 were observed to be present but were not sampled and are presumed to contain asbestos based on historical known use of asbestos. Sampling of these materials may be completed prior to disturbance.

4.1.1 Excluded Asbestos Materials

The following is a list of materials which may contain asbestos and were excluded from the assessment. These materials are presumed to contain asbestos until otherwise proven to be non-asbestos by sampling and analysis:

- Roofing felts and tar, mastics
- Floor levelling compound
- Electrical components
- Mechanical packing, ropes, and gaskets
- Vermiculite
- Adhesives and duct mastics
- Fire resistant doors
- Vibration dampers on HVAC equipment
- Terrazzo
- Ropes and gaskets in cast-iron bell and spigot joints
- Sealants on pipe threads

4.2 Lead

Refer to the Hazardous Material Summary / Sample Log and All Data Report in Appendices V and VI for details on locations, condition and approximate quantities on paints sampled and their locations.

The following table summarizes the analytical results of paints sampled.

Sample Number	Material Description	Concentration	Confirmed Hazard	Material Specific Notes
V0002	Structure Steel red, assumed present under beige paint (no access)	0.28%	Yes	
L0003	Structure Concrete (precast) Tan paint on concrete block wall	0.019%	Yes	
L0017	Wall Concrete Block White	0.098%	Yes	
L0018	Wall Plaster White	0.00052%	No	
L0019	Wall Metal White	0.083%	Yes	
L0020	Other Metal black, on hand rails	0.22%	Yes	

General Notes:

Results above 0.1% (1,000 mg/kg) are considered lead-containing, and over 0.5% (5,000 mg/kg) are considered lead-based.

Results less than or equal to 0.1% (1,000 mg/kg), but equal to or greater than 0.009% (90 mg/kg), are considered low-level lead paints or surface coatings in accordance with the EACC guideline.

Paints containing lead less than 0.009% (90 mg/kg) are assumed to be insignificant relating to potential exposure from construction disturbance.

4.2.1 Lead Products and Applications

Refer to the Hazardous Material Summary / Sample Log and All Data Report in Appendices V and VI for details on lead-products including their locations and quantities.

Sample Number	Material Description	Confirmed Hazard	Total Quantity Present	Material Specific Notes
V9500	Batteries In Emer. Lights	Yes	6EA	

General Notes:

Items identified as Sample Number V9500 were observed to be present but could not be definitively determined to contain lead (e.g., inaccessible batteries).

4.2.2 Excluded Lead Materials

Lead may be present in a number of materials which were not assessed and/or sampled. The following materials, where found, should be considered to contain lead.

- Electrical components, including wiring connectors, grounding conductors, and solder
- Solder on pipe connections

4.3 Silica

Crystalline silica is a presumed component of the following materials:

- Poured and pre-cast concrete
- Masonry and mortar
- Plaster
- Terrazzo
- Talc

4.4 Mercury

Refer to the Hazardous Material Summary / Sample Log and All Data Report in Appendices V and VI for details on mercury-containing products including their locations and quantities.

Sample Number	Material Description	Confirmed Hazard	Material Specific Notes
V9500	Light Fixture	Yes	
V0000	Light Fixture	No	

General Notes:

Items identified as Sample Number V9500 were observed to be present but could not be definitively determined to contain mercury (e.g., inaccessible lamps and thermostats).

Items identified as Sample Number V0000 are items that historically may have contained mercury; however, have been visually identified as non-mercury types (e.g., LED lamps, digital or electric thermostats).

4.1 Polychlorinated Biphenyls

PCB products were not found during the assessment.

4.1.1 Excluded PCB Materials

PCBs are known to be present in several materials and equipment which were not assessed or sampled. The following materials, where found, should be presumed to contain PCBs until sampling proves otherwise.

- Capacitors within or associated with electrical equipment

4.2 Mould and Water Damage

Visible mould growth and water damage was not found during the assessment.

5.0 METHODOLOGY

For the purpose of the assessment and this report, hazardous building materials are defined as follows:

- Asbestos
- Lead
- Silica
- Mercury
- Polychlorinated Biphenyls (PCBs)
- Mould and Water Damage



Arsenic, acrylonitrile, benzene, coke oven emissions, ethylene oxide, isocyanates and vinyl chloride monomer are not typically found in building materials in a composition/state that is hazardous and were not included in this assessment.

Pinchin conducted a room-by-room assessment to identify the hazardous building materials as defined in the scope.

The assessment was performed to establish the type of specified hazardous building materials, locations and approximate quantities incorporated in the structure(s) and its finishes.

Demolition of exterior building finishes, masonry walls (chases, shafts etc.), and structural surrounds was not conducted.

For further details on the methodology including test methods and evaluation criteria, refer to Appendix III.

6.0 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Asbestos on Construction Projects and in Buildings and Repair Operations, Ontario Regulation 278/05.
2. Designated Substances, Ontario Regulation 490/09.
3. Lead on Construction Projects, Ministry of Labour Guidance Document.
4. The Environmental Abatement Council of Canada (EACC) Lead Guideline for Construction, Renovation, Maintenance or Repair.
5. Ministry of the Environment Regulation, R.R.O. 1990 Reg. 347 as amended.
6. Silica on Construction Projects, Ministry of Labour Guidance Document.
7. Alert – Mould in Workplace Buildings, Ontario Ministry of Labour.
8. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
9. Surface Coating Materials Regulations, SOR/2016-193, Canada Consumer Product Safety Act.
10. Consolidated Transportation of Dangerous Goods Regulations, including Amendment SOR/2019-101, Transportation of Dangerous Goods Act.

7.0 LIMITATIONS

This work was performed subject to the Terms and Limitations presented or referenced in the proposal for this project.



Information provided by Pinchin is intended for Client use only. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law. Any use by a third party of reports or documents authored by Pinchin or any reliance by a third party on or decisions made by a third party based on the findings described in said documents, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted. No other warranties are implied or expressed.

8.0 CLOSURE

Contact the Project Manager, Jessica Cozzitorto at jcozzitorto@pinchin.com should you have any questions.

Sincerely,

Pinchin Ltd.

Prepared by:

A handwritten signature in blue ink, appearing to read "Emily Balfour".

Emily Balfour
Project Manager

Project Managed by:

A handwritten signature in blue ink, appearing to read "Jessica Cozzitorto".

Jessica Cozzitorto, C. Tech
Team Leader

Reviewed by:

A handwritten signature in blue ink, appearing to read "Leslie Heywood".

Leslie Heywood, BEng Mgt
Senior Project Manager



Hazardous Building Materials Assessment (Preconstruction)

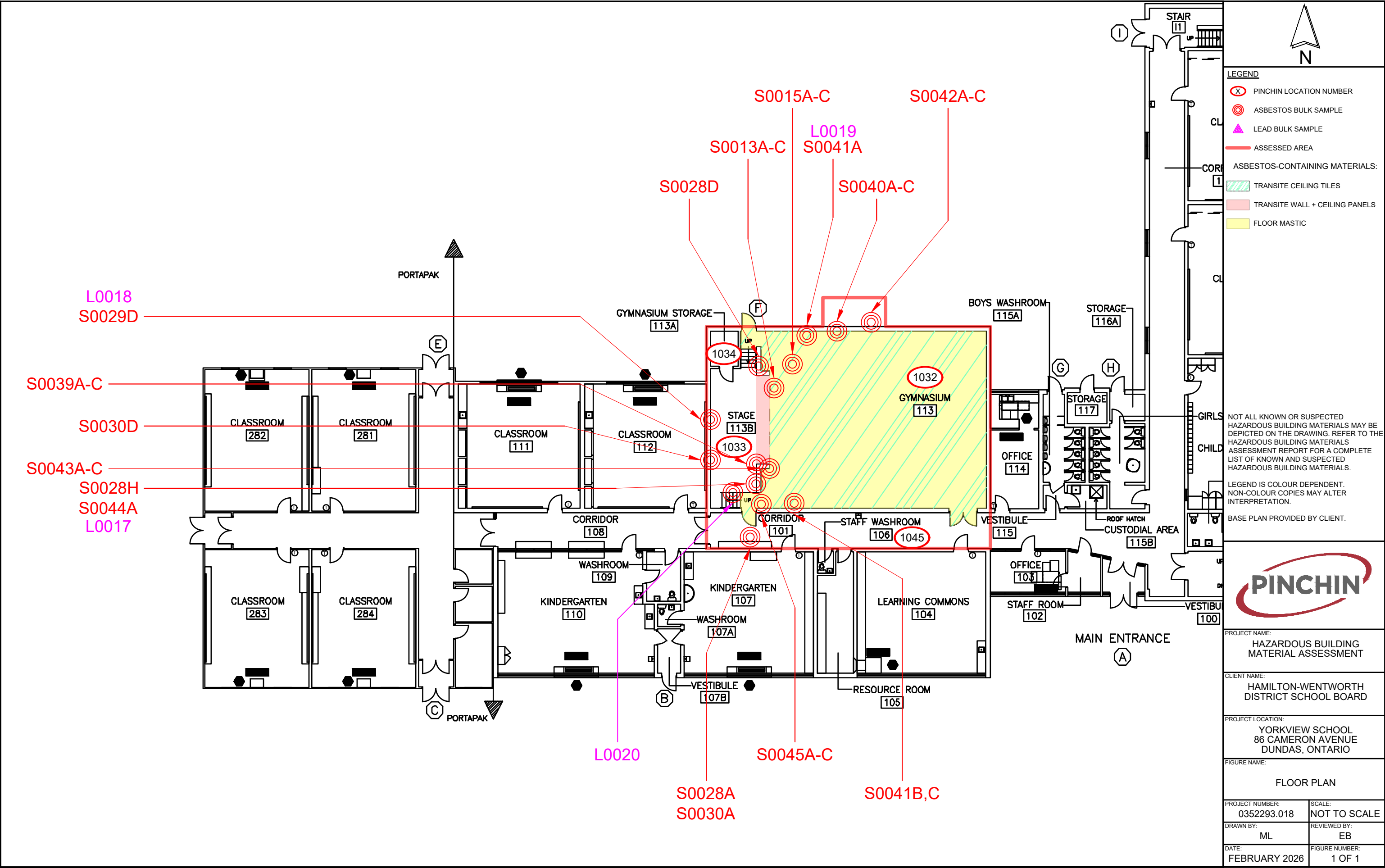
Yorkview Elementary School, 86 Cameron Ave, Dundas, ON
Hamilton-Wentworth District School Board

February 5, 2026
Pinchin File: 0352293.018

Encl:	APPENDIX I	Drawings
	APPENDIX II-A	Asbestos Analytical Certificates
	APPENDIX II-B	Lead Analytical Certificates
	APPENDIX III	Methodology
	APPENDIX IV	Location Summary Report
	APPENDIX V	Hazardous Materials Summary Report / Sample Log
	APPENDIX VI	All Data Report
	APPENDIX VII	Photographs

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Template: Master Template HBMA PreConstruction, HMIS, HAZ, August 15, 2024

APPENDIX I
Drawings



APPENDIX II-A
Asbestos Analytical Certificates



Your Project #: 0352293.018
Your C.O.C. #: N/A

Attention: Jessica Cozzitorto

Pinchin Ltd
151 York Boulevard
Suite 200
Hamilton, ON
CANADA L8R 3M2

Report Date: 2026/01/29
Report #: R8687960
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C607451

Received: 2026/01/23, 14:20

Sample Matrix: Solid
Samples Received: 22

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Asbestos by PLM - 0.5 RDL (1)	22	N/A	2026/01/29	COR3SOP-00002	EPA 600R-93/116

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Bureau Veritas' Asbestos Laboratory is accredited by NVLAP for bulk asbestos analysis by polarized light microscopy, NVLAP Code 600136-0.

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Bureau Veritas' scope of accreditation includes EPA -- 40 CFR Appendix E to Subpart E of Part 763, "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" and EPA-600/R-93/116: "Method for the Determination of Asbestos in Bulk Building Materials".

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) P.O.B. - Percent of Bulk

When Asbestos data is reported with other data, this report contains data that are not covered by the NVLAP accreditation.



Your Project #: 0352293.018
Your C.O.C. #: N/A

Attention: Jessica Cozzitorto

Pinchin Ltd
151 York Boulevard
Suite 200
Hamilton, ON
CANADA L8R 3M2

Report Date: 2026/01/29
Report #: R8687960
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C607451

Received: 2026/01/23, 14:20

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Elora Di Bratto, Project Manager
Email: Elora.Di-Bratto@bureauveritas.com
Phone# (905) 817-5700

=====

This report has been generated and distributed using a secure automated process.

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



Bureau Veritas Job #: C607451
Report Date: 2026/01/29

Pinchin Ltd
Client Project #: 0352293.018
Sampler Initials: EB

Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0028H WALL,PAINT,LOC:1033,STAGE					
Bureau Veritas ID: AZHB77		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Non-homogeneous white/grey paint/cementitious material	Not Detected		Non-Fibrous

S0029D WALL,PLASTER,WHITEBOARD,LOC:1033,STAGE					
Bureau Veritas ID: AZHB78		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	60	Homogeneous white plaster	Not Detected		Non-Fibrous
Layer 2	40	Homogeneous grey plaster	Not Detected		Non-Fibrous

S0030D WALL,TEXTURE COAT,LOC:1033,STAGE					
Bureau Veritas ID: AZHB79		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey texture coat	Not Detected		Non-Fibrous

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd



Bureau Veritas Job #: C607451
Report Date: 2026/01/29

Pinchin Ltd
Client Project #: 0352293.018
Sampler Initials: EB

Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0039A WALL,COLUMN,CEMENT PRODUCT,LOC:1033,STAGE					
Bureau Veritas ID: AZHB80		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos		Particulate
Layer 1	100	Homogeneous grey transite	Chrysotile	10%	Non-Fibrous

S0039B WALL,COLUMN,CEMENT PRODUCT,LOC:1033,STAGE					
Bureau Veritas ID:		AZHB81		Date Analyzed:	2026/01/29
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1			N/A		
	Comment: Not Analyzed - Positive Stop				

S0039C WALL,COLUMN,CEMENT PRODUCT,LOC:1033,STAGE					
Bureau Veritas ID:		AZHB82		Date Analyzed:	2026/01/29
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1			N/A		
	Comment: Not Analyzed - Positive Stop				

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd



Bureau Veritas Job #: C607451
Report Date: 2026/01/29

Pinchin Ltd
Client Project #: 0352293.018
Sampler Initials: EB

Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0040A WINDOW,CAULKING,GREY,LOC:1032,GYM					
Bureau Veritas ID: AZHB83		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey caulking	Not Detected		Non-Fibrous

S0040B WINDOW,CAULKING,GREY,LOC:1032,GYM					
Bureau Veritas ID: AZHB84		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey caulking	Not Detected		Non-Fibrous

S0040C WINDOW,CAULKING,GREY,LOC:1032,GYM					
Bureau Veritas ID: AZHB85		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey caulking	Not Detected		Non-Fibrous

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd



Bureau Veritas Job #: C607451
Report Date: 2026/01/29

Pinchin Ltd
Client Project #: 0352293.018
Sampler Initials: EB

Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0041A WALL,COLUMN,PAINT,METAL,LOC:1032,GYM Bureau Veritas ID: AZHB86 Date Analyzed: 2026/01/29					
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous white/grey paint	Not Detected		Non-Fibrous

S0041B WALL,COLUMN,PAINT,METAL,LOC:1032,GYM Bureau Veritas ID: AZHB87 Date Analyzed: 2026/01/29					
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous white/grey paint	Not Detected		Non-Fibrous

S0041C WALL,COLUMN,PAINT,METAL,LOC:1032,GYM Bureau Veritas ID: AZHB88 Date Analyzed: 2026/01/29					
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous white/grey paint	Not Detected		Non-Fibrous

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd



Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0042A WINDOW,CAULKING,WHITE, UNDER SILICONE,LOC:1032,GYM					
Bureau Veritas ID: AZHB89		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous white caulking	Not Detected		Non-Fibrous

S0042B WINDOW,CAULKING,WHITE, UNDER SILICONE,LOC:1032,GYM					
Bureau Veritas ID: AZHB90		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous white caulking	Not Detected		Non-Fibrous

S0042C WINDOW,CAULKING,WHITE, UNDER SILICONE,LOC:1032,GYM					
Bureau Veritas ID: AZHB91		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous white caulking	Not Detected		Non-Fibrous

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, “<0.50%”. “Not Detected” indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd



Bureau Veritas Job #: C607451
Report Date: 2026/01/29

Pinchin Ltd
Client Project #: 0352293.018
Sampler Initials: EB

Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0043A WALL,MASONRY,YELLOW FIREPROOF BRICK,LOC:1033,STAGE					
Bureau Veritas ID: AZHB92		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous yellow refractory brick	Not Detected		Non-Fibrous

S0043B WALL,MASONRY,YELLOW FIREPROOF BRICK,LOC:1033,STAGE					
Bureau Veritas ID: AZHB93		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous yellow refractory brick	Not Detected		Non-Fibrous

S0043C WALL,MASONRY,YELLOW FIREPROOF BRICK,LOC:1033,STAGE					
Bureau Veritas ID: AZHB94		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous yellow refractory brick	Not Detected		Non-Fibrous

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd



Bureau Veritas Job #: C607451
Report Date: 2026/01/29

Pinchin Ltd
Client Project #: 0352293.018
Sampler Initials: EB

Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0044A DUST, OPEN BAG OF CANADA TALC INDUSTRIES LTD. TALFIL 325, LOC:1033, STAGE					
Bureau Veritas ID: AZHB95		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous white powdery material	Not Detected		Non-Fibrous

S0045A WALL, EXPANSION JOINT, CAULKING, LOC:1032, GYM *ONLY ANALYZE CAULKING*					
Bureau Veritas ID: AZHB96		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey caulking	Not Detected		Non-Fibrous

S0045B WALL, EXPANSION JOINT, CAULKING, LOC:1032, GYM *ONLY ANALYZE CAULKING*					
Bureau Veritas ID: AZHB97		Date Analyzed: 2026/01/29			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey caulking	Not Detected		Non-Fibrous

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, “<0.50%”. “Not Detected” indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd



Bureau Veritas Job #: C607451
Report Date: 2026/01/29

Pinchin Ltd
Client Project #: 0352293.018
Sampler Initials: EB

Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

S0045C WALL,EXPANSION JOINT,CAULKING,LOC:1032,GYM *ONLY ANALYZE CAULKING*					
Bureau Veritas ID:		AZHB98	Date Analyzed: 2026/01/29		
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous grey caulking	Not Detected		Non-Fibrous

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, “<0.50%”. “Not Detected” indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd



**BUREAU
VERITAS**

Bureau Veritas Job #: C607451

Report Date: 2026/01/29

Pinchin Ltd

Client Project #: 0352293.018

Sampler Initials: EB

GENERAL COMMENTS

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C607451

Report Date: 2026/01/29

Pinchin Ltd

Client Project #: 0352293.018

Sampler Initials: EB

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Dina Yousif, Analyst 2

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

C607451

2026/01/23 14:20

Pinchin Ltd. - Asbestos Laboratory
Internal Asbestos Bulk Sample Chain of Custody



NONT-2026-01-3261

Special Instructions:

Client Name:		Project Address:	ON
Portfolio/Building No:	Yorkview	Pinchin File:	0352293.018
Submitted by:	Emily Balfour	Email:	ebalfour@pinchin.com
CC Email:	Jessica Cozzitorto	CC Email:	jcozzitorto@pinchin.com
Date Submitted:	January 22 2026	Required by:	January 29 2026
# of Samples:	22	Priority:	5 Day Turnaround
Year of Building Construction (Mandatory, Years ONLY):	1954		
Do NOT Stop on Positive (Sample Numbers):			
Pinchin Group Company (Mandatory Field):	Pinchin		
HMIS2 Building Reference #:	159769/202602096091022		
To be Completed by Lab Personnel Only:			
Lab Reference #:	Time: 14:20 Date: 2026/01/23		24 hour clock
Received by:	JAN 23 2026 Month Day Year		
Name(s) of Analyst(s):	G. Balfour, J. Cozzitorto		
Sample Prefix	Sample No.	Sample Suffix	Sample Description/Location (Mandatory)
S	0028	H	Wall, Paint, Loc: 1033, Stage
S	0029	D	Wall, Plaster, Whiteboard, Loc: 1033, Stage
S	0030	D	Wall, Texture Coat, Loc: 1033, Stage
S	0039	A	Wall, Column, Cement Product, Loc: 1033, Stage
S	0039	B	Wall, Column, Cement Product, Loc: 1033, Stage
S	0039	C	Wall, Column, Cement Product, Loc: 1033, Stage
S	0040	A	Window, Caulking, Grey, Loc: 1032, Gym
S	0040	B	Window, Caulking, Grey, Loc: 1032, Gym

Sample Prefix	Sample No.	Sample Suffix	Sample Description/Location (Mandatory)
S	0040	C	Window,Caulking,Grey,Loc:1032,Gym
S	0041	A	Wall,Column,Paint,Metal,Loc:1032,Gym
S	0041	B	Wall,Column,Paint,Metal,Loc:1032,Gym
S	0041	C	Wall,Column,Paint,Metal,Loc:1032,Gym
S	0042	A	Window,Caulking,White, Under Silicone,Loc:1032,Gym
S	0042	B	Window,Caulking,White, Under Silicone,Loc:1032,Gym
S	0042	C	Window,Caulking,White, Under Silicone,Loc:1032,Gym
S	0043	A	Wall,Masonry, Yellow Fireproof Brick,Loc:1033,Stage
S	0043	B	Wall,Masonry, Yellow Fireproof Brick,Loc:1033,Stage
S	0043	C	Wall,Masonry, Yellow Fireproof Brick,Loc:1033,Stage
S	0044	A	Dust,Open Bag Of Canada Talc Industries Ltd. Talfil 325,Loc:1033,Stage
S	0045	A	Wall,Expansion Joint,Caulking,Loc:1032,Gym *only analyze caulking*
S	0045	B	Wall,Expansion Joint,Caulking,Loc:1032,Gym *only analyze caulking*
S	0045	C	Wall,Expansion Joint,Caulking,Loc:1032,Gym *only analyze caulking*



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
App.E



Customer: Pinchin Ltd.
6-875 Main St West
Suite 200
Hamilton, Ontario L8S 4P9
Project: Yorkview Elementary School

Attn: Evan Peplinski

Lab Order ID: 71965970
Analysis ID: 71965970_PLM
Date Received: 5/20/2021
Date Reported: 5/21/2021

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0001A - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Grey Fleck, Loc: 1055, Classroom	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_1	tile				Dissolved
S0001A - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Grey Fleck, Loc: 1055, Classroom	3% Chrysotile		97% Other	Black Non Fibrous Homogeneous
71965970PLM_52	mastic				Dissolved
S0001B - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Grey Fleck, Loc: 1043, Classroom	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_2	tile				Dissolved
S0001B - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Grey Fleck, Loc: 1043, Classroom	Not Analyzed			
71965970PLM_53	mastic				
S0001C - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Grey Fleck, Loc: 1055, Classroom	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_3	tile-ashed				Ashed
S0001C - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Grey Fleck, Loc: 1055, Classroom	Not Analyzed			
71965970PLM_54	mastic				
S0005A - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Light Grey With White Fleck, Loc: 1030, Office	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_4	tile				Dissolved
S0005A - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Light Grey With White Fleck, Loc: 1030, Office	3% Chrysotile		97% Other	Black Non Fibrous Homogeneous
71965970PLM_55	mastic				Dissolved

Disclaimer: Due to the nature of the EPA 600 method, asbestos may not be detected in samples containing low levels of asbestos. We strongly recommend that analysis of floor tiles, vermiculite, and/or heterogeneous soil samples be conducted by TEM for confirmation of "None Detected" by PLM. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAL. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. government. Analytical uncertainty available upon request. Scientific Analytical Institute participates in the NVLAP Proficiency Testing program. Unless otherwise noted blank sample correction was not performed. Estimated MDL is 0.1%.

Yanelis Delgado (99)

Analyst

Approved Signatory



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
App.E



Customer: Pinchin Ltd.
6-875 Main St West
Suite 200
Hamilton, Ontario L8S 4P9
Project: Yorkview Elementary School

Attn: Evan Peplinski

Lab Order ID: 71965970
Analysis ID: 71965970_PLM
Date Received: 5/20/2021
Date Reported: 5/21/2021

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0005B - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Light Grey With White Fleck, Loc: 1030, Office	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_5	tile				Dissolved
S0005B - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Light Grey With White Fleck, Loc: 1030, Office	Not Analyzed			
71965970PLM_56	mastic				
S0005C - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Light Grey With White Fleck, Loc: 1060, Portopa	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_6	tile-ashed				Ashed
S0005C - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Light Grey With White Fleck, Loc: 1060, Portopa	Not Analyzed			
71965970PLM_57	mastic				
S0007A - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Grey With Dark Fleck, Loc: 1053, Classroom	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_7	tile				Dissolved
S0007A - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Grey With Dark Fleck, Loc: 1053, Classroom	None Detected		100% Other	Yellow Non Fibrous Homogeneous
71965970PLM_58	mastic				Dissolved
S0007B - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Grey With Dark Fleck, Loc: 1053, Classroom	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_8	tile				Dissolved
S0007B - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Grey With Dark Fleck, Loc: 1053, Classroom	None Detected		100% Other	Yellow Non Fibrous Homogeneous
71965970PLM_59	mastic				Dissolved

Disclaimer: Due to the nature of the EPA 600 method, asbestos may not be detected in samples containing low levels of asbestos. We strongly recommend that analysis of floor tiles, vermiculite, and/or heterogeneous soil samples be conducted by TEM for confirmation of "None Detected" by PLM. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAL. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. government. Analytical uncertainty available upon request. Scientific Analytical Institute participates in the NVLAP Proficiency Testing program. Unless otherwise noted blank sample correction was not performed. Estimated MDL is 0.1%.

Yanelis Delgado (99)

Analyst

Approved Signatory



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
App.E



Customer: Pinchin Ltd.
6-875 Main St West
Suite 200
Hamilton, Ontario L8S 4P9
Project: Yorkview Elementary School

Attn: Evan Peplinski

Lab Order ID: 71965970
Analysis ID: 71965970_PLM
Date Received: 5/20/2021
Date Reported: 5/21/2021

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0007C - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Grey With Dark Fleck, Loc: 1044, Staff Room	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_9	tile-ashed				Ashed
S0007C - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Grey With Dark Fleck, Loc: 1044, Staff Room	2% Chrysotile		98% Other	Black Non Fibrous Homogeneous
71965970PLM_60	mastic				Dissolved
S0008A	Paper, Building Paper On Exterior Wall, Loc: 1028, Vestibule	None Detected	80% Cellulose	20% Other	Brown, Black Fibrous Heterogeneous
71965970PLM_10					Ashed
S0008B	Paper, Building Paper On Exterior Wall, Loc: 1028, Vestibule	None Detected	80% Cellulose	20% Other	Brown, Black Fibrous Heterogeneous
71965970PLM_11					Ashed
S0008C	Paper, Building Paper On Exterior Wall, Loc: 1028, Vestibule	None Detected	80% Cellulose	20% Other	Brown, Black Fibrous Heterogeneous
71965970PLM_12					Ashed
S0009A - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Cream With Grey Fleck, Loc: 1031, Principal	None Detected		100% Other	Cream Non Fibrous Homogeneous
71965970PLM_13	tile				Dissolved
S0009A - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Cream With Grey Fleck, Loc: 1031, Principal	3% Chrysotile		97% Other	Black Non Fibrous Homogeneous
71965970PLM_61	mastic				Dissolved
S0009B - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Cream With Grey Fleck, Loc: 1031, Principal	None Detected		100% Other	Cream Non Fibrous Homogeneous
71965970PLM_14	tile				Dissolved

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Yanelis Delgado (99)

Analyst

Approved Signatory



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
App.E



Customer: Pinchin Ltd.
6-875 Main St West
Suite 200
Hamilton, Ontario L8S 4P9
Project: Yorkview Elementary School

Attn: Evan Peplinski

Lab Order ID: 71965970
Analysis ID: 71965970_PLM
Date Received: 5/20/2021
Date Reported: 5/21/2021

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0009B - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Cream With Grey Fleck, Loc: 1031, Principal	Not Analyzed			
71965970PLM_62	mastic				
S0009C - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Cream With Grey Fleck, Loc: 1031, Principal	None Detected		100% Other	Cream Non Fibrous Homogeneous
71965970PLM_15	tile-ashed				Ashed
S0009C - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Cream With Grey Fleck, Loc: 1031, Principal	Not Analyzed			
71965970PLM_63	mastic				
S0011A - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Brown Fleck, Loc: 1042, Resource Roo	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_16	tile 1				Dissolved
S0011A - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Brown Fleck, Loc: 1042, Resource Roo	None Detected		100% Other	Black Non Fibrous Homogeneous
71965970PLM_64	mastic 1				Dissolved
S0011A - C	Floor, Vinyl Floor Tile And Mastic, 12x12 Brown Fleck, Loc: 1042, Resource Roo	None Detected		100% Other	White Non Fibrous Homogeneous
71965970PLM_65	tile 2				Dissolved
S0011A - D	Floor, Vinyl Floor Tile And Mastic, 12x12 Brown Fleck, Loc: 1042, Resource Roo	None Detected		100% Other	Black Non Fibrous Homogeneous
71965970PLM_66	mastic 2				Dissolved
S0011B - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Brown Fleck, Loc: 1042, Resource Roo	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_17	tile 1				Dissolved

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Yanelis Delgado (99)

Analyst

Approved Signatory



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
App.E



Customer: Pinchin Ltd.
6-875 Main St West
Suite 200
Hamilton, Ontario L8S 4P9
Project: Yorkview Elementary School

Attn: Evan Peplinski

Lab Order ID: 71965970
Analysis ID: 71965970_PLM
Date Received: 5/20/2021
Date Reported: 5/21/2021

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0011B - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Brown Fleck, Loc: 1042, Resource Roo	None Detected		100% Other	Black Non Fibrous Homogeneous
71965970PLM_67	mastic 1				Dissolved
S0011B - C	Floor, Vinyl Floor Tile And Mastic, 12x12 Brown Fleck, Loc: 1042, Resource Roo	None Detected		100% Other	White Non Fibrous Homogeneous
71965970PLM_68	tile 2				Dissolved
S0011B - D	Floor, Vinyl Floor Tile And Mastic, 12x12 Brown Fleck, Loc: 1042, Resource Roo	None Detected		100% Other	Black Non Fibrous Homogeneous
71965970PLM_69	mastic 2				Dissolved
S0011C - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Brown Fleck, Loc: 1042, Resource Roo	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_18	tile 1 - ashed				Ashed
S0011C - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Brown Fleck, Loc: 1042, Resource Roo	None Detected		100% Other	Black Non Fibrous Homogeneous
71965970PLM_70	mastic 1				Dissolved
S0011C - C	Floor, Vinyl Floor Tile And Mastic, 12x12 Brown Fleck, Loc: 1042, Resource Roo	None Detected		100% Other	White Non Fibrous Homogeneous
71965970PLM_71	tile 2 - ashed				Ashed
S0011C - D	Floor, Vinyl Floor Tile And Mastic, 12x12 Brown Fleck, Loc: 1042, Resource Roo	None Detected		100% Other	Black Non Fibrous Homogeneous
71965970PLM_72	mastic 2				Dissolved
S0012A - A	Floor, Vinyl Sheet Flooring, Grey, Loc: 1040, Kindergarten	None Detected	80% Cellulose	20% Other	Brown Fibrous Homogeneous
71965970PLM_19	backing				Ashed

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Yanelis Delgado (99)

Analyst

Approved Signatory



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
App.E



Customer: Pinchin Ltd.
6-875 Main St West
Suite 200
Hamilton, Ontario L8S 4P9
Project: Yorkview Elementary School

Attn: Evan Peplinski

Lab Order ID: 71965970
Analysis ID: 71965970_PLM
Date Received: 5/20/2021
Date Reported: 5/21/2021

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0012A - B	Floor, Vinyl Sheet Flooring, Grey, Loc: 1040, Kind ergarten	None Detected		100% Other	Gray, Yellow Non Fibrous Heterogeneous
71965970PLM_73	leveling compound/mastic				Dissolved, Crushed
S0012B - A	Floor, Vinyl Sheet Flooring, Grey, Loc: 1040, Kind ergarten	None Detected	80% Cellulose	20% Other	Brown Fibrous Homogeneous
71965970PLM_20	backing				Ashed
S0012B - B	Floor, Vinyl Sheet Flooring, Grey, Loc: 1040, Kind ergarten	None Detected		100% Other	Gray, Yellow Non Fibrous Heterogeneous
71965970PLM_74	leveling compound/mastic				Dissolved, Crushed
S0012C - A	Floor, Vinyl Sheet Flooring, Grey, Loc: 1040, Kind ergarten	None Detected	80% Cellulose	20% Other	Brown Fibrous Homogeneous
71965970PLM_21	backing				Ashed
S0012C - B	Floor, Vinyl Sheet Flooring, Grey, Loc: 1040, Kind ergarten	None Detected		100% Other	Gray, Yellow Non Fibrous Heterogeneous
71965970PLM_75	leveling compound/mastic				Dissolved, Crushed
S0013A - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Teal, Loc: 1032, Gym	None Detected		100% Other	Blue Non Fibrous Homogeneous
71965970PLM_22	tile				Dissolved
S0013A - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Teal, Loc: 1032, Gym	None Detected		100% Other	Tan Non Fibrous Homogeneous
71965970PLM_76	mastic 1				Dissolved
S0013A - C	Floor, Vinyl Floor Tile And Mastic, 12x12 Teal, Loc: 1032, Gym	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_77	leveling compound				Crushed

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Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
App.E



Customer: Pinchin Ltd.
6-875 Main St West
Suite 200
Hamilton, Ontario L8S 4P9
Project: Yorkview Elementary School

Attn: Evan Peplinski

Lab Order ID: 71965970
Analysis ID: 71965970_PLM
Date Received: 5/20/2021
Date Reported: 5/21/2021

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0013A - D	Floor, Vinyl Floor Tile And Mastic, 12x12 Teal, Loc: 1032, Gym	5% Chrysotile		95% Other	Black Non Fibrous Homogeneous
71965970PLM_78	mastic 2				Dissolved
S0013B - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Teal, Loc: 1032, Gym	None Detected		100% Other	Blue Non Fibrous Homogeneous
71965970PLM_23	tile				Dissolved
S0013B - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Teal, Loc: 1032, Gym	None Detected		100% Other	Tan Non Fibrous Homogeneous
71965970PLM_79	mastic 1				Dissolved
S0013B - C	Floor, Vinyl Floor Tile And Mastic, 12x12 Teal, Loc: 1032, Gym	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_80	leveling compound				Crushed
S0013B - D	Floor, Vinyl Floor Tile And Mastic, 12x12 Teal, Loc: 1032, Gym	Not Analyzed			
71965970PLM_81	mastic 2				
S0013C - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Teal, Loc: 1032, Gym	None Detected		100% Other	Blue Non Fibrous Homogeneous
71965970PLM_24	tile - ashed				Ashed
S0013C - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Teal, Loc: 1032, Gym	None Detected		100% Other	Tan Non Fibrous Homogeneous
71965970PLM_82	mastic 1				Dissolved
S0013C - C	Floor, Vinyl Floor Tile And Mastic, 12x12 Teal, Loc: 1032, Gym	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_83	leveling compound				Crushed

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Analyst

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Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
App.E



Customer: Pinchin Ltd.
6-875 Main St West
Suite 200
Hamilton, Ontario L8S 4P9
Project: Yorkview Elementary School

Attn: Evan Peplinski

Lab Order ID: 71965970
Analysis ID: 71965970_PLM
Date Received: 5/20/2021
Date Reported: 5/21/2021

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0013C - D	Floor, Vinyl Floor Tile And Mastic, 12x12 Teal, Loc: 1032, Gym	Not Analyzed			
71965970PLM_84	mastic 2				
S0015A - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Off White With Grey Fleck, Loc: 1032, Gym	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_25	tile				Dissolved
S0015A - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Off White With Grey Fleck, Loc: 1032, Gym	None Detected		100% Other	Yellow Non Fibrous Homogeneous
71965970PLM_85	mastic				Dissolved
S0015B - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Off White With Grey Fleck, Loc: 1032, Gym	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_26	tile				Dissolved
S0015B - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Off White With Grey Fleck, Loc: 1032, Gym	None Detected		100% Other	Yellow Non Fibrous Homogeneous
71965970PLM_86	mastic				Dissolved
S0015C - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Off White With Grey Fleck, Loc: 1032, Gym	None Detected		100% Other	Gray Non Fibrous Homogeneous
71965970PLM_27	tile-ashed				Ashed
S0015C - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Off White With Grey Fleck, Loc: 1032, Gym	None Detected		100% Other	Yellow Non Fibrous Homogeneous
71965970PLM_87	mastic				Dissolved
S0017A - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Blue, Loc: 1039, Classroom	None Detected		100% Other	Blue Non Fibrous Homogeneous
71965970PLM_28	tile				Dissolved

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Analyst

Approved Signatory



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
App.E



Customer: Pinchin Ltd.
6-875 Main St West
Suite 200
Hamilton, Ontario L8S 4P9
Project: Yorkview Elementary School

Attn: Evan Peplinski

Lab Order ID: 71965970
Analysis ID: 71965970_PLM
Date Received: 5/20/2021
Date Reported: 5/21/2021

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0017A - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Blue, Loc: 1039, Classroom	3% Chrysotile		97% Other	Black Non Fibrous Homogeneous
71965970PLM_88	mastic				Dissolved
S0017B - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Blue, Loc: 1039, Classroom	None Detected		100% Other	Blue Non Fibrous Homogeneous
71965970PLM_29	tile				Dissolved
S0017B - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Blue, Loc: 1039, Classroom	Not Analyzed			
71965970PLM_89	mastic				
S0017C - A	Floor, Vinyl Floor Tile And Mastic, 12x12 Blue, Loc: 1039, Classroom	None Detected		100% Other	Blue Non Fibrous Homogeneous
71965970PLM_30	tile-ashed				Ashed
S0017C - B	Floor, Vinyl Floor Tile And Mastic, 12x12 Blue, Loc: 1039, Classroom	Not Analyzed			
71965970PLM_90	mastic				
S0018A - A	Floor, Vinyl Floor Tile And Mastic, 9x9 Red And Brown, Loc: 1068, Resource Ro	5% Chrysotile		95% Other	Red Non Fibrous Homogeneous
71965970PLM_31	tile 1				Dissolved
S0018A - B	Floor, Vinyl Floor Tile And Mastic, 9x9 Red And Brown, Loc: 1068, Resource Ro	None Detected		100% Other	Yellow Non Fibrous Homogeneous
71965970PLM_91	mastic 1				Dissolved
S0018A - C	Floor, Vinyl Floor Tile And Mastic, 9x9 Red And Brown, Loc: 1068, Resource Ro	5% Chrysotile		95% Other	Brown Non Fibrous Homogeneous
71965970PLM_92	tile 2				Dissolved

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Yanelis Delgado (99)

Analyst

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Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
App.E



Customer: Pinchin Ltd.
6-875 Main St West
Suite 200
Hamilton, Ontario L8S 4P9
Project: Yorkview Elementary School

Attn: Evan Peplinski

Lab Order ID: 71965970
Analysis ID: 71965970_PLM
Date Received: 5/20/2021
Date Reported: 5/21/2021

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0018A - D	Floor, Vinyl Floor Tile And Mastic, 9x9 Red And Brown, Loc: 1068, Resource Ro	None Detected		100% Other	Yellow Non Fibrous Homogeneous
71965970PLM_93	mastic 2				Dissolved
S0018B - A	Floor, Vinyl Floor Tile And Mastic, 9x9 Red And Brown, Loc: 1068, Resource Ro	Not Analyzed			
71965970PLM_32	tile 1				
S0018B - B	Floor, Vinyl Floor Tile And Mastic, 9x9 Red And Brown, Loc: 1068, Resource Ro	None Detected		100% Other	Yellow Non Fibrous Homogeneous
71965970PLM_94	mastic 1				Dissolved
S0018B - C	Floor, Vinyl Floor Tile And Mastic, 9x9 Red And Brown, Loc: 1068, Resource Ro	Not Analyzed			
71965970PLM_95	tile 2				
S0018B - D	Floor, Vinyl Floor Tile And Mastic, 9x9 Red And Brown, Loc: 1068, Resource Ro	None Detected		100% Other	Yellow Non Fibrous Homogeneous
71965970PLM_96	mastic 2				Dissolved
S0018C - A	Floor, Vinyl Floor Tile And Mastic, 9x9 Red And Brown, Loc: 1068, Resource Ro	Not Analyzed			
71965970PLM_33	tile 1				
S0018C - B	Floor, Vinyl Floor Tile And Mastic, 9x9 Red And Brown, Loc: 1068, Resource Ro	None Detected		100% Other	Yellow Non Fibrous Homogeneous
71965970PLM_97	mastic 1				Dissolved
S0018C - C	Floor, Vinyl Floor Tile And Mastic, 9x9 Red And Brown, Loc: 1068, Resource Ro	Not Analyzed			
71965970PLM_98	tile 2				

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Yanelis Delgado (99)

Analyst

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Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
App.E



Customer: Pinchin Ltd.
6-875 Main St West
Suite 200
Hamilton, Ontario L8S 4P9
Project: Yorkview Elementary School

Attn: Evan Peplinski

Lab Order ID: 71965970
Analysis ID: 71965970_PLM
Date Received: 5/20/2021
Date Reported: 5/21/2021

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0018C - D	Floor,Vinyl Floor Tile And Mastic,9x9 Red And Brown,Loc:1068,Resource Ro	None Detected		100% Other	Yellow Non Fibrous Homogeneous
71965970PLM_99	mastic 2				Dissolved
S0021A	Tar,Black Tar On RTU,Loc:1,Roof	None Detected		100% Other	Black Non Fibrous Homogeneous
71965970PLM_34					Dissolved, Ashed
S0021B	Tar,Black Tar On RTU,Loc:1,Roof	None Detected		100% Other	Black Non Fibrous Homogeneous
71965970PLM_35					Dissolved, Ashed
S0021C	Tar,Black Tar On RTU,Loc:1,Roof	None Detected		100% Other	Black Non Fibrous Homogeneous
71965970PLM_36					Dissolved, Ashed
S0022A	Caulking,Brown Caulking On Roof Vent,Loc:1,Roof	None Detected		100% Other	Black Non Fibrous Homogeneous
71965970PLM_37					Ashed
S0022B	Caulking,Brown Caulking On Roof Vent,Loc:1,Roof	None Detected		100% Other	Black Non Fibrous Homogeneous
71965970PLM_38					Ashed
S0022C	Caulking,Brown Caulking On Roof Vent,Loc:1,Roof	None Detected		100% Other	Black Non Fibrous Homogeneous
71965970PLM_39					Ashed
S0023A	Caulking,White Caulking On RTU,Loc:1,Roof	None Detected		100% Other	White Non Fibrous Homogeneous
71965970PLM_40					Ashed

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Suite 200
Hamilton, Ontario L8S 4P9
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Attn: Evan Peplinski

Lab Order ID: 71965970
Analysis ID: 71965970_PLM
Date Received: 5/20/2021
Date Reported: 5/21/2021

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0023B	Caulking, White Caulking On RTU, Loc: 1, Roof	None Detected		100% Other	White Non Fibrous Homogeneous
71965970PLM_41					Ashed
S0023C	Caulking, White Caulking On RTU, Loc: 1, Roof	None Detected		100% Other	White Non Fibrous Homogeneous
71965970PLM_42					Ashed
S0024A	Caulking, Red Caulking On RTU, Loc: 1, Roof	None Detected		100% Other	Red Non Fibrous Homogeneous
71965970PLM_43					Ashed
S0024B	Caulking, Red Caulking On RTU, Loc: 1, Roof	None Detected		100% Other	Red Non Fibrous Homogeneous
71965970PLM_44					Ashed
S0024C	Caulking, Red Caulking On RTU, Loc: 1, Roof	None Detected		100% Other	Red Non Fibrous Homogeneous
71965970PLM_45					Ashed
S0025A	Paper, Black Fibrous Paper On RTU Door, Loc: 1, Roof	None Detected	80% Fiber Glass	20% Other	Black Fibrous Heterogeneous
71965970PLM_46					Teased
S0025B	Paper, Black Fibrous Paper On RTU Door, Loc: 1, Roof	None Detected	80% Fiber Glass	20% Other	Black Fibrous Heterogeneous
71965970PLM_47					Teased
S0025C	Paper, Black Fibrous Paper On RTU Door, Loc: 1, Roof	None Detected	80% Fiber Glass	20% Other	Black Fibrous Heterogeneous
71965970PLM_48					Teased

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Bulk Asbestos Analysis

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Customer: Pinchin Ltd.
6-875 Main St West
Suite 200
Hamilton, Ontario L8S 4P9
Project: Yorkview Elementary School

Attn: Evan Peplinski

Lab Order ID: 71965970
Analysis ID: 71965970_PLM
Date Received: 5/20/2021
Date Reported: 5/21/2021

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0026A	Textile duct connector, Loc:1, Roof	None Detected	70% Fiber Glass	30% Other	White Fibrous Heterogeneous
71965970PLM_49					Ashed, Teased
S0026B	Textile duct connector, Loc:1, Roof	None Detected	70% Fiber Glass	30% Other	White Fibrous Heterogeneous
71965970PLM_50					Ashed, Teased
S0026C	Textile duct connector, Loc:1, Roof	None Detected	70% Fiber Glass	30% Other	White Fibrous Heterogeneous
71965970PLM_51					Ashed, Teased

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Yanelis Delgado (99)

Analyst


Approved Signatory

Client: Pinchin Ltd.
Contact: Evan Peplinski
Address: 6-875 Main St W, Hamilton
Phone: 289.237.6716
Fax:
Email: epeplinski@pinchin.com

Project: Yorkview Elementary School
 Stop positive on all samples.
 Perform ashing on third vinyl floor
 tile if first two are ND.

Client Notes:

P.O. #: 286531.018
Date Submitted: 05-19-2021

Analysis: PLM BULK EPA 600
TurnAroundTime: 3 day

"Instructions:
 Use Column "B" for your contact info

 To See an Example Click the
 bottom Example Tab.

54
Begin Samples with a "<<" "above the first sample

and end with a ">>" below the last sample.
 Only Enter your data on the first sheet "Sheet1"

Note: Data 1 and Data 2 are optional
 fields that do not show up on the official
 report, however they will be included
 in the electronic data returned to you
 to facilitate your reintegration of the report data.

Scientific
Analytical



Institute

4604 Dundas Dr.
 Greensboro, NC 27407
 Phone: 336.292.3888
 Fax: 336.292.3313
 Email: lab@sailab.com

Sample Number	Data 1 (Lab use only)	Sample Description	Data 2 (Lab use only)
<<			
S0001A		Floor,Vinyl Floor Tile And Mastic,12x12 Grey Fleck,Loc:1055,Classroom	
S0001B		Floor,Vinyl Floor Tile And Mastic,12x12 Grey Fleck,Loc:1043,Classroom	
S0001C		Floor,Vinyl Floor Tile And Mastic,12x12 Grey Fleck,Loc:1055,Classroom	
S0005A		Floor,Vinyl Floor Tile And Mastic,12x12 Light Grey With White Fleck,Loc:1030,Office	
S0005B		Floor,Vinyl Floor Tile And Mastic,12x12 Light Grey With White Fleck,Loc:1030,Office	
S0005C		Floor,Vinyl Floor Tile And Mastic,12x12 Light Grey With White Fleck,Loc:1060,Portopack Classrooms	
S0007A		Floor,Vinyl Floor Tile And Mastic,12x12 Grey With Dark Fleck,Loc:1053,Classroom	
S0007B		Floor,Vinyl Floor Tile And Mastic,12x12 Grey With Dark Fleck,Loc:1053,Classroom	
S0007C		Floor,Vinyl Floor Tile And Mastic,12x12 Grey With Dark Fleck,Loc:1044,Staff Room	
S0008A		Paper,Building Paper On Exterior Wall,Loc:1028,Vestibule	
S0008B		Paper,Building Paper On Exterior Wall,Loc:1028,Vestibule	
S0008C		Paper,Building Paper On Exterior Wall,Loc:1028,Vestibule	
S0009A		Floor,Vinyl Floor Tile And Mastic,12x12 Cream With Grey Fleck,Loc:1031,Principals Office	
S0009B		Floor,Vinyl Floor Tile And Mastic,12x12 Cream With Grey Fleck,Loc:1031,Principals Office	
S0009C		Floor,Vinyl Floor Tile And Mastic,12x12 Cream With Grey Fleck,Loc:1031,Principals Office	
S0011A		Floor,Vinyl Floor Tile And Mastic,12x12 Brown Fleck,Loc:1042,Resource Room	
S0011B		Floor,Vinyl Floor Tile And Mastic,12x12 Brown Fleck,Loc:1042,Resource Room	
S0011C		Floor,Vinyl Floor Tile And Mastic,12x12 Brown Fleck,Loc:1042,Resource Room	
S0012A		Floor,Vinyl Sheet Flooring,Grey,Loc:1040,Kindergarten	
S0012B		Floor,Vinyl Sheet Flooring,Grey,Loc:1040,Kindergarten	
S0012C		Floor,Vinyl Sheet Flooring,Grey,Loc:1040,Kindergarten	
S0013A		Floor,Vinyl Floor Tile And Mastic,12x12 Teal,Loc:1032,Gym	
S0013B		Floor,Vinyl Floor Tile And Mastic,12x12 Teal,Loc:1032,Gym	
S0013C		Floor,Vinyl Floor Tile And Mastic,12x12 Teal,Loc:1032,Gym	
S0015A		Floor,Vinyl Floor Tile And Mastic,12x12 Off White With Grey Fleck,Loc:1032,Gym	
S0015B		Floor,Vinyl Floor Tile And Mastic,12x12 Off White With Grey Fleck,Loc:1032,Gym	
S0015C		Floor,Vinyl Floor Tile And Mastic,12x12 Off White With Grey Fleck,Loc:1032,Gym	
S0017A		Floor,Vinyl Floor Tile And Mastic,12x12 Blue,Loc:1039,Classroom	
S0017B		Floor,Vinyl Floor Tile And Mastic,12x12 Blue,Loc:1039,Classroom	
S0017C		Floor,Vinyl Floor Tile And Mastic,12x12 Blue,Loc:1039,Classroom	
S0018A		Floor,Vinyl Floor Tile And Mastic,9x9 Red And Brown,Loc:1068,Resource Room	
S0018B		Floor,Vinyl Floor Tile And Mastic,9x9 Red And Brown,Loc:1068,Resource Room	
S0018C		Floor,Vinyl Floor Tile And Mastic,9x9 Red And Brown,Loc:1068,Resource Room	
S0021A		Tar,Black Tar On RTU,Loc:1,Roof	
S0021B		Tar,Black Tar On RTU,Loc:1,Roof	
S0021C		Tar,Black Tar On RTU,Loc:1,Roof	
S0022A		Caulking,Brown Caulking On Roof Vent,Loc:1,Roof	
S0022B		Caulking,Brown Caulking On Roof Vent,Loc:1,Roof	
S0022C		Caulking,Brown Caulking On Roof Vent,Loc:1,Roof	
S0023A		Caulking,White Caulking On RTU,Loc:1,Roof	
S0023B		Caulking,White Caulking On RTU,Loc:1,Roof	
S0023C		Caulking,White Caulking On RTU,Loc:1,Roof	
S0024A		Caulking,Red Caulking On RTU,Loc:1,Roof	
S0024B		Caulking,Red Caulking On RTU,Loc:1,Roof	
S0024C		Caulking,Red Caulking On RTU,Loc:1,Roof	
S0025A		Paper,Black Fibrous Paper On RTU Door,Loc:1,Roof	
S0025B		Paper,Black Fibrous Paper On RTU Door,Loc:1,Roof	
S0025C		Paper,Black Fibrous Paper On RTU Door,Loc:1,Roof	
S0026A		Textile duct connector,Loc:1,Roof	
S0026B		Textile duct connector,Loc:1,Roof	
S0026C		Textile duct connector,Loc:1,Roof	
>>			

Accepted ☒

Rejected ☐

N. Franco 5/20 10:30 A



Pinchin Ltd. Asbestos Laboratory *Certificate of Analysis*

Project Name:	HWDSB, Yorkview Elementary School, 86 Cameron Ave, Dundas, ON		
Project No.:	0286531.018		
Prepared For:	S. Holmquist / J. Cozzitorto		
Lab Reference No.:	b251661		
Analyst(s):	Y. Park		
Date Received:	June 3, 2021	# Samples submitted:	16
Date Analyzed:	June 5, 2021	# Phases analyzed:	20

Method of Analysis:

EPA 600/R-93/116 - Method for the Determination of Asbestos in Bulk Building Materials dated July, 1993

Bulk samples are checked visually and scanned under a stereomicroscope. Slides are prepared and observed under a Polarized Light Microscope (PLM) at magnifications of 40X, 100X or 400X as appropriate. Asbestos fibres are identified by a combination of morphology, colour, refractive index, extinction, sign of elongation, birefringence and dispersion staining colours. A visual estimate is made of the percentage of asbestos present. A reported concentration of less than (<) the regulatory threshold indicates the presence of confirmed asbestos in trace quantities, limited to only a few fibres or fibre bundles in an entire sample. This method complies with provincial regulatory requirements where applicable. Multiple phases within a sample are analyzed and reported separately.

All bulk samples submitted to this laboratory for asbestos analysis are retained for a minimum of three months. Samples may be retrieved, upon request, for re-examination at any time during that period.

The Pinchin Ltd. Mississauga asbestos laboratory is accredited by the National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program (NVLAP Lab Code 101270-0) for the 'EPA – 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples,' and the 'EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials'; and meets all requirements of ISO/IEC 17025:2017.

This report relates only to the items tested.

NOTE: *This test report may not be reproduced, except in full, without the written approval of the laboratory. The client may not use this report to claim product endorsement by NVLAP or any agency of the U.S. Government. This report is valid only when signed in blue ink by the analyst. Vinyl asbestos floor tiles contain very fine fibres of asbestos and may be missed by some laboratories using the PLM method. Internal verification studies performed by Pinchin indicate that the chance of missing asbestos in floor tiles is no higher than about 2%. The vinyl tile study and laboratory documentation on measurement uncertainty is available upon request. The analysis of dust samples by PLM cannot be used as an indicator of past or present airborne asbestos fibre levels.*



Pinchin Ltd. Asbestos Laboratory

Certificate of Analysis

Project Name: HWDSB, Yorkview Elementary School, 86 Cameron Ave, Dundas, ON
Project No.: 0286531.018
Prepared For: S. Holmquist / J. Cozzitorto

Lab Reference No.: b251661
Date Analyzed: June 5, 2021

BULK SAMPLE ANALYSIS

SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	% COMPOSITION (VISUAL ESTIMATE)	
		ASBESTOS	OTHER
S0028A Yellow paint on masonry wall - Location 1045	Non-homogeneous, beige and green, coating material.	None Detected	Non-Fibrous Material > 75%
S0028B Yellow paint on masonry wall - Location 1043	Non-homogeneous, white and off-white, coating material.	None Detected	Non-Fibrous Material > 75%
S0028C Blue paint on masonry wall - Location 1030	Non-homogeneous, blue and white, coating material.	None Detected	Non-Fibrous Material > 75%
S0028D White on masonry wall - Location 1032	Non-homogeneous, white and beige, coating material.	None Detected	Non-Fibrous Material > 75%
S0028E White on masonry wall - Location 1054	Non-homogeneous, beige and white, coating material.	None Detected	Non-Fibrous Material > 75%
S0028F White on masonry wall - Location 1072	Non-homogeneous, white and green, coating material.	None Detected	Non-Fibrous Material > 75%
S0028G Blue on masonry wall - Location 1070	Non-homogeneous, blue and green, coating material.	None Detected	Non-Fibrous Material > 75%
S0029A Smooth plaster wall - Location 1043	2 Phases: a) Homogeneous, grey, hard, cementitious, plaster base coat.	None Detected	Perlite 10-25% Other Non-Fibrous > 75%
	b) Homogeneous, white, hard, cementitious, plaster top coat.	None Detected	Non-Fibrous Material > 75%
Comments:	Cellulose is present on the surface of this sample.		



Pinchin Ltd. Asbestos Laboratory Certificate of Analysis

Project Name: HWDSB, Yorkview Elementary School, 86 Cameron Ave, Dundas, ON
Project No.: 0286531.018
Prepared For: S. Holmquist / J. Cozzitorto

Lab Reference No.: b251661
Date Analyzed: June 5, 2021

BULK SAMPLE ANALYSIS

SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	% COMPOSITION (VISUAL ESTIMATE)	
		ASBESTOS	OTHER
S0029B Smooth plaster wall - Location 1039	2 Phases: a) Homogeneous, grey, hard, cementitious, plaster base coat. b) Homogeneous, white, hard, cementitious, plaster top coat.	None Detected	Perlite 10-25% Other Non-Fibrous > 75%
S0029C Smooth plaster wall - Location 1039	2 Phases: a) Homogeneous, grey, hard, cementitious, plaster base coat. b) Homogeneous, white, hard, cementitious, plaster top coat.	None Detected	Perlite 10-25% Other Non-Fibrous > 75%
Comments:	Cellulose is present on the surface of this sample.		
S0030A Texture coat on block - Location 1045	Non-homogeneous, beige and green, coating material.	None Detected	Non-Fibrous Material > 75%
Comments:	Another phase is present but was not analyzed.		
S0030B Texture coat on block - Location 1030	Non-homogeneous, blue, beige, and brown, coating material.	None Detected	Non-Fibrous Material > 75%
S0030C Texture coat on block - Location 1054	Non-homogeneous, beige and green, coating material.	None Detected	Non-Fibrous Material > 75%
Comments:	Another phase is present but was not analyzed.		
S0031A Drywall joint compound - Location 1040	Homogeneous, white, drywall joint compound.	None Detected	Non-Fibrous Material > 75%



Pinchin Ltd. Asbestos Laboratory
Certificate of Analysis

Project Name: HWDSB, Yorkview Elementary School, 86 Cameron Ave, Dundas, ON
Project No.: 0286531.018
Prepared For: S. Holmquist / J. Cozzitorto

Lab Reference No.: b251661
Date Analyzed: June 5, 2021

BULK SAMPLE ANALYSIS

SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	% COMPOSITION (VISUAL ESTIMATE)	
		ASBESTOS	OTHER
S0031B Drywall joint compound - Location 1044	2 Phases:		
	a) Homogeneous, light beige, drywall joint compound.	None Detected	Non-Fibrous Material > 75%
	b) Homogeneous, white, drywall joint compound.	None Detected	Non-Fibrous Material > 75%
S0031C Drywall joint compound - Location 1059	Homogeneous, off-white, drywall joint compound.	None Detected	Non-Fibrous Material > 75%
Comments:	Cellulose is present on the surface of this sample.		

Reviewed by:

Reporting Analyst:

YP
KB
KB

Pinchin Ltd. - Asbestos Laboratory Internal Asbestos Bulk Sample Chain of Custody

Client Name:	HWDSB	Project Address:	86 Cameron Ave, Dundas, ON	
Portfolio/Building No:	Yorkview Elementary School	Pinchin File:	286531.018	
Submitted by:	Stephen Holmquist	Email:	sholmquist@pinchin.com	
CC Results to:	Jessica Cozzitorto	CC Email:	jcozzitorto@pinchin.com	
Date Submitted:	June 2 2021	Required by:	June 4 2021	
# of Samples:	16	Priority:	Rush Turnaround	
Year of Building Construction (Mandatory, Years ONLY):				
Do NOT Stop on Positive (Sample Numbers):				
Pinchin Group Company (Mandatory Field): Pinchin				
HMIS2 Building Reference #:		92054/202141714017010		
To be Completed by Lab Personnel Only:				
Lab Reference #:	0251 (do)		Time:	24 hour clock
Received by:	JUN 03 2021 JF		Date: June 5, 2021	Month Day Year
Name(s) of Analyst(s): YP				
Sample Prefix	Sample No.	Sample Suffix	Sample Description/Location (Mandatory)	
S	0028	A	Yellow paint on masonry wall - Location 1045 ND	
S	0028	B	Yellow paint on masonry wall - Location 1043 ND	
S	0028	C	Blue paint on masonry wall - Location 1030 ND	
S	0028	D	White on masonry wall - Location 1032 ND	
S	0028	E	White on masonry wall - Location 1054 ND	
S	0028	F	White on masonry wall - Location 1072 ND	
S	0028	G	Blue on masonry wall - Location 1070 ND	
S	0029	A	Smooth plaster wall - Location 1043 a) ND b) ND	

S	0029	B	Smooth plaster wall - Location 1039	a)ND b)ND
S	0029	C	Smooth plaster wall - Location 1039	a)ND b)ND
S	0030	A	Texture coat on block - Location 1045	ND
S	0030	B	Texture coat on block - Location 1030	ND
S	0030	C	Texture coat on block - Location 1054	ND
S	0031	A	Drywall joint compound - Location 1040	ND
S	0031	B	Drywall joint compound - Location 1044	a)ND b)ND
S	0031	C	Drywall joint compound - Location 1059	ND

11

APPENDIX II-B
Lead Analytical Certificates



Your Project #: 0352293.018
Your C.O.C. #: N/A

Attention: Jessica Cozzitorto

Pinchin Ltd
151 York Boulevard
Suite 200
Hamilton, ON
CANADA L8R 3M2

Report Date: 2026/01/29
Report #: R8688133
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C607437

Received: 2026/01/23, 14:20

Sample Matrix: Bulk
Samples Received: 4

Analyses	Date		Laboratory Method	Analytical Method
	Quantity	Date Extracted		
Metals in Paint	4	2026/01/29	CAM SOP-00408	EPA 6010D m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Your Project #: 0352293.018
Your C.O.C. #: N/A

Attention: Jessica Cozzitorto

Pinchin Ltd
151 York Boulevard
Suite 200
Hamilton, ON
CANADA L8R 3M2

Report Date: 2026/01/29
Report #: R8688133
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C607437

Received: 2026/01/23, 14:20

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Elora Di Bratto, Project Manager
Email: Elora.Di-Bratto@bureauveritas.com
Phone# (905) 817-5700

=====

This report has been generated and distributed using a secure automated process.

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C607437

Report Date: 2026/01/29

Pinchin Ltd

Client Project #: 0352293.018

Sampler Initials: EB

ELEMENTS BY ATOMIC SPECTROSCOPY (BULK)

Bureau Veritas ID		AZHA61		AZHA62		AZHA63		
Sampling Date		2026/01/20 16:00		2026/01/20 16:00		2026/01/20 16:00		
COC Number		N/A		N/A		N/A		
	UNITS	L0017,WALL,CONCRETE BLOCK,WHITE,LOC:10 33 STAGE	RDL	L0018,WALL,PLASTER,WHITE, LOC:1033,STAGE	RDL	L0019,WALL,METAL,LOC:1033, GYM	RDL	QC Batch

Metals								
Lead (Pb)	%	0.098	0.00013	0.00052	0.00035	0.083	0.00010	A093872
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								

Bureau Veritas ID		AZHA64		
Sampling Date		2026/01/20 16:00		
COC Number		N/A		
	UNITS	L0020,OTHER,METAL,LOC:1033, STAGE	RDL	QC Batch
Metals				
Lead (Pb)	%	0.22	0.0017	A093872
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				



GENERAL COMMENTS

Sample AZHA61 [L0017,WALL,CONCRETE BLOCK,WHITE,LOC:1033 STAGE] : Metals Analysis: Due to limited amount of sample available for analysis, a smaller than usual portion of the sample was used. Detection limits were adjusted accordingly.

Sample AZHA62 [L0018,WALL,PLASTER,WHITE,LOC:1033,STAGE] : Metals Analysis: Due to limited amount of sample available for analysis, a smaller than usual portion of the sample was used. Detection limits were adjusted accordingly.

Sample AZHA64 [L0020,OTHER,METAL,LOC:1033,STAGE] : Metals Analysis: Due to limited amount of sample available for analysis, a smaller than usual portion of the sample was used. Detection limits were adjusted accordingly.

Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C607437

Report Date: 2026/01/29

Pinchin Ltd

Client Project #: 0352293.018

Sampler Initials: EB

QUALITY ASSURANCE REPORT

QA/QC								
Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
A093872	MEN	QC Standard	Lead (Pb)	2026/01/29		97	%	75 - 125
A093872	MEN	Method Blank	Lead (Pb)	2026/01/29	<0.00010		%	
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.								
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.								



BUREAU
VERITAS

Bureau Veritas Job #: C607437

Report Date: 2026/01/29

Pinchin Ltd

Client Project #: 0352293.018

Sampler Initials: EB

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Louise Harding, Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



NONT-2026-01-3256



6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/6

CHAIN OF CUSTODY RECORD

Page of

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required												
Company Name: Pinchin Ltd.		Company Name: <u> </u>		Quotation #: <u> </u>		☒ Regular TAT (5-7 days) Most analyses												
Contact Name: <u>Emily Balfour / Jessica Cozzitorto</u>		Contact Name: <u> </u>		P.O. #/ AFE#: <u> </u>		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS												
Address: <u> </u>		Address: <u> </u>		Project #: <u>0352293.018</u>		Rush TAT (Surcharges will be applied)												
Phone: <u> </u> Fax: <u> </u>		Phone: <u> </u> Fax: <u> </u>		Site Location: <u> </u>		☐ 1 Day ☐ 2 Days ☐ 3-4 Days												
Email: <u>ebalfour@pinchin.com / jcozzitorto@pinchin.com</u>		Email: <u> </u>		Site #: <u> </u>		Date Required: <u> </u>												
MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY				Site Location Province: <u> </u> ON		Rush Confirmation #: <u> </u>												
Sampled By: <u>Emily Balfour</u>																		
Regulation 153		Other Regulations		Analysis Requested												LABORATORY USE ONLY		
☐ Table 1 ☐ Res/Park ☐ Med/ Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/ Other ☐ Table <u> </u> FOR RSC (PLEASE CIRCLE) Y / N		☐ CCME ☐ Sanitary Sewer Bylaw ☐ MISA ☐ Storm Sewer Bylaw ☐ PWQO ☐ Region <u> </u> ☐ Other (Specify) <u> </u> ☐ REG 558 (MIN. 3 DAY TAT REQUIRED) ☐ REG 406 Table <u> </u>		# OF CONTAINERS SUBMITTED FIELD FILTERED (CIRCLE) Metals / Hg / CrVI BTEX/ PHC F1 PHCS F2 - F4 VOCs REG 153 METALS & INORGANICS REG 153 ICPMS METALS REG 153 METALS (Hg, Cr, VI, ICPMS Metals, HWS - B) Lead (Pb) in Paints PCBs HOLD- DO NOT ANALYZE												CUSTOMER SEAL Y / N Present Intact COOLING MEDIA PRESENT: Y / N COMMENTS		
Include Criteria on Certificate of Analysis: Y / N		SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS																
SAMPLE IDENTIFICATION		DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX														
L0017, Wall, Concrete Block, White, Loc:1033, Stage		2026/01/20	16:00	BULK														
L0018, Wall, Plaster, White, Loc:1033, Stage		2026/01/20	16:00	BULK														
L0019, Wall, Metal, , Loc:1032, Gym		2026/01/20	16:00	BULK														
L0020, Other, Metal, , Loc:1033, Stage		2026/01/20	16:00	BULK														
RELINQUISHED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)		DATE: (YYYY/MM/DD)		TIME: (HH:MM)		BV JOB #								
Emily Balfour		2026/01/22	14:00	<i>Susan Swoboda</i>		2026/01/23		14:20										

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Bureau Veritas' standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms available at <https://www.bvna.com/coc-terms-and-conditions>



Analysis for Lead Concentration in Paint Chips

by Flame Atomic Absorption Spectroscopy
EPA SW-846 3050B/6010C/7000B



Customer: Pinchin Ltd.
6-875 Main St West
Suite 200
Hamilton, Ontario L8S 4P9
Project: Yorkview Elementary School

Attn: Evan Peplinski

Lab Order ID: 71965957
Analysis ID: 71965957_PBP
Date Received: 5/20/2021
Date Reported: 5/25/2021

Sample ID	Description	Mass	Concentration	Concentration
Lab Sample ID	Lab Notes	(g)	(ppm)	(% by weight)
L0001	Wall, Concrete (precast), Textured White Paint On Concrete Wall, Loc: 1055, Classroom	0.0715	200	0.020%
71965957PBP_1				
L0002	Struct, Metal, Red Paint On Steel Structure, Loc: 1055, Classroom	0.0800	2800	0.28%
71965957PBP_2				
L0003	Wall, Concrete (precast), Tan Paint On Concrete Block Wall, Loc: 1045, Corridor	0.0956	190	0.019%
71965957PBP_3				
L0004	Struct, Concrete (poured), Textured White Paint On Concrete Deck, Loc: 1043, Classroom	0.0579	320	0.032%
71965957PBP_4				
L0005	Wall, Concrete (poured), Light Blue On Concrete Wall, Loc: 1070, Classroom	0.0551	2300	0.23%
71965957PBP_5				
L0006	Mech, Metal, Light Grey Paint On RTU, Loc: 1, Roof	0.0681	1400	0.14%
71965957PBP_6				
L0007	Pipe, Metal, Yellow Paint On Pipes, Loc: 1, Roof	0.0581	380	0.038%
71965957PBP_7				
L0008	Other, Metal, Brown Paint On Metal Flashing, Loc: 1, Roof	0.0285	100	0.010%
71965957PBP_8				

Unless otherwise noted blank sample correction was not performed on analytical results. Scientific Analytical Institute participates in the AIHA ELPAT program. ELPAT Laboratory ID: 173190. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAI. Analytical uncertainty available upon request. The quality control samples run with the samples in this report have passed all EPA required specifications unless otherwise noted. RL: (Report Limit for an undiluted 50ml sample is 4µg Total Pb). Unless indicated, areas and volumes were provided by the customer.

Matthew Caffey (8)

Analyst

Scientific Analytical Institute, Inc. 4604 Dundas Dr. Greensboro, NC 27407 (336) 292-3888

Laboratory Director

Client: Pinchin Ltd.
 Contact: Evan Peplinski
 Address: 6-875 Main St W, Hamilton
 Phone: 289.237.6716
 Fax:
 Email: epeplinski@pinchin.com

Project: Yorkview Elementary School

Client Notes:

P.O. #: 286531.018
 Date Submitted: 05-19-2021

Analysis: Paint Chips Flame AA
 TurnAroundTime: 3 day

***Instructions:**
 Use Column "B" for your contact info

To See an Example Click the
 bottom Example Tab.

10

**Begin Samples with a "<<" above the first sample
 and end with a ">>" below the last sample.
 Only Enter your data on the first sheet "Sheet1"**

*Note: Data 1 and Data 2 are optional
 fields that do not show up on-the official
 report, however they will be included
 in the electronic data returned to you
 to facilitate your reintegration of the report data.*

Scientific
 Analytical
 Institute



4604 Dundas Dr.
 Greensboro, NC 27407
 Phone: 336.292.3888
 Fax: 336.292.3313
 Email: lab@sailab.com

Sample Number	Data 1 (Lab use only)	Sample Description	Data 2 (Lab use only)
<<			
L0001		Wall, Concrete (precast), Textured White Paint On Concrete Wall, Loc:1055, Classroom	
L0002		Struct, Metal, Red Paint On Steel Structure, Loc:1055, Classroom	
L0003		Wall, Concrete (precast), Tan Paint On Concrete Block Wall, Loc:1045, Corridor	
L0004		Struct, Concrete (poured), Textured White Paint On Concrete Deck, Loc:1043, Classroom	
L0005		Wall, Concrete (poured), Light Blue On Concrete Wall, Loc:1070, Classroom	
L0006		Mech, Metal, Light Grey Paint On RTU, Loc:1, Roof	
L0007		Pipe, Metal, Yellow Paint On Pipes, Loc:1, Roof	
L0008		Other, Metal, Brown Paint On Metal Flashing, Loc:1, Roof	
>>			

Accepted ☒

Rejected ☐

N. Francis 5/20 10:30 A

APPENDIX III

Methodology



1.0 GENERAL

An investigation was conducted to identify the type of Hazardous Building Materials incorporated in the structure and its finishes.

Information regarding the location and condition of hazardous building materials encountered and visually estimated quantities were recorded. The locations of any samples collected were recorded on small-scale plans. As-built drawings and previous reports were referenced where provided.

Sample collection was conducted in accordance with our Standard Operating Procedures.

The following methodologies appropriate to each hazardous building material were applied where those materials were included in the scope of work.

1.1 Asbestos

The investigation for asbestos included friable and non-friable asbestos-containing materials (ACM). A friable material is a material that when dry can be crumbled, pulverized or powdered by hand pressure, or a material that has already become crushed, pulverized, or powdered.

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials were determined by visual examination and available information on the phases of construction and prior renovations.

Samples were collected at a rate that is in compliance with the requirements of local regulations and guidelines. The sampling strategy was also based on known ban dates and phase out dates of the use of asbestos; sampling of certain building materials is not conducted after specific construction dates. In addition, to be conservative, several years past these dates are added to account for some uncertainty in the exact start / finish date of construction and associated usage of ACM. In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

The asbestos analysis of select materials was completed using a stop-positive approach. Only one result meeting the regulated criteria was required to determine that a material is asbestos-containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once a result equal to or greater than the regulated criteria is detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos is detected. In some cases, all samples were analyzed in the sample set regardless of result.

The analysis was performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

Analytical results were compared to the following criteria:

Jurisdiction	Friable	Non-Friable
Ontario	0.5%	0.5%

Where building materials are described in the report as “non-asbestos” or “does not contain asbestos”, this means that either no asbestos was detected by the analytical method utilized in any of the multiple samples or, if detected, it is below the lower limit of an asbestos-containing material in the applicable regulation. Additionally, these terms are used for materials which historically are known to not include asbestos in their manufacturing.

1.2 Lead

Samples of distinctive paint finishes, and surface coatings present in more than a limited application, where removal of the paint is possible were collected. The samples were collected by scraping the painted finish to include base and covering applications.

Analysis for lead in paints or surface coatings was performed in accordance with regulated or industry accepted methods, including flame atomic absorption or inductively coupled plasma.

Analytical results were compared to the following criteria.

Jurisdiction	Units (%)	Units (ppm) / (mg/kg)
Ontario	0.009	90

Other lead building products (e.g. batteries, lead sheeting, flashing) were identified by visual observation only.

1.3 Silica

Building materials known to contain crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) were identified by visual inspection only. Pinchin did not perform sampling of these materials for laboratory analysis of crystalline silica content.

1.4 Mercury

Building materials, products or equipment (e.g. thermostats, barometers, pressure gauges, lamp tubes), suspected to contain mercury were identified by visual inspection only. Dismantling of equipment



suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

1.5 Polychlorinated Biphenyls

The potential for light ballasts to contain PCBs was based on the age of the building and visual observations of the type of fixture and lamp.

The potential for oil filled transformers to contain PCBs was based on the age of the building, a review of maintenance records, and examination of labels or nameplates on equipment, where present and accessible. The information was compared to known ban dates of PCBs and Environment Canada publications. Fluids (mineral oil, hydraulic, Aroclor or Askarel) in transformers or other equipment were not sampled for PCB content.

1.6 Visible Mould

The presence of mould or water damage was determined by visual inspection of exposed building surfaces. If any mould growth or water damage was concealed within building cavities it was not addressed in this assessment.

APPENDIX IV
Location Summary Report

Client:HWDSB**Site:** 86 Cameron Ave, Dundas, ON**Building Name:** Yorkview Elementary School**Survey Date:****Last Re-Assessment:****Building Phases:** A: 1953

Location No.	Name or Description	Area ft ²	Floor No.	Bldg. Phase	Notes
1032	Gym, room no. 113	2500	1	A	above ceiling not assessed due to height
1033	Stage, room no. 113B	600	1	A	
1034	Gym Storage, room no. 113A	0	1	A	
1045	Corridor, room no. 101	2500	1	A	Includes 118, 108

APPENDIX V
Hazardous Materials Summary Report / Sample Log

HAZARDOUS MATERIALS SUMMARY / SAMPLE LOG

Client:HWDSB		Site: 86 Cameron Ave, Dundas, ON		Building Name: Yorkview Elementary School					Survey Date:		
HAZMAT	Sample No	System/Component/Material/Sample Description	Locations	Bldg. Phase	LF	SF	EA	%	Type	Positive	Friability
Asbestos	V0005	Floor Vinyl Floor Tile And Mastic 12x12 Light Grey With White Fleck	1045	A	0	1000	0	0	Chrysotile	Yes	NF
Asbestos	S0013 ABC	Floor Mastic Below 12x12 Teal	1032	A	0	2500	0	0	Chrysotile	Yes	NF
Asbestos	S0015 ABC	Floor Vinyl Floor Tile 12x12 Off White With Grey Fleck	1032	A	0	1430	0	0	None Detected	No	
Asbestos	S0028 ADH	Other, Wall Paint	1032,1033,1034,1045	A	0	0	0	100	None Detected	No	
Asbestos	S0029 D	Wall Plaster Smooth	1033	A	0	0	0	0	None Detected	No	
Asbestos	S0030 AD	Wall Texture Coat	1032,1033,1034,1045	A	0	0	0	100	None Detected	No	
Asbestos	V0031	Wall Drywall And Joint Compound	1045	A	0	0	0	0	None Detected	No	
Asbestos	S0039 ABC	Wall Column Cement Product	1032,1033	A	0	1050	0	0	Chrysotile	Yes	NF
Asbestos	S0040 ABC	Other Window Caulking Grey	1032	A	30	0	0	0	None Detected	No	
Asbestos	S0041 ABC	Wall Column Paint Metal	1032	A	0	0	0	0	None Detected	No	
Asbestos	S0042 ABC	Other Window Caulking White, Under Silicone	1032	A	0	0	0	0	None Detected	No	
Asbestos	S0043 ABC	Wall Masonry Yellow Fireproof Brick	1033	A	0	0	0	0	None Detected	No	
Asbestos	S0044 A	Other Dust Open Bag Of Canada Talc Industries Ltd. (tafil 325)	1033	A	0	0	0	0	None Detected	No	
Asbestos	S0045 ABC	Wall Expansion Joint Caulking	1032	A	45	0	0	0	None Detected	No	
Asbestos	V9500	Ceiling Acoustic Tile Cement Product 24x24 Perforated	1032	A	0	2500	0	0	Presumed Asbestos	Yes	NF
Asbestos	V0000	Ceiling Ceiling Tiles (lay-in) 24x48 Pinhole And Fleck	1045	A	0	0	0	100	Non Asbestos	No	
Paint	V0002	Structure Steel Red, Assumed Present (no Access)	1032,1033,1034,1045	A	0	0	0	100	Lead (High)	Yes	-
Paint	L0003	Structure Concrete (precast) Tan Paint On Concrete Block Wall	1045	A	0	0	0	100	Lead (Low)	Yes	-
Paint	L0017	Wall Concrete Block White	1032,1033,1034	A	0	0	0	0	Lead (Low)	Yes	-
Paint	L0018	Wall Plaster White	1033	A	0	0	0	0		No	-
Paint	L0019	Wall Metal	1032	A	0	0	0	0	Lead (Low)	Yes	-
Paint	L0020	Other Metal Black, On Hand Rails	1033	A	0	0	0	0	Lead (High)	Yes	-
Lead Product	V9500	Batteries In Emer. Lights	1032	A	0	0	4	0	Presumed Lead Product	Yes	-
Lead Product	V9500	Batteries In Emer. Lights	1033	A	0	0	2	0	Presumed Lead Product	Yes	-
Hg	V9500	Light Fixture	1033	A	0	0	0	100	Presumed Hg	Yes	-
Hg	V0000	Light Fixture	1032	A	0	0	0	0	-	No	-

Legend:

Sample number	
S####	Asbestos sample collected
L####	Paint sample collected
P####	PCB sample collected
M####	Mould sample collected
V####	Material visually similar to numbered sample collected
V0000	Known non Hazardous Material
V9000	Material is visually identified as Hazardous Material
V9500	Material is presumed to be Hazardous Material
[Loc. No.]	Abated Material

Units	
SF	Square feet
LF	Linear feet
EA	Each
%	Percentage

NF	Non Friable material.
F	Friable material
PF	Potentially Friable material

APPENDIX VI
All Data Report

ALL DATA REPORT

Client: HWDSB
Location: #1032 : Gym
Survey Date: 2026-01-20

Site: 86 Cameron Ave, Dundas, ON
Floor: 1

Building Name: Yorkview Elementary School
Room #: 113
Last Re-Assessment: 0000-00-00

Area (sqft): 2500

ASBESTOS																
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard	Friable
Ceiling ¹	Acoustic tile	Cement Product, 24x24 perforated			C	Y		2500(7)			SF	V9500	Presumed Asbestos		Presumed Asbestos	NF
Duct		Not Insulated			C	N										
Floor		Mastic			A	Y		2500(7)			SF	S0013ABC	Chrysotile	0.5-5%	Confirmed Asbestos	NF
Floor		Vinyl Floor Tile, 12x12 off white with grey fleck			A	Y		1430			SF	S0015ABC	None Detected	N.D.	None	
Floor		Vinyl Floor Tile, 12x12 teal			A	Y						V0013	[None]	[None]	[None]	
Mechanical Equipment	Unit heater	Not Insulated			C	Y										
Other		Paint			A	Y		100			%	S0028D	None Detected	N.D.	None	
Other	Window	Caulking, Grey			C	Y		30			LF	S0040ABC	None Detected	N.D.	None	
Other	Window	Caulking, white, under silicone	Exterior		C	Y						S0042ABC	None Detected	N.D.	None	
Piping		Fibreglass	ALL		A	Y										
Structure	Beam deck joist	Metal			C	Y										
Wall		Masonry			A	Y										
Wall		Cement Product			A	Y		350(7)			SF	V0039	Chrysotile	10-25%	Confirmed Asbestos	NF
Wall		Texture Coat		Masonry	A	Y		100			%	V0030	None Detected	N.D.	None	
Wall	Column	Paint, Metal			A	Y						S0041ABC	None Detected	N.D.	None	
Wall	Expansion joint	Caulking			A	Y		45			LF	S0045ABC	None Detected	N.D.	None	

above ceiling not assessed due to height

1 - asbestos-containing pipe insulations are assumed present above Transite ceiling tiles (no access)

Client: HWDSB
Location: #1032 : Gym
Survey Date: 2026-01-20

Site: 86 Cameron Ave, Dundas, ON
Floor: 1

Building Name: Yorkview Elementary School
Room #: 113
Last Re-Assessment: 0000-00-00

Area (sqft): 2500

PAINT								
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard
Wall	Metal				L0019		Pb: 0.083 %	Lead (Low)
Structure	Steel	100		%	V0002	red, assumed present (no access)	Pb: 0.28 %	Lead (High)
Wall	Concrete Block				V0017	White	Pb: 0.098 %	Lead (Low)

above ceiling not assessed due to height

Client: HWDSB
Location: #1032 : Gym
Survey Date: 2026-01-20

Site: 86 Cameron Ave, Dundas, ON
Floor: 1

Building Name: Yorkview Elementary School
Room #: 113
Last Re-Assessment: 0000-00-00

Area (sqft): 2500

PB PRODUCTS				
Component	Quantity	Unit	Sample	Hazard
Batteries In Emer. Lights	4	EA	V9500	Presumed

above ceiling not assessed due to height

Client: HWDSB

Location: #1032 : Gym

Survey Date: 2026-01-20

Site: 86 Cameron Ave, Dundas, ON

Floor: 1

Building Name: Yorkview Elementary School

Room #: 113

Last Re-Assessment: 0000-00-00

Area (sqft): 2500

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture			V0000	

above ceiling not assessed due to height

ALL DATA REPORT

Client: HWDSB
Location: #1033 : Stage
Survey Date: 2026-01-20

Site: 86 Cameron Ave, Dundas, ON
Floor: 1

Building Name: Yorkview Elementary School
Room #: 113B
Last Re-Assessment: 0000-00-00

Area (sqft): 600

ASBESTOS																
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard	Friable
Floor		Wood			A	Y										
Other		Dust, open bag of Canada Talc Industries Ltd. (Talfil 325)			B	Y						S0044A	None Detected	N.D.	None	
Structure	Beam deck joist	Steel			C	Y										
Wall		Plaster, Whiteboard			A	Y						S0029D	None Detected	N.D.	None	
Wall		Masonry, yellow fireproof brick			B	Y						S0043ABC	None Detected	N.D.	None	
Wall		Cement Product, Above curtains			A	Y		400(7)			SF	V0039	Chrysotile	10-25%	Confirmed Asbestos	NF
Wall		Texture Coat			A	Y						S0030D	None Detected	N.D.	None	
Wall		Paint			A	Y						S0028H	None Detected	N.D.	None	
Wall		Concrete Block			A	Y										
Wall	Column	Cement Product			A	Y		300(7)			SF	S0039ABC	Chrysotile	10-25%	Confirmed Asbestos	NF

Client: HWDSB
Location: #1033 : Stage
Survey Date: 2026-01-20

Site: 86 Cameron Ave, Dundas, ON
Floor: 1

Building Name: Yorkview Elementary School
Room #: 113B
Last Re-Assessment: 0000-00-00

Area (sqft): 600

PAINT								
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard
Wall	Concrete Block				L0017	White	Pb: 0.098 %	Lead (Low)
Wall	Plaster				L0018	White	Pb: 0.00052 %	No
Other	Metal				L0020	black, on hand rails	Pb: 0.22 %	Lead (High)
Structure	Steel	100		%	V0002	red, assumed present below beige paint (no access)	Pb: 0.28 %	Lead (High)

Client: HWDSB
Location: #1033 : Stage
Survey Date: 2026-01-20

Site: 86 Cameron Ave, Dundas, ON
Floor: 1

Building Name: Yorkview Elementary School
Room #: 113B
Last Re-Assessment: 0000-00-00

Area (sqft): 600

PB PRODUCTS				
Component	Quantity	Unit	Sample	Hazard
Batteries In Emer. Lights	2	EA	V9500	Presumed

Client: HWDSB
Location: #1033 : Stage
Survey Date: 2026-01-20

Site: 86 Cameron Ave, Dundas, ON
Floor: 1

Building Name: Yorkview Elementary School
Room #: 113B
Last Re-Assessment: 0000-00-00

Area (sqft): 600

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	100	%	V9500	Presumed

ALL DATA REPORT

Client: HWDSB
Location: #1034 : Gym Storage
Survey Date: 2026-01-20

Site: 86 Cameron Ave, Dundas, ON
Floor: 1

Building Name: Yorkview Elementary School
Room #: 113A
Last Re-Assessment: 0000-00-00

Area (sqft): 0

ASBESTOS																
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard	Friable
Floor		Wood			A	Y										
Structure	Beam deck joist	Steel			C	Y										
Wall		Texture Coat			A	Y						V0030	None Detected	N.D.	None	
Wall		Paint			A	Y						V0028	None Detected	N.D.	None	
Wall		Concrete Block			A	Y										

Client: HWDSB
Location: #1034 : Gym Storage
Survey Date: 2026-01-20

Site: 86 Cameron Ave, Dundas, ON
Floor: 1

Building Name: Yorkview Elementary School
Room #: 113A
Last Re-Assessment: 0000-00-00

Area (sqft): 0

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry				V0017	White	Pb: 0.098 %	Lead (Low)	
Structure	Steel	100		%	V0002	red, assumed present below beige paint (no access)	Pb: 0.28 %	Lead (High)	
Wall	Concrete Block				V0017	White	Pb: 0.098 %	Lead (Low)	

ALL DATA REPORT

Client: HWDSB
Location: #1045 : Corridor
Survey Date: 2026-01-20

Site: 86 Cameron Ave, Dundas, ON
Floor: 1

Building Name: Yorkview Elementary School
Room #: 101
Last Re-Assessment: 0000-00-00

Area (sqft): 2500

ASBESTOS																
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard	Friable
Ceiling ¹		Ceiling Tiles (lay-in), 24x48 pinhole and fleck			C	Y		100			%	V0000	Non-Asbestos		None	
Duct		Not Insulated			C	N										
Floor		Vinyl Floor Tile and Mastic, 12x12 light grey with white fleck						1000(7)			SF	V0005	Chrysotile	0.5-5%	Confirmed Asbestos	NF
Floor		Terrazzo			A	Y										
Mechanical Equipment	Not found															
Other		Paint			A	Y		100			%	S0028A	None Detected	N.D.	None	
Piping		Fibreglass	ALL		A	Y										
Structure	Beam deck joist	Metal			C	N										
Wall		Drywall and joint compound			A	Y						V0031	None Detected	N.D.	None	
Wall		Masonry			A	Y										
Wall		Texture Coat		Masonry	A	Y		100			%	S0030A	None Detected	N.D.	None	

Includes 118, 108
1 - Date stamped 04/16/11

Client: HWDSB
Location: #1045 : Corridor
Survey Date: 2026-01-20

Site: 86 Cameron Ave, Dundas, ON
Floor: 1

Building Name: Yorkview Elementary School
Room #: 101
Last Re-Assessment: 0000-00-00

Area (sqft): 2500

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Structure	Metal	100		%	V0002	Red paint on steel structure	Pb: 0.28 %	Lead (High)	
Structure	Concrete (precast)	100		%	L0003	Tan paint on concrete block wall	Pb: 0.019 %	Lead (Low)	

Includes 118, 108

Client: HWDSB
Location: #1045 : Corridor
Survey Date: 2026-01-20

Site: 86 Cameron Ave, Dundas, ON
Floor: 1

Building Name: Yorkview Elementary School
Room #: 101
Last Re-Assessment: 0000-00-00

Area (sqft): 2500

PB PRODUCTS				
Component	Quantity	Unit	Sample	Hazard
Batteries In Emer. Lights	6	EA		

Includes 118, 108

Legend:

Sample number	Units	Other
S#### Asbestos sample collected	SF Square feet	A Access
L#### Paint sample collected	LF Linear feet	V Visible
P#### PCB sample collected	EA Each	AP Air Plenum
M#### Mould sample collected	% Percentage	F Friable material
V#### Material is visually identified to be identical to S####	LF Linear feet	NF Non Friable material
V0000 Known non hazardous material		PF Potentially Friable material
V9000 Material visually identified as a Hazardous Material		Pb Lead
V9500 Material is presumed to be a hazardous material		Hg Mercury
		As Arsenic
		Cr Chromium

Access
A Accessible to all building occupants
B Accessible to maintenance and operations staff without a ladder
C Accessible to maintenance and operations staff with a ladder. Also rarely entered, locked areas
D Not normally accessible

Condition
Good No visible damage or deterioration
Fair Minor, repairable damage, cracking, delamination or deterioration
Poor Irreparable damage or deterioration with exposed and missing material

Visible
Y The material is visible when standing on the floor of the room, without the removal or opening of other building components (e.g. ceiling tiles or access panels).
N The material is not visible to view when standing on the floor of the room and requires the removal of a building component (e.g. ceilings tiles or access panels) to view and access. Includes rarely entered crawlspaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.
L The material is partially visible to view when standing on the floor of the room and requires the removal of a building component (e.g. ceiling system or access panels) to view completely and access. Includes partially viewed access points to crawlspaces, attic spaces, etc. without entering. Observations are limited to the extent visible from the access points.

Air Plenum
Yes or No The material is in a return air plenum or in a direct airstream or there is evidence of air erosion (e.g. duct for heating or cooling blowing directly on or across an ACM). This field is only completed where Air Plenum consideration is required by regulation.

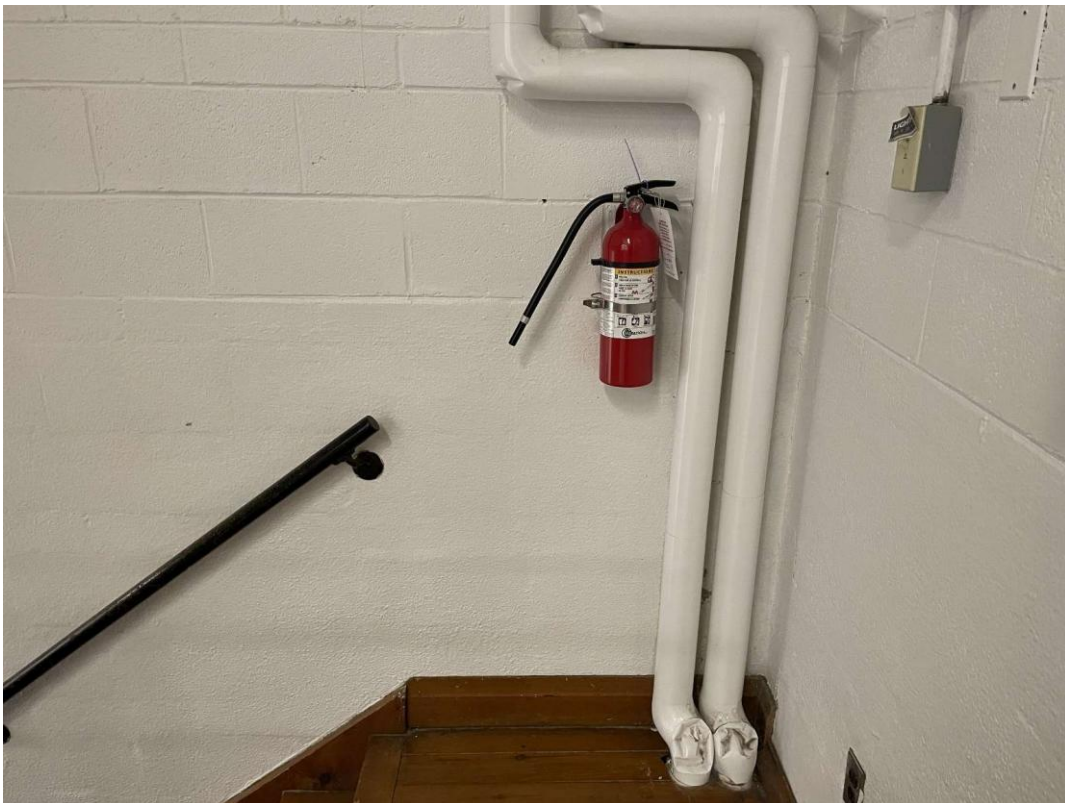
Colour Coding
The material is a hazardous material, either by analytical results or by visible identification.
The material is presumed to be a hazardous material, based on visual appearance, and was not sampled due to limited access or the non-destructive nature of sampling.

Action					
(1)	Clean up of ACM Debris	(2)	Precautions for Access Which may Disturb ACM Debris	(3)	ACM removal
(4)	Precautions for Work Which may Disturb ACM in Poor Condition	(5)	Proactive ACM removal (Minimum repair required for fair condition)	(6)	ACM repair
(7)	Management program and surveillance				

APPENDIX VII
Photographs



S0013A (Confirmed Asbestos), Floor, Mastic, Gym (Location #: 1032)



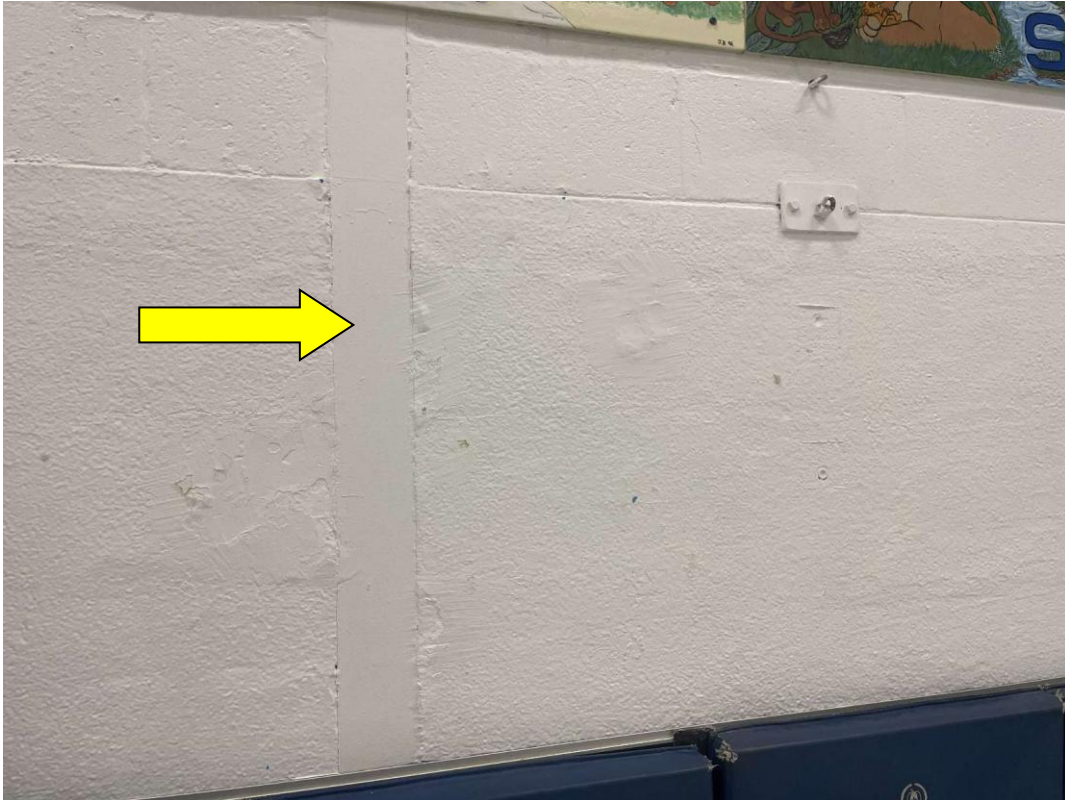
S0030D (None), Wall, Texture Coat, Stage (Location #: 1033)



V0039 (Confirmed Asbestos), Wall, Cement Product, Stage (Location #: 1033)



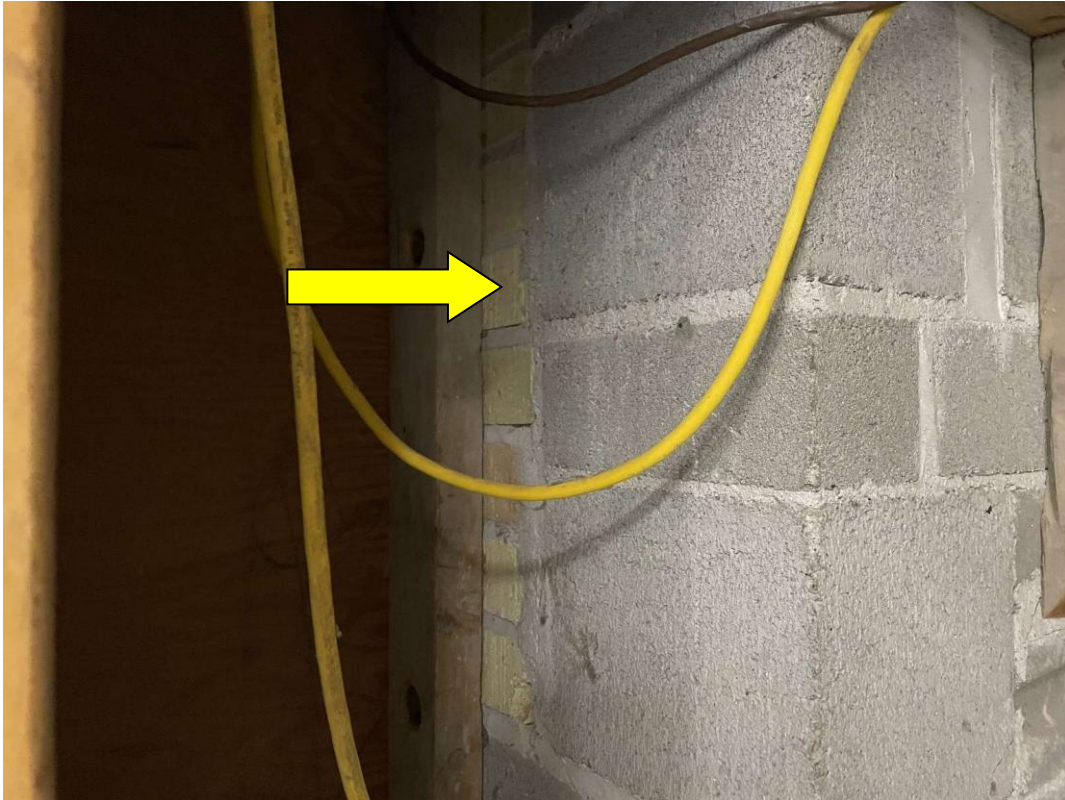
S0040A (None), Grey, Other, Window, Caulking, Gym (Location #: 1032)



S0041A (None), Metal, Wall, Column, Paint, Gym (Location #: 1032)



S0042A (None), white, under silicone, Other, Window, Caulking, Gym (Location #: 1032)



S0043A (None), yellow fireproof brick, Wall, Masonry, Stage (Location #: 1033)



S0044A (None), open bag of Canada Talc Industries Ltd. (Talfil 325), Other, Dust, Stage (Location #: 1033)



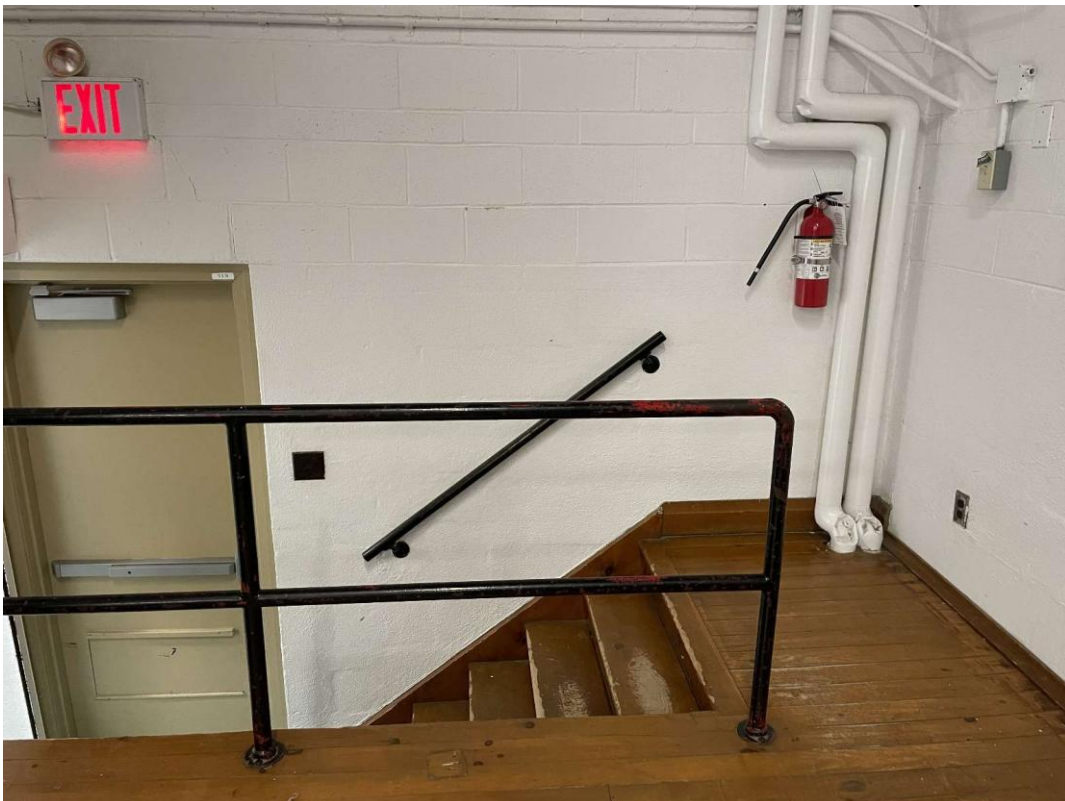
S0045A (None), Wall, Expansion Joint, Caulking, Gym (Location #: 1032)



V9500 (Presumed Asbestos), 24x24 perforated, Ceiling, ACOUSTIC TILE, Cement Product, Gym (Location #: 1032)



V0002(Lead, High), red, assumed present below beige paint (no access), Structure, Stage (Location #: 1033)



L0020(Lead, High), black, on hand rails, Other, Stage (Location #: 1033)