



Hamilton Wentworth District School Board
RENOVATIONS AT RICHARD BEASLEY ELEMENTARY SCHOOL
80 Currie Street, Hamilton, Ontario

Project 24148

DATE April 22, 2024



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End of Section

PART 1 GENERAL

1.1 Definitions

- .1 The following Section of this Specification are of the abbreviated type and include incomplete sentences. Definite and indefinite articles have often been omitted and sentences are written in the form of direct instructions to the Contractor without using the phrase 'the Contractor shall.' Standard specifications and other quality references inserted govern materials and workmanship without using phrases 'conform with,' 'conformity therewith,' etc. Omitted words and phrases to be supplied in the same manner as they are when a note appears on the Drawings.
- .2 The Specifications are separated into Sections for reference convenience only. Such separation must in no instance make Owner or his Consultants arbiter to establish subcontract limits between Contractor and Subcontractor.
- .3 Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on Drawings and/or in Specifications, including all labour, materials, equipment, tools, services, and incidentals necessary and required to complete the work. Responsibility for breakdown into and extension of subcontracts, including co ordination of same, rests entirely with the Contractor.
- .4 Standard Specifications referred to are editions in force at Tender Closing Date.

1.2 Terminology

- .1 Consultants are the team of Architects, Engineers and other experts commissioned by the Owner, directly or indirectly, to execute design, contract documents and supervision for the project, including any of their agents or employees.
- .2 Prime Consultant is the Architect.
- .3 Contractor is the Firm or Corporation who, having signed the Agreement, has the sole legal responsibility to carry out the work shown or described in the Contract Documents for the Owner, whether contractually assigned to a Subcontractor or supplier, or not.

1.3 Minimum Standards

- .1 Unless otherwise specified, work and material to conform or exceed the minimum standards set out in the editions of the Canadian Government Specification Board, Canadian Standards Associations, the Ontario Building Code, Underwriters' Laboratories of Canada, the Canadian Electrical Code, the Local Building Code in force, whichever is applicable.
- .2 Copies of Standard Specifications referred to in this Specification to be kept on the site.
- .3 The use of the name (or its abbreviation) of any of the following bodies, accompanied by the reference number of a specification of that body to mean that the entire specification of the body to apply as noted:

AISC:	American Institute of Steel Construction;
ASTM:	American Society for Testing Materials;
CEC:	Canadian Electric Code;
CGSB:	Canadian Government Specification Board;
CISC:	Canadian Institute of Steel Construction;
CRCA:	Canadian Roofing Contractors' Association;
CSA:	Canadian Standards Association;

OBC: Ontario Building Code;
ULC: Underwriters' Laboratories of Canada;
CLA: Canadian Lumbermen's Association.

1.4 Cooperation

- .1 Each trade to co operate with the trades of adjacent or affected work. Supply in good time requirements affecting adjacent and underlying work in writing and items to be set or built in. Similarly, heed requirements and build in items provided by other trades.
- .2 Take necessary precautions to protect work of other trades from contamination, marring or other damage due to application or installation processes, methods and activities.
- .3 General Contractor and each trade to co-operate with Contractors which may be assigned or selected by the Owner to perform work under Cash Allowances. Owner reserves the right to assign non-unionized labour to perform work under Cash Allowances, at Owners discretion.

1.5 Coordination

- .1 Co ordinate the work of all trades in such a manner that each trade co operates with the trade of adjacent work.
- .2 Organize weekly job site meetings and send out notices stating time and place to Consultants, subcontractors, Suppliers and all others whose presence is required at the meetings.
- .3 Make note of all persons attending these meetings and submit to Consultants and Owner, Minutes of these Meetings showing any major decisions made and instructions or information required.
- .4 Co-ordinate the Work in this Contract with the work of others awarded work under Cash Allowances.

1.6 Building Dimensions and Coordination

- .1 Ensure that all necessary job dimensions are taken and all trades are coordinated for the proper execution of the work. Assume complete responsibility for the accuracy and completeness of such dimensions, and for co-ordination.
- .2 Verify that all work, as it proceeds, is executed in accordance with dimensions and positions indicated which maintain levels and clearances to adjacent work, as set out by requirements of the drawings, and ensure that work installed in error is rectified before construction resumes.
- .3 Check and verify all dimensions referring to the work and the interfacing of all services. Verify all dimensions with the trade concerned when pertaining to the work of other trades. Be responsible to see that Subcontractors for various trades co-operate for the proper performance of the Work.
- .4 Avoid scaling directly from the drawings. If there is ambiguity or lack of information, immediately inform the Consultant. Be responsible for any change through the disregarding of this clause.
- .5 All details and measurements of any work which is to fit or to conform with work installed shall be taken at the building.
- .6 Advise Consultant of discrepancies and if there are omissions on drawings, particularly reflected ceiling plans and jointing patterns for paving, ceramic tile, or carpet tile layouts, which affect

aesthetics, or which interfere with services, equipment or surfaces. DO NOT PROCEED without direction from the Consultant.

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

1.7 Use of Premises Before Substantial Performance

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

1.8 Layout of Work

- .1 Layout work with respect to the work of all trades. Arrange mechanical and electrical work such as piping, ducts, conduits, panels, equipment and the like to suit the architectural and structural details.
- .2 Alterations necessary due to conflict and interference between trades, to be executed at no cost to the Owner unless notification is given in writing before Tender Closing Date.

1.9 Bylaws and Regulations

- .1 Nothing contained in the Drawings and Specifications are to be so construed as to be knowingly in conflict with any law, by law or regulation of municipal, provincial or other authorities having jurisdiction.
- .2 Perform work in conformity with such laws, by laws and regulations and make any necessary changes or deviations from the Drawings and Specifications subsequently required as directed and at no cost to the Owner unless notification is given in writing before Tender Closing Date.
- .3 Furnish inspection certificates and/or permits as may be applicable as evidence, that installed work conforms with laws, by laws, and regulations of authorities having jurisdiction.

1.10 Protection

- .1 Take necessary precautions and provide and install required coverings to protect material, work and finishes from contamination, damage, the elements, water and frost.
- .2 Make good any damage or replace damaged materials, as directed. Repairs to be made by the trade having originally installed or fabricated the damaged material, finish or item. Protect electrical equipment from water and the elements.
- .3 Protect adjacent private and public property from damage and contamination.

- .4 Protect curbs and sidewalks from damage from trucking by means of boards and the like. Repair, or pay or repair of damage to existing roads and sidewalks.
- .5 Mark glass after glazing in an acceptable manner and leave in place until final clean-up.
- .6 Protect floor finishes from construction traffic and transport of construction materials and equipment by means of 6 mm plywood panels.

1.11 Delivery, Handling and Storage of Materials

- .1 Schedule material delivery so as to keep storage at site to the absolute minimum, but without causing delays due to late delivery.
- .2 All deliveries to the school premises must be scheduled to arrive when no students are outside. This includes avoiding times when students are arriving, departing, or during outdoor activities.
- .3 Any maneuvering of vehicles or equipment within or around the school premises must be conducted while students are in class. This excludes maneuvering during breaks, lunch periods, or any other times when students might be outside.
- .4 All site maneuvering activities must be accompanied by a flag person to ensure the safety of students and staff.
- .5 Store materials which will be damaged by weather in suitable dry accommodation. Provide heat, as required, to maintain temperatures recommended by material manufacturer.
- .6 Store highly combustible or volatile materials separately from other materials, and under no circumstances, within the building. Protect against open flame and other fire hazards. Limit volume of supply on the site to minimum required for one day's operations.
- .7 Handle and store material so as to prevent damage to material, structure and finishes. Avoid undue loading stresses in materials or overloading of floors.
- .8 Do not store material and equipment detrimental to finished surfaces within areas of the building where finishing has commenced or has been completed. No storage will be available within the school. Contractor to make necessary arrangements exterior to the school in storage containers as needed. Coordinate locations with school prior to placement and protect all existing surfaces.
- .9 Deliver package material in original, and Storage of unopened and undamaged containers with manufacturer's labels and seals intact.

1.12 Debris

- .1 Assign clean-up duties to a crew with own Foremen which will be of sufficient size to prevent accumulation of debris and dirt in any part of the structure or on the site.
- .2 Remove construction debris on a daily basis and legally dispose of same.
- .3 Under no circumstances should debris, rubbish or trash be burned or buried on the site.

1.13 Cutting, Fitting and Patching

- .1 Required cutting to be done by General Contractor. Patching and painting of work to be executed by the General Contractor.
- .2 All sub-trades are to notify the General Contractors bidding as to the extent of the cutting, patching, and painting of their respective trades.
- .3 Drilling, cutting, fitting and patching necessary due to failure to deliver items to be built in time, or installation in wrong location to be executed, as directed, at no cost to the Owner.
- .4 Give written notification prior to commencement of drilling and cutting of load bearing structural members and finished surfaces.
- .5 Cut holes with smooth, true, clean edges, after they are approved by applicable trade. Size holes and openings for hot water and steam pipes, so as to allow for expansion and contraction of such pipes.

1.14 Fastenings

- .1 Supply all fastenings, anchors and accessories required for fabrication and erection or work.
- .2 Metal fastenings to be of the same material as the metal component they are anchoring, or of a metal which will not set up an electrolysis action which would cause damage to the fastening or metal component under moist conditions.
- .3 Exposed metal fastenings and accessories to be of the same texture, color, and finish as base metal on which they occur. Keep to a minimum; evenly space and lay out.
- .4 Fastenings to be permanent, of such a type and size and installed in such a manner to provide positive anchorage of the unit to be secured. Wood plugs are not acceptable. Install anchors at required spacing to provide required load bearing or shear capacity.
- .5 Power actuated fastenings are not to be used without prior written approval for specific use.

1.15 Surplus Materials

- .1 Surplus materials specifically so specified, to remain property of the Owner and be neatly stockpiled or stored, as directed.
- .2 All other surplus materials to become property of the Contractor; to be removed from the site and legally disposed of.

1.16 Documents Required and General Duties

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

- .2 Organize Job Meetings in accordance with Section 01200.
 - .3 Supply Monthly Progress Reports and Construction Schedule in accordance with Section 01 20 00.
 - .4 Confirm that payments are being made to subcontractors and suppliers by submission of receipts with the second and subsequent Progress Payment Application. No payment will be made for unincorporated material on the site, unless Bill of Sale in proper format is provided.
- .3 Upon Completion
- .1 Upon completion of work before the Final Certificate of Payment is issued, the following to be observed, executed and submitted:
 - .1 All deficiencies to have been completed in a satisfactory manner.
 - .2 All final clean-up to have been executed, as specified in Section 01 71 00.
 - .3 Finishing Hardware, Inspection and Verification.
 - .4 Organize a Final Inspection tour at which to be present:
 - .1 The Owner's authorized representative; the Architectural, Structural, Mechanical and Electrical Consultants, and their supervisory personnel, if any;
 - .2 The Contractor and his superintendent.
 - .5 Where the above procedure is impossible or where any deficiencies remain outstanding, the Owner's representative and the Consultant concerned, to inspect and accept the affected work and/or material upon notification by the Contractor, that all deficiencies involving this Consultant have been made good.
 - .6 A complete release of all liens arising out of this Contract, other than his own. If a subcontractor or supplier refuses to furnish a release of such a lien, furnish a bond satisfactory to the Owner to indemnify him against any claim under such a lien.
 - .7 Certificates of good standing from the Workers' Compensation board, for the General Contractor and all Subcontractors.
 - .8 All reference records, as specified, under Section 01720.
 - .9 Certificate of Inspection from Mechanical and Electrical Engineers.
 - .10 Copies of all Lists of Deficiencies with each Deficiency verified when complete by only this project's job Superintendent. The Final List of Deficiencies to be signed, completed by all concerned, if accepted.
 - .11 Statement of Completion from General Contractor.
 - .12 Final adjustment of all Allowances.
 - .13 H.E.P.C. Inspection Certificate and all other Inspection Certificates required by Provincial, Municipal and other authorities having jurisdiction.
 - .14 Balancing Reports.
 - .15 As-Built Drawings. – Hardcopy mark ups and digital pdf files and AutoCAD v2018 or higher.
 - .16 One hard copy of Operation and Maintenance Manuals. A digital copy (pdf file) of all closeout documents to be provided on USB memory stick format.

1.17 Progress Reports

- .1 Submit to the Architect, Monthly Progress Reports consisting of a concise narrative and a marked up summary schedule showing physical percentage complete by item and in total. These progress calculations must agree with the Progress Payment Claims.
- .2 Keep permanent written daily records on the site on the progress of work. Record to be open to inspection at reasonable times and copies to be furnished upon request. Records to show notes of commencement and completion of different trades and parts of work; daily high and low temperatures and other weather particulars; number of men engaged on the site (including sub-trades) broken down in groups for each type of construction work, and particulars about

excavation and shoring; erection and removal of form work; pouring and curing of concrete; floor finishing; placing and compaction of backfill, masonry work; roofing.

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

1.18 Inspection and Testing

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

1.19 Site Specific Information

- .1 Refer to the attached Construction School Specific Information Sheet.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not Used.

PART 3 EXECUTION

3.1 Not Used

- .1 Not Used.

End of Section

Appendix A – Construction School Specific Information Sheet Sample

In addition to the terms and conditions of the Contract Documents, the Contractor shall follow the protocols of the Construction Site Specific Information Sheet, sample provided below.

A completed version of this document, with site specific content, will be provided to the Contractor at the pre-construction meeting.

Construction School Specific Information Sheet

1. School Information:

School Name: Insert School Name

Bell Times

Morning (School Entry): 0:00 AM
Afternoon (School Dismissal): 0:00 PM
Aftercare Program Dismissal: 6:00 PM

Caretaking Phone Number: 000-000-0000

***After-Hours Emergency Number:** 905-667-3079

****Caretaking Hours**

September to June 6:00 AM – 10:00 PM
December Holiday Break 6:00 AM – 2:00 PM
March Break 6:00 AM – 2:00 PM
July to August 6:00 AM – 2:00 PM
Saturday / Sunday CLOSED

Account Code: HP0000

Security Panel Code: 0000

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

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

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

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

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

Construction School Specific Information Sheet

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

3. Protocol for Work Impacting Fire Alarm System or Devices

The contractor is to follow this procedure when the fire alarm system is impacted.

A. References and Definitions:

Fire Alarm Control and Testing Service Provider: Hamilton Fire Control

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

Fire Watch: An hourly patrol of areas that are not protected/monitored by the fire alarm system. These include but are not limited to, a disconnected device, a covered device, a bypassed device, or device in trouble. The general contractor is responsible for fire watch in all construction areas. Caretaking staff are responsible for fire watch in all other areas of the school. Fire watch is to be recorded in a Fire Watch Log.

Fire Watch Log: The general contractor is to document and maintain a written log confirming fire watch has been conducted hourly. This log is to remain on site for the duration of the project. This written log is maintained separate from the caretaking fire watch log. The caretaking log is digitally recorded within the Boards asset management system (eBase).

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

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

Contact: Michael Fleet - Hamilton Fire Control

Phone: (905) 527-7042

Email: michael@hamiltonfirecontrol.ca

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

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

Construction School Specific Information Sheet

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

If hot work is taking place, prior to the above-noted steps:

- Contractors are required to advise HWDSB at least 24 hours before any hot work is scheduled to take place.
 - The contractor is required to provide a hot work permit to HWDSB at the same time.
3. If devices are impacted outside of occupied hours, and the contractor is the only party in the building:
 - The same protocol above is to be followed.
 4. If the system or specific devices will not be operational while the school is completely vacant (i.e. overnight or on a weekend when no Work is taking place):
 - No action required.

The system is not to be bypassed (device(s) or full system). The system is NOT to be put on test. The only time the system will be put on test and the school will be on Fire Watch is if the system is being tested.

In the event a fire alarm device is activated, all occupants of the school, including contractors, must evacuate the school. The fire department will be dispatched. The contractor will be responsible for all fire department costs resulting from construction.

4. Please follow these steps for planning any service (electrical, gas, water) shutdowns:

A. Internal Localized System/Service Shutdowns:

Construction School Specific Information Sheet

1. Localized shutdowns **require minimum 3 days' notice** to HWDSB project supervisor for coordination with the school facility and staff.
2. Shutdowns must be completed outside of school bell times/operational hours which vary by facility and must be scheduled for evenings after 6:00 PM, weekends or board holidays.
3. If a shutdown will impact the security system, the contractor shall contact API Alarm Inc. at 1-877-787-5237 and notify them in advance of the day(s) and time(s) of the shutdown.
4. If a shutdown impacts the fire alarm system, the contractor shall follow the Fire Alarm Bypass Protocol, section 4 above.
5. If required, the contractor is to coordinate with Board vendor/s to be on site to ensure boilers, roof top units, heat pumps, etc. are functioning properly after service disruption has concluded.

- Chamberlain Building Services Inc - info@chbs.ca, 905-664-1914 or
- Union Boiler Company Limited - info@unionboiler.com, 905-528-7977

6. Process will vary based on services shutdown and ability to localize shutdown.

B. Complete School System/Service Shutdowns:

1. Complete building shutdowns **require minimum 5 days' notice** to HWDSB project supervisor.
2. Shutdowns must be completed outside of school bell times/operational hours which vary by facility and must be scheduled for evenings after 6:00 PM, weekends or board holidays.
3. Contractor to contact API Alarm Inc. at 1-877-787-5237 and notify them in advance of the day(s) and time(s) of shutdown.
4. During the shutdown, the contractor is responsible for following Fire Alarm Bypass Protocol, section 4 above.
5. The contractor is to coordinate with Board vendor/s to be on site to ensure boilers, roof top units, heat pumps, etc. are functioning properly after service disruption has concluded.

- Chamberlain Building Services Inc - info@chbs.ca, 905-664-1914 or
- Union Boiler Company Limited - info@unionboiler.com, 905-528-7977

6. HWDSB project supervisor will coordinate with other HWDSB departments to ensure all systems (IIT, security, communications) are up and running after service disruption has concluded.
7. If required, HWDSB project supervisor will coordinate with City of Hamilton staff if site has shared facilities such as recreation centre, community centre, pool or library, etc.
8. Process will vary based on service shutdown.

C. Heating and Cooling System Shutdowns:

Construction School Specific Information Sheet

1. Heating and cooling system shutdowns **require minimum 5 days' notice** to HWDSB project supervisor
2. Shutdowns must be completed outside of school bell times/operational hours which vary by facility and must be scheduled for evenings after 6:00 PM, weekends or board holidays.
3. The contractor is to coordinate with Board vendor/s to be on site to ensure boilers, roof top units, heat pumps, etc. are functioning properly after service disruption has concluded.
 - Chamberlain Building Services Inc - info@chbs.ca, 905-664-1914 or
 - Union Boiler Company Limited - info@unionboiler.com, 905-528-7977
4. If the boiler system is drained, the contractor upon refilling the system, is responsible for coordinating Board approved chemical treatment vendor to treat water.
 - Aquarian Chemicals Inc - info@aquarianchemicals.com, 905-825-3711
5. Process will vary based on services shutdown and ability to localize shutdown.

D. Asbestos Abatement and Designated Substance Related Work:

1. Designated substance related work **requires minimum 5 days' notice** to HWDSB project supervisor.
2. Designated substance related work in occupied areas must be completed outside of school bell times/operational hours which vary by facility and must be scheduled for evenings after 6:00 PM, weekends or board holidays.

LIST OF DRAWINGS

Dwg. No.	Title	Issue No.	Rev. No.	Issue Date
ARCHITECTURAL				
A000	OBC Matrix, Location Plan & Drawing List	4	-	
A101	Site Plan	4	-	
A102	Part Site Plan	4	-	
A103	Part Demolition Site Plan	4		
A104	Site Details	4		
A201	Overall Demolition Floor Plan	4	-	
A202	Overall Floor Plan	4	-	
A203	Part Demolition Floor Plans	4	-	
A204	Part Floor Plans	4	-	
A205	Part Reflected Ceiling Plans	4	-	
A401	Lift Sections	4	-	
A402	Wall Sections	4	-	
A701	Interior Elevations	4	-	
A901	Room and Door Schedules	4	-	
STRUCTURAL				
S100	General Notes and Schedules	4	-	
S101	Typical Details	4	-	
S201	Part Plans	4	-	
STRUCTURAL				
S101	General Notes & Schedules	4	-	
S201	Structural Plans	4	-	
S501	Sections	4	-	
MECHANICAL				
M-0	Title Sheet	4	-	
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M-1.2	Mechanical Specifications II	4	-	
M-1.3	Mechanical Legend	4	-	
M-1.4	Mechanical Schedules	4	-	
M-1.5	Mechanical Details	4	-	
M-2.1	Floor Plan – HVAC Demolition	4	-	
M-2.2	Floor Plan- HVAC New	4	-	

Dwg. No.	Title	Issue No.	Rev. No.	Issue Date
M-3.1	Floor Plan – Drainage Demolition	4	-	
M-3.2	Floor Plan – Drainage New	4	-	
M-3.3	Floor Plan – Plumbing Demolition	4	-	
M-3.4	Floor Plan – Plumbing New	4	-	
ELECTRICAL				
E-1.1	Electrical Legend & Details	4	-	
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End of Section

PART 1 GENERAL

1.1 Project Meetings for Coordination

- .1 Following the pre-construction meeting/construction phase kick-off meeting, arrange for site meetings every 2 weeks as appropriate to the stage of construction, for project coordination. Such meetings shall fall at the same time each week the meeting is scheduled. Prior to substantial performance, meetings shall be scheduled for every week in an effort to effectively complete all obligations under the contract in a timely manner.
- .2 General contractor's site supervisor and project manager as well as other responsible representatives of the Contractor's and Subcontractor's office and field forces and suppliers shall be obliged to attend.
- .3 Inform the Owner, Consultant, and those others whose attendance is obligatory, of the date of each meeting, in sufficient time to ensure their attendance.
- .4 Provide physical space for meetings within the construction office, prepare an agenda, chair and record the minutes of each meeting. Relevant information must be made available to all concerned, in order that problems to be discussed may be expeditiously resolved. Identify "action by: _____".
- .5 Within three days after each meeting, distribute digital copies of the minutes to each invited person, regardless of attendance.

1.2 Preconstruction Meeting

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

1.3 Project Meetings for Progress of Work

- .1 Conduct progress meetings in accordance with the schedule and/or decisions made at Pre-construction meeting.
- .2 Inform the Owner, Consultant, project consultants, Subcontractors and suppliers and those whose attendance is obligatory, of the date of the meeting, in sufficient time to ensure their attendance.
- .3 Include in the agenda the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revisions to construction schedule.
 - .8 Progress during the preceding work period.
 - .9 Look ahead for the succeeding two-week work period.
 - .10 Review submittal schedules: expedite as required.
 - .11 Maintenance of quality standards.
 - .12 Pending changes and substitutions.
 - .13 Review proposed changes for effect on construction schedule and on completion date.
 - .14 Other business

1.4 Progress Records

- .1 Maintain a permanent written record on the site of the progress of the work using standard OGCA form. This record shall be available to the Consultant at the site, and a copy shall be furnished to same on request. The record shall contain:
 - .1 Daily weather conditions, including maximum and minimum temperatures.
 - .2 Dates of the commencement and completion of stage or portion of the work of each trade in each area of the project.
 - .3 Conditions encountered during excavation.
 - .4 Dates of erection and removal of formwork, in each area of the project.
 - .5 Dates of pouring the concrete in each area of the project, with quantity and particulars of the concrete.
 - .6 Work force on project daily per trade.
 - .7 Visits to site by personnel of Consultant, Jurisdictional Authorities and testing companies.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Selection of Products

- .1 If requested by the Consultant, provide the following services and/or information:
 - .1 Assist the Consultant in determining qualified suppliers.
 - .2 Obtain proposals from suppliers.
 - .3 Make appropriate recommendations for consideration of Consultant.
 - .4 Notify Consultant of any effect anticipated by selection of product or supplier under consideration, on construction schedule and contract sum.
- .2 On notification of selection, enter into purchase agreement with designated supplier

1.2 Cash Allowance

- .1 Expend cash allowance only as authorized by the Owner through the Consultant's written instructions with the issuance of a cash allowance disbursement authorization document.
- .2 Include in Contract price the Contractor's charges for handling at site, including uncrating and storage, protection from elements and damage, labour, installation and finishing, testing, adjusting and balancing, and other expenses including overhead and profit on account of Cash Allowance in accordance with Article GC4.1 of the General Conditions of the Contract as amended.
- .3 Credit the Owner with any unused portion of Cash Allowances in the statement for final payment. This credit will be issued as a credit change order.
- .4 If a test made under payment by a specific allowance proves that the material or system is not in accordance with the Documents, then the subsequent testing including Owner's testing of replacement materials or systems shall be Contractor's expense and not taken from Cash Allowance.
- .5 Add or deduct any variation in cost from the Cash Allowance. No adjustment will be made to Contractor's expense.
- .6 The amount of each allowance includes the net cost of the product or service, delivery and unloading at the site.
- .7 All refunds, trade and/or quantity discounts which the Contractor may receive in the purchase of goods under allowances, to be extended to the Owner.
- .8 Receipted invoices covering all disbursements made by the Contractor under Allowances, to be submitted to the Consultant for audit.
- .9 Where the Cash Allowance stipulates "Supply Only," the Contract Price and not the Cash Allowances include the installation and hook-up costs. The installation and hook-up of some equipment and materials are specified under other Sections of the Specifications. The General Contract includes the installation and hook-up not specified elsewhere.
- .10 Contractor's profit and overhead on all Cash Allowances to be carried in his lump sum amount, not in the Cash Allowances.
- .11 All Cash Allowances will be dealt with in accordance with Article GC4.1 of the General Conditions as well as HWDSB Supplemental General Conditions.

- .12 All expenditures under Cash Allowances must be approved by the Owner.
- .13 Include in the Stipulated Price quoted, a Cash Allowance in the amount of Ten Thousand----- Dollars (\$10,000).
- .14 To be allocated as follows:
 - .1 Door Hardware, supply only.
 - .2 Supply and installation of Signage
- .15 H.S.T. Goods and Services tax is not included in Cash Allowance amount and is to be carried in the General Contractor's Stipulated Sum Amount.
- .16 Refer to Section 01 00 05 for co-operation with others assigned to this Section.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Requests for Information.
- .2 Submittal Procedures.
- .3 Screening of RFI's.
- .4 Response to RFI's.
- .5 Response Timing.

1.2 Request for Information (RFI)

- .1 A request for information (RFI) is a formal process used during the Work to obtain an interpretation of the Contract Documents or to obtain additional information.
- .2 An RFI shall not constitute notice of claim for a delay.

1.3 Submittal Procedures

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Number RFI's consecutively in one sequence in order submitted, in numbering system as established by the Contractor.
- .3 Submit one distinct subject per RFI form. Do not combine unrelated items on one form.
- .4 RFI Form:
 - .1 Submit a draft "Request for Information" form to be approved by the Owner and Consultant.
 - .2 Submit RFI's to the Consultant on approved "Request for Information" form. The Consultant shall not respond to an RFI except as submitted on this form.
 - .3 Where RFI form does not have sufficient space to provide complete information thereon, attach additional sheets as required.
 - .4 Submit with RFI form all necessary supporting documentation.
- .5 RFI Log:
 - .1 Maintain log of RFI's sent to and responses received from the Consultant, complete with corresponding dates.
 - .2 Submit updated log of RFI's at each construction meeting.
- .6 Submit RFI's sufficiently in advance of affected parts of the Work so as not to cause delay in the performance of the Work. Costs resulting from failure to do so will not be paid by the Owner.
- .7 Only the Contractor shall submit RFI's to the Consultant.
- .8 RFI's submitted by Subcontractors or Suppliers directly to the Consultant will not be accepted.

1.4 Screening of RFI's

- .1 Contractor shall satisfy itself that an RFI is warranted by undertaking a thorough review of the Contract Documents to determine that the claim, dispute, or other matters in question relating to the performance of the Work or the Interpretation of the Contract Documents cannot be resolved by direct reference to the Contract Documents. Contractor shall describe in detail this review on the RFI form as part of the RFI submission. RFI submittals that lack such detailed review

description, or where the detail provided is, in the opinion of the Consultant, insufficient, shall not be reviewed by the Consultant and shall be rejected.

1.5 Response to RFI's

- .1 Consultant shall review RFI's from the Contractor submitted in accordance with this section with the following understandings:
 - .1 Consultant's response shall not be considered as a Change Order or Change Directive, nor does it authorize changes in the Contract Price or Contract Time or changes in the Work.
 - .2 Only the Consultant shall respond to RFI's. Responses to RFI's received from entities other than the Consultant shall not be considered.

1.6 Response Timing

- .1 Allow 5 Working Days for review of each RFI by the Consultant.
- .2 Consultant's review of RFI commences on date of receipt of RFI submission by the Consultant from Contractor and extends to date RFI returned by Consultant.
- .3 When the RFI submission is received by Consultant before noon, review period commences that day. When RFI submittal is received by Consultant after noon, review period begins on the next Working Day.
- .4 If, at any time, the Contractor submits a large enough number of RFI's or the Consultant considers the RFI to be of such complexity that the Consultant cannot process these RFI's within 5 Working Days, the Consultant will confer with the Contractor within 3 Working Days of receipt of such RFI's, and the Consultant and the Contractor will jointly prepare an estimate of the time necessary for processing same as well as an order of priority among the RFI's submitted. The Contractor shall accommodate such necessary time at no increase in the Contract Time and at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Access

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

1.2 Contractor's Site Office

- .1 Contractor's trailer will be used as site office during construction and to accommodate site meetings. It shall be furnished with a drawing layout table and remain for the duration of the project. Coordinate location with Owner and obtain approval.
- .2 Maintain in clean condition.
- .3 Provide and maintain in clean condition: two separate plans layout tables, minimum 48" x 72" each. One table shall be used by the General Contractor, and Subcontractors, at their discretion. The second shall be provided for use by subcontractors and by the Consultant or Inspection and Testing Companies during site visits or project meetings.
- .4 The contractors and/or subcontractors are not permitted to use school spaces/areas form a site office/s at any time.

1.3 Storage Sheds

- .1 Provide adequate weather-tight sheds with raised floors, for storage of materials, tools and equipment. Coordinate location with Owner and obtain approval.
- .2 The contractors and/or subcontractors are not permitted to use school spaces/areas for storage at any time.

1.4 Sanitary Facilities

- .1 Provide portable toilets and other washroom facilities as required. Coordinate location with Owner and obtain approval. Keep area and premises in sanitary condition.
- .2 The contractors and/or subcontractors are not permitted to use school sanitary facilities at any time.

1.5 Parking

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

1.6 Site Enclosures

- .1 Erect temporary site enclosures, hoarding, using prefabricated lock fence system. Fencing shall be mechanically fastened to the ground using secure spikes on the construction side of the fence. Alternatively, construction fencing shall be mechanically fastened to the vertical t-bar piled into the ground. The ground shall be repaired to its original condition matching adjacent surfaces once the fence is no longer required and removed off site. Exterior fencing shall include visual barrier using

geotextile fastened to the fence. Access into this fenced area shall be controlled by the general contractor. Maintain fence at all times for the duration of the project.

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

1.7 Enclosure of Structures

- .1 Provide temporary weather-tight enclosures protection for exterior openings until permanently enclosed.
- .2 Erect enclosures to allow access for installation of materials and working inside enclosures.
- .3 Design enclosures to withstand wind pressure.
- .4 Erect dust barriers to prevent dust migration to non-renovated areas. Provide boot dust mats at each interior connection to occupied areas from the construction entrances/exits. If contractor is not able to prevent dust migration to non-renovated areas, the contractor shall provide negative air units and maintain for the duration of the project until such time where dust migration can be prevented.

1.8 Power Supply

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

1.9 Water Supply

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

1.10 Scaffolding

- .1 Construct and maintain scaffolding in rigid, secure and safe manner.
- .2 Erect scaffolding independent of walls. Remove promptly when no longer required.
- .3 Scaffolding to be designed by a professional Engineer when required under the Occupational Health and Safety Act.

1.11 Heat and Ventilating

- .1 Not applicable.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Construction Safety Measures

- .1 Observe and enforce construction safety measures required by the National Building Code; the O.B.C.; The Provincial Government; Workers' Compensation Board; and Municipal authorities.
- .2 In particular, the Occupational Health and Safety Act (Ont. Re. 213/91), the Occupational Health and Safety Act, the regulations of the Ontario Ministry of Labour and Ontario Hydro Safety requirements shall be strictly enforced.
- .3 Contractor shall ensure that copies of all applicable construction safety regulations, codes and standards are available on the job-site throughout the period of construction. All workers are to be informed that these documents are available for reference at any time.
- .4 The Contractor shall ensure that all supervisory personnel on the job-site are fully aware of the contents of the Occupational Health and safety Act (Ontario Regulation 213/91 - Construction Projects) the Workers' Compensation Act" and, Bill 208 (Chapter 7, Standards of Ontario) "An Act to Amend the Occupational Health & Safety Act and the Workers' Compensation Act", and, that they comply with all requirements and procedures prescribed therein. These documents include, but are not limited to, the following construction safety requirements:
 - .1 Contractor to register with the Director of the Occupational Health and Safety Division before or within 30 days of the commencement of the project, (O.Reg. 213/91, sec 5).
 - .2 File a notice of project with a Director before beginning work on the project, (O.Reg 313/91, sec 6).
 - .3 Notification prior to trenching deeper than 1.2m, (O.Reg. 213/91, sec 7).
 - .4 Accident Notices and Reports, (O.Reg. 213/91, sec 8 through sec 12).
 - .5 General Safety Requirements, (O.Reg. 213/91, sec 13 through sec 19).
 - .6 General Construction Requirements, e.g. protective clothing, hygiene practices, housekeeping, temporary heat, fire safety, access to the job-site, machine and equipment guarding and coverings, scaffolds and platforms, electrical hazards, roofing, et al, (O.Reg. 213/91, sec 20 through sec 221).
 - .7 Establish a Joint Health and Safety Committee where more than 19 workers are employed for more than 3 months, (Bill 208, S.8(2) to S.8(14).
 - .8 Establish a Worker Trades Committee for all projects employing more than 49 workers for more than 3 months, (Bill 208, S-8a(1) to S.8b(4).
 - .9 Ensure that all activities arising out of (.07) and (.08) above are recorded and that minutes are available to an inspector of the Ontario Ministry of Labour.
- .5 The Contractor shall be considered as the "Constructor" in consideration of the rights and responsibilities for all construction safety requirements, procedures, facilities and inspection of all work performed by the Contractor, Subcontractors/Sub-trades and other Contractors engaged on this project.
- .6 In the event of a conflict between any of the provisions of the above authorities the most stringent provisions are to be applied.

1.2 Safety Data Sheets

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

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

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

1.3 Fire Safety Requirements

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

1.4 Overloading

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

1.5 Falsework

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

1.6 Scaffolding

- .1 Design and construct scaffolding in accordance with CSA S269.2-M1980.
- .2 Scaffolding to be designed by a Professional Engineer when required under the Occupational Health and Safety Act.

1.7 Materials Specifically Excluded

- .1 Asbestos and/or asbestos-containing products are not permitted. Submit Material Safety Data Sheets for any product suspected of containing asbestos if so requested by Consultant. Examples of some materials requiring close scrutiny and/or confirmation include:
 - .1 Transite drainage pipe - whether buried or above grade - not permitted.
 - .2 Composite floor tile containing asbestos - not permitted.
 - .3 Lay-in ceiling tiles containing asbestos - not permitted.
 - .4 Insulation and/or jacketing for pipes, ducts, motors, pumps, etc. - not permitted if any asbestos is present.
- .2 Solder for all piping is to be lead-free.
 - .1 "Lead Free" shall mean solder which contains less than 0.030% of lead when dissolved in fluoroboric and nitric acids and tested by inductively coupled argon plasma atomic emission spectroscopy. "Steelbond 281" and "Silverbrite" are acceptable solder products.

- .2 The mechanical contractor shall provide an affidavit signed by the Principal of the company, on company letterhead, that all of the solder used on the project was either one of the two acceptable products or that the solder used (identified by brand name) meets or exceeds the testing criteria.
- .3 The Owner shall undertake random testing of the soldered joints. Should testing prove that the solder used was not as specified, the Owner shall take action against the contractor to the full extent of the law.
- .3 All paint and finish coatings are to be lead and mercury-free. Submit Safety Data Sheets confirming that these products are free of all lead and/or mercury compounds.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Related Work

- .1 These specifications apply to all divisions of the project specification. It is the responsibility of the contractor to apply these provisions wherever practical within specification limits to all products and services used on this project.
- .2 It is recognized that currently specified materials and methods may conflict with the basic intention of this section. Where reasonable alternate materials and methods exist that are not specified here, and that do not compromise quality or create additional cost for the owner, notify the Architect of such alternate materials or methods. Do not proceed to use alternate materials or methods to those specified without the express approval of the Architect.
- .3 Elsewhere, apply the provisions of this section to all work. Exceptions can only be made when signed off by the Architect. Suitability of all products used is the responsibility of the contractor.

1.2 Compliance Specifications

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

1.3 Beyond Compliance Specifications

- .1 These specifications apply in addition to all applicable health, safety and environmental compliance regulations. They are incorporated here to reflect the Owner's intention to develop a specification which maximizes environmentally "friendly" materials and methods wherever possible within current technical and budget limitations.
- .2 Beyond compliance specifications recognize that performance well beyond the minimum regulatory standard is often desirable, possible and affordable, often with no cost or low cost options. It also recognizes that application methods or protocols may be as important as the material specified. Therefore these specifications cover both material and methods.
- .3 The primary goal of beyond compliance specification is to reduce the use of products or methods which have negative health and environmental impacts both during and after construction. These considerations may include full life cycle impacts, associated with raw materials, manufacturing, transport, deconstruction and their eventual fate.
- .4 These specifications will specifically address primary categories of readily identifiable products, ingredients and methods.
- .5 These provisions apply to both indoor and outdoor applications equally.

1.4 Exceptions

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

PART 2 PRODUCTS

2.1 Products or Substances to be Avoided or Limited in Use

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

2.2 Volatile Organic Compounds

- .1 No product containing volatile organic compounds (in over simplified terms volatile petro chemical or similar plant derived solvents) may be used on this project when a suitable non VOC or failing that a low VOC substitute is available. Manufacturers may refer to the U.S. EPA definition of VOC's for guidance or alternatively use the low molecular weight organic compound descriptor.
 - .1 Example: Paints, Coatings, Primer, Adhesives, Chalks, Firestops, etc.
- .2 Waterborne equivalents are available for most of the solvent borne products used in construction and in most cases would be the preferred alternative. Waterborne products may in some instances have high VOC contents, therefore the fact that a product is waterborne does not automatically make it acceptable.

2.3 Chlorinated Substances

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

2.4 Plasticizers

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

2.5 Man-Made Mineral Fibres

- .1 Products containing mineral fibres which can be emitted or abraded should be avoided.
 - .1 Examples: duct liner, mineral fibre ceiling tiles, etc.

2.6 Radiation

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

2.7 Biocides

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

2.8 Heavy Metals

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

2.9 Aluminum

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

2.10 Ozone Depleting Substances

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

2.11 Greenhouse Gases

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

2.12 Bituminous (tar) Products

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

2.13 Chemical Compounds

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

2.14 Adhesives

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

2.15 Composite Products

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

2.16 Cleaners and Solvents

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

PART 3 EXECUTION

3.1 Not Used

Not used

End of Section



Hazardous Building Materials Assessment (Pre-construction)

Washroom and Stage
Renovations
Richard Beasley Elementary
School
80 Currie Street, Hamilton,
Ontario

Prepared for:

**Hamilton-Wentworth District
School Board**

20 Education Court
Hamilton, Ontario, L9A 0B9

March 11, 2025

Pinchin File: 352293.003



Issued to: Hamilton-Wentworth District School Board
Issued on: March 11, 2025
Pinchin File: 352293.003
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EXECUTIVE SUMMARY

Hamilton-Wentworth District School Board (Client) retained Pinchin Ltd. (Pinchin) to conduct a hazardous building materials assessment at Richard Beasley Elementary School located at 80 Currie Street, Hamilton, Ontario. Pinchin performed the assessment on February 18, 2025.

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 renovations to the Washrooms and Stage area.

The results of this assessment are intended for use with a properly developed scope of work or performance specifications and safe work procedures.

SUMMARY OF FINDINGS

The following is a summary of significant findings; refer to the body of the report for detailed findings:

Asbestos:

- Texture coat
- Pipe insulation
- Cement products (Transite)
- Vinyl sheet flooring
- Vinyl floor tiles and mastic
- Window putty
- Caulking
- Sink mastic

Lead:

- Lead is present in paints and coatings.
- Batteries of emergency lights contain solid lead.
- Caulking on cast iron pipe joints (bell and spigot) contains lead.

Silica: Crystalline silica is present in concrete and other materials such as concrete, masonry, and asphalt.

Mercury: Mercury vapour is present in lamp tubes.



Polychlorinated Biphenyls (PCBs): Based on the date of construction, PCBs may be present in light ballasts.

Mould and Water Damage: Visible mould and water damage was not observed.



SUMMARY OF RECOMMENDATIONS

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Conduct further investigation of the following items, which was not completed during this assessment:
 - a. Any items listed as exclusions in this report, prior to disturbance.
2. Prepare a scope of work or specifications and safe work procedures for the hazardous materials removal required for the planned work.
3. Do not disturb suspected hazardous building materials discovered during the planned work, which have not been identified in this report and arrange for further evaluation and testing.
4. Remove and properly dispose of asbestos-containing materials prior to demolition or renovation activities.
5. Remove and properly dispose of PCB ballasts when fixtures are decommissioned. All PCB lamp ballasts must be removed from service and properly disposed of by December 31, 2025.
6. Recycle mercury-containing lamp tubes when removed from service.
7. Follow appropriate safe work procedures when handling or disturbing asbestos, lead, silica, and mould.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.



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APPENDIX II-B	Lead Analytical Certificates
APPENDIX III	Methodology
APPENDIX IV	Location Summary Report
APPENDIX V	Hazardous Materials Summary Report / Sample Log
APPENDIX VI	HMIS All Data Report



1.0 INTRODUCTION AND SCOPE

Hamilton-Wentworth District School Board (Client) retained Pinchin Ltd. (Pinchin) to conduct a hazardous building materials assessment at Richard Beasley Elementary School located at 80 Currie Street, Hamilton, Ontario.

Pinchin performed the assessment on February 18, 2025. The surveyor was unaccompanied during the assessment. The assessed area was unoccupied at the time of the assessment.

The objective of the assessment was to identify specified hazardous building materials in preparation for building renovation.

Renovations are limited to Washrooms and adjacent finishes throughout the building, as well as the Stage and adjacent areas that may be affected by the work.

The results of this assessment are intended for use with a properly developed scope of work or performance specification.

1.1 Scope of Assessment

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.

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.

For the purpose of the assessment and this report, hazardous building materials are defined as follows:

- Asbestos
- Lead
- Silica
- Mercury
- Polychlorinated Biphenyls (PCBs)
- Mould

The following Designated Substances are not typically found in building materials in a composition/state that is hazardous and were not included in this assessment:

- Arsenic
- Acrylonitrile
- Benzene



- Coke oven emissions
- Ethylene oxide
- Isocyanates
- Vinyl chloride monomer

2.0 METHODOLOGY

Pinchin conducted a room-by-room assessment to identify the hazardous building materials as defined in the scope.

Limited destructive testing of flooring was conducted where possible (under ceramic tiles, carpets, or multiple layers of flooring). Demolition of exterior building finishes, masonry walls (chases, shafts etc.), and structural surrounds was not conducted.

Limited demolition of masonry block walls (core holes) was conducted to investigate for loose fill vermiculite insulation. Sampling of roofing materials was not conducted.

For further details on the methodology including test methods, refer to Appendix III.

3.0 BACKGROUND INFORMATION

3.1 Building Description

Description Item	Details
Use	Elementary school
Number of Floors	The building is 1 storey.
Total Area	The area of the building is approximately 30,000 square feet. The assessed area is approximately 10,106 square feet.
Year of Construction	The building was constructed in 1968.
Structure	Concrete (precast), structural steel beams, masonry
Exterior Cladding	N/A
HVAC	Forced air, radiant heating
Roof	N/A
Flooring	Terrazzo, vinyl floor tiles, vinyl sheet flooring, wood, concrete
Interior Walls	Masonry, drywall
Ceilings	Ceiling tiles (lay-in)

3.2 Existing Reports

Pinchin was provided with the following reports, which have been reviewed as part of this assessment:



- “Richard Beasley Asbestos Report” dated January 2024, prepared by Hamilton-Wentworth District School Board.
- “Richard Beasley Elementary School Roof Replacement Designated Substance Audit Report”, dated January 25, 2024, prepared by MTE Consultants Inc. MTE File No.:54631-100.

3.3 Inaccessible Locations

The following rooms or areas were not accessible and are therefore not included in the report.

Area or Room	Loc No.	Reason
Storage Room # 109	Location 1672	Locked

4.0 FINDINGS

The following section summarizes the findings of the assessment and provides a general description of the hazardous building materials identified. 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.

Any quantities listed in this report or data tables are estimated based on visual approximations only and are subject to variation.

4.1 Asbestos

4.1.1 Texture Finishes (Decorative)

Texture coat, containing asbestos (previously sampled), is present on the concrete deck in the Lobby (Location 1659). Pinchin collected additional confirmatory samples which were determined not to contain asbestos (samples S0019A-C, photos 1-2). As there was a previous positive result for this material, it is to be treated as an asbestos-containing material. Further delineation sampling may be considered.



Photo 1



Photo 2

4.1.2 Pipe Insulation

Parging cement, containing asbestos, is present on pipe fittings (elbows, valves, tees, hangers etc.), on pipe systems in the assessed area (samples S0002A-C, photos 1 and 2).

Remaining pipes in the assessed area are either uninsulated or insulated with non-asbestos fibreglass or other non-asbestos insulation such as mineral fibre or elastomeric foam insulation.

Pipes insulated with asbestos-containing insulations may be present in inaccessible spaces such as above solid ceilings, in chases, in column enclosures and within shafts.

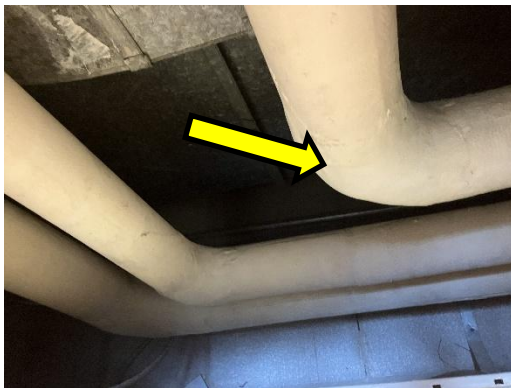


Photo 1



Photo 2

4.1.3 Duct Insulation and Mastic

Ducts in the assessed area are uninsulated or insulated with non-asbestos fibreglass (foil-faced or canvas jacketing).

Mastic was not observed on exterior sections of ducts assessed.

4.1.4 Mechanical Equipment Insulation

Mechanical equipment (radiators) within the assessed area is uninsulated.

4.1.5 Vermiculite

Destructive testing was conducted of a representative selection of masonry block walls, including creating penetrations at four locations (photos 1 and 2). The locations of destructive testing have been indicated on the drawings in Appendix I.

Loose fill vermiculite was not observed within the cavities.




Photo 1





Photo 2

4.1.6 Acoustic Ceiling Tiles

The following is a summary of acoustic ceiling tiles sampled/observed.

Description	Sample Location	Sample number, Date Code	Asbestos	Photo
24"x48" lay-in, pinhole with width-wide fissures	Throughout the assessed area	Stamped 10/26/93	No	

Description	Sample Location	Sample number, Date Code	Asbestos	Photo
24"x48" lay-in, pinhole with fleck	Throughout the assessed area	Stamped 07/28/03	No	
24"x48" pinhole with length-wise fissures	Corridor between the Gymnasium and Classrooms (Location 1685)	S0020A-C	No	

Ceiling tiles are presumed to be non-asbestos based on the date of manufacture determined from the date stamp applied to the top of the tiles. The tiles were manufactured after asbestos stopped being used in acoustic ceiling tiles.

4.1.7 Drywall Joint Compound

Drywall joint compound present as pipe chases throughout the assessed area does not contain asbestos (samples S0007A-C, photos 1 and 2).



Photo 1



Photo 2

4.1.8 Asbestos Cement Products

Cement board (i.e. Transite), containing asbestos, is present as panels above exterior doors in the Boys' and Girls' Washrooms (Locations 1699 and 1700) and both Kindergarten Classrooms (Locations 1670 and 1675) (samples S0015A-C, photos 1 and 2).




Photo 1



Photo 2

4.1.9 Vinyl Sheet Flooring




The following is a summary of vinyl sheet flooring material sampled.

Description	Sample Location (Loc #)	Sample Number	Asbestos	Photo
Beige, square pattern	Kindergarten Classrooms on benches (Location 1670 and 1675)	S0011A-C	Yes	

4.1.10 Vinyl Floor Tiles and Baseboard Mastic


The following is a summary of vinyl floor tiles sampled.




Description	Sample Location (Location #)	Sample Number	Asbestos (Tile / Adhesive)	Photo
12"x12" mottled blue	Gymnasium (Location 1676)	S0003A-C	No / Yes	
9"x9" beige with blue streaks	Gymnasium Storage Room (Location 1678)	S0008A-C	Yes / Yes	
9"x9" tan with white streaks	Staff Kitchen (Location 1679)	S0009A-C	Yes / Yes	
12"x12" beige with brown fleck	Kindergarten Classroom 1 (Location 1670)	S0012A-C	No / No	

Description	Sample Location (Location #)	Sample Number	Asbestos (Tile / Adhesive)	Photo
12"x12" mottled yellow	Kindergarten Classroom 2 (Location 1675)	S0013A-C	No / Yes	
9"x9" red with white and dark red streaks	Storage closet (Location 1687)	S0014A-C	Yes \ Yes	
Brown baseboard mastic	Stage, Gym Storage and Staff Kitchen (Locations 1677, 1678 and 1679) Present throughout the assessed area	S0004A-C	No	

4.1.11 Sealants, Caulking, and Putty

The following is a summary of sealants, caulking, and putties sampled.

Material, Description and Application	Sample Location (Location #)	Sample Number	Asbestos	Photo
Caulking, white, masonry wall joints	Stage (Location 1677)	S0006A-C	No	

Material, Description and Application	Sample Location (Location #)	Sample Number	Asbestos	Photo
Window putty, grey/black	Storage Room (Location 1687)	S0016A-C	Yes	
Caulking, brown, around door frames	Gril's Washroom (Location 1699)	S0017A-C	Yes	
Caulking, white on expansion joints of siporex decking	Kindergarten Classroom 1 (Location 1670)	S0018A-C	Yes	

4.1.12 Roofing Products

Roofing materials, previously sampled from Roof sections 101, 201, 301 and 401, were found to not contain asbestos, according to the MTE Report provided by the client. Section 201 of the roof was replaced in 2024 and will not contain asbestos.

4.1.13 Other Building Materials

Silver mastic, containing asbestos, is present on the underside of the sinks in the Staff Kitchen (Location 1679) and Kindergarten Classrooms (Locations 1670 and 1675) (samples S0010A-C, photos 1 and 2).

Paint present on concrete block walls throughout the assessed area does not contain asbestos (samples S0005A-G, photo 3).

Terrazzo, present as flooring throughout the assessed area, does not contain asbestos (S0001A-C, photo 4).



Photo 1



Photo 2



Photo 3



Photo 4

4.1.14 Excluded Materials

The following is a list of materials which may contain asbestos and was excluded from the assessment. These materials are presumed to contain asbestos until otherwise proven by sampling and analysis:

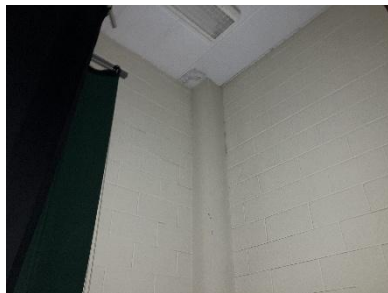
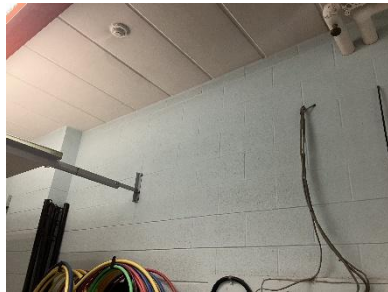

- Floor levelling compound
- Electrical components
- Mechanical packing, ropes, and gaskets
- Paper products
- Soffit and fascia boards
- Fire resistant doors
- Ropes and gaskets in cast-iron bell and spigot joints
- Sealants on pipe threads



4.2 Lead

4.2.1 Paints and Surface Coatings

Refer to the lab report(s) in Appendix II-B and the Hazardous Material Summary / Sample Log in Appendix V for details on paints sampled and their locations.

The following table summarizes the analytical results of paints sampled.

Sample Number	Colour, Substrate Description	Sample Location	Lead (%)	Photo
L0001	White on masonry block wall	Stage (Location 1677)	0.0073	
L0002	Light Blue on masonry block wall	Gymnasium Storage (Location 1678)	0.0015	
L0003	Off-white on masonry block walls	Staff Kitchen (Location 1679)	0.00080	

Sample Number	Colour, Substrate Description	Sample Location	Lead (%)	Photo
L0004	Cream on masonry block walls	Kindergarten Classroom 1 (Location 1670)	0.032	
L0005	White on green on masonry block walls	Girls Washroom (Location 1699)	0.034	

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.

4.2.2 Lead Products and Applications

Lead-containing batteries are present in emergency lighting (photos 1 and 2).

Lead caulking is present in bell and spigot fittings on cast iron pipes.



Photo 1



Photo 2



4.2.3 Excluded Lead Materials

Lead is known to be present in several materials which were not assessed or sampled. The following materials, where found, should be presumed to contain lead.

- Electrical components, including wiring connectors, grounding conductors, and solder
- Solder on pipe connections

4.3 Silica

Crystalline silica is assumed to be a component of the following materials where present in the building.

- Concrete
- Masonry and mortar
- Asphalt

4.4 Mercury

4.4.1 Lamps

Mercury vapour is present in fluorescent lamp tubes.

4.4.2 Mercury-Containing Devices

Mercury-containing devices were not found during the assessment.

4.5 Polychlorinated Biphenyls

4.5.1 Lighting Ballasts

The building has not been comprehensively re-lamped with energy efficient light fixtures and as such, a percentage of light ballasts may be manufactured prior to 1980 and may contain PCBs.

4.5.2 Transformers

Transformers were not found during the assessment.

4.5.3 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
- Caulking and sealants



4.6 Mould and Water Damage

Visible mould growth and water damage was not found during the assessment.

5.0 RECOMMENDATIONS

5.1 General

1. 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.
2. 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.
3. Conduct further investigation of the following items, areas, or locations, which were not completed during this assessment:
 - a. Any items listed as exclusions in this report, prior to disturbance.
4. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
5. Retain a qualified consultant to specify, observe and document the successful removal of hazardous materials.
6. Update the asbestos inventory upon completion of the abatement and removal of asbestos-containing materials and any other relevant findings.

5.2 Remedial Work

Remedial work is not recommended.

5.3 Building Renovation Work

The following recommendations are made regarding renovation involving the hazardous materials identified.

5.3.1 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.

5.3.2 Lead

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.

5.3.3 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.

5.3.4 Mercury

Do not break lamps. Recycle and reclaim 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.

5.3.5 PCBs

Prior to demolition, remove light fixtures and examine light ballasts for PCB content. If ballasts are not clearly labelled as "non-PCB" or are suspected to contain PCBs, package and ship ballasts for destruction at a federally permitted facility.

As light fixtures are removed from service, examine light ballasts for PCB content. If ballasts are not clearly labelled as "non-PCB" or are suspected to contain PCBs, package, and ship ballasts for destruction at a federally permitted facility. As per the PCB Regulation (SOR/2008-273), all PCB light ballasts must be removed from service and properly disposed of by December 31, 2025.



6.0 TERMS AND 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.

7.0 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

Ontario

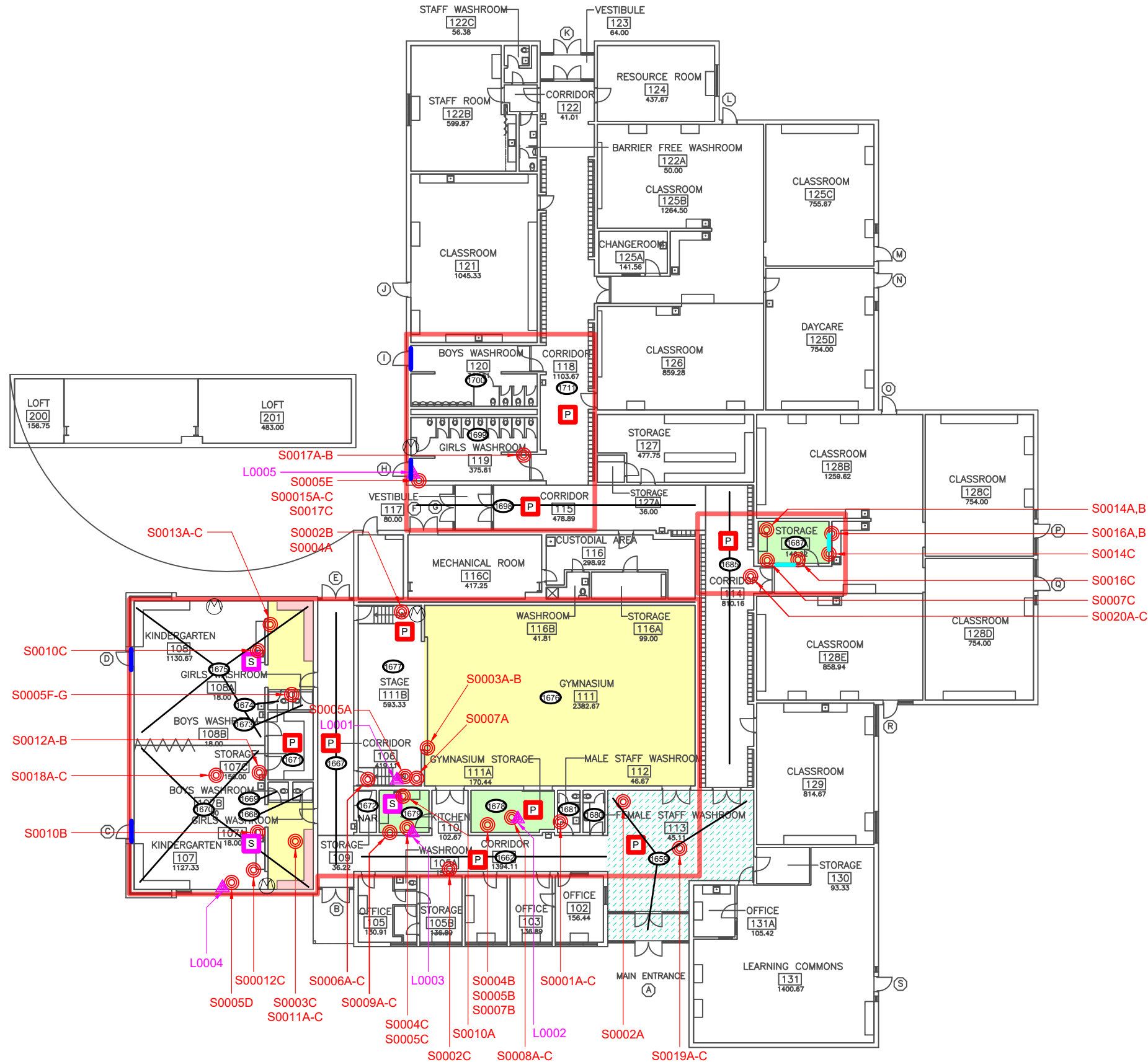
1. Asbestos on Construction Projects and in Buildings and Repair Operations, Ontario Regulation 278/05.
2. Designated Substances, Ontario Regulation 490/09.
3. Lead on Construction Projects, Ministry of Labour Guidance Document.
4. The Environmental Abatement Council of Canada (EACC) Lead Guideline for Construction, Renovation, Maintenance or Repair.
5. Ministry of the Environment Regulation, R.R.O. 1990 Reg. 347 as amended.
6. Ministry of the Environment Regulation, R.R.O. 1990 Reg. 362 as amended.
7. Silica on Construction Projects, Ministry of Labour Guidance Document.
8. Alert – Mould in Workplace Buildings, Ontario Ministry of Labour.

Federal Workplaces

1. Canada Occupational Health and Safety Regulation, SOR/86-304
2. Technical Guideline to Asbestos Exposure Management Programs.

\\PIN-HAM-FS02\job\352000s\0352293.000 HAMILTON-WENT,Various2025Pr,HAZ,CONS\0352293.003
HWDSB, Richard Beasley, WR&Stage, HAZ, ASSMT\Deliverables\HBMA\352293.003 HBMA Richard Beasley WR&Stage HWDSB March 11 2025.docx
Template: Master Report for Hazardous Materials Assessment (Pre-Construction), HAZ, June 19, 2024

APPENDIX I
Drawings



LEGEND

(X) PINCHIN LOCATION NUMBER

NAR NO ACCESS TO ROOM/AREA

— ASSESSED AREA

⊙ ASBESTOS BULK SAMPLE

▲ LEAD BULK SAMPLE

⊙ VERMICULITE DRILLHOLE

ASBESTOS-CONTAINING MATERIALS:

P PIPE INSULATION

S SINK MASTIC

TEXTURE COAT

VINYL FLOOR TILES & MASTIC

VINYL SHEET FLOORING

MASTIC

TRANSITE

WINDOW PUTTY

FOR CLARITY, THE FOLLOWING ASBESTOS-CONTAINING MATERIALS, ARE PRESENT IN THE ASSESSED AREA, BUT HAVE NOT BEEN HATCHED ON THE DRAWING:
• CAULKING/MORTAR ON DECKING

NOT ALL KNOWN OR SUSPECTED HAZARDOUS BUILDING MATERIALS MAY BE DEPICTED ON THE DRAWING. REFER TO THE HAZARDOUS BUILDING MATERIALS ASSESSMENT REPORT FOR A COMPLETE LIST OF KNOWN AND SUSPECTED HAZARDOUS BUILDING MATERIALS.

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

BASE PLAN PROVIDED BY CLIENT.



PROJECT NAME:
HAZARDOUS BUILDING MATERIALS ASSESSMENT

CLIENT NAME:
HAMILTON-WENTWORTH DISTRICT SCHOOL BOARD

PROJECT LOCATION:
RICHARD BEASLEY ELEMENTARY SCHOOL
80 CURRIE STREET,
HAMILTON, ONTARIO

FIGURE NAME:
FIRST FLOOR

PROJECT NUMBER:
352293.003

SCALE:
NOT TO SCALE

DRAWN BY:
KU

REVIEWED BY:
GF

DATE:
MARCH 2025

FIGURE NUMBER:
1 OF 1

APPENDIX II-A
Asbestos Analytical Certificates



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.
151 York Boulevard Suite 200
Hamilton, ON L8R 3M2

Attn: Jessica Cozzitorto
Greg Forrest

Lab Order ID: 10075999
Analysis: PLM
Date Received: 02/26/2025
Date Reported: 03/05/2025

Project: 352293.003

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0001A	Floor,Terrazzo,Loc:1681,Male Staff Washroom	None Detected		100% Other	Gray Non-Fibrous Homogeneous
10075999_0001					Crushed
S0001B	Floor,Terrazzo,Loc:1681,Male Staff Washroom	None Detected		100% Other	Gray Non-Fibrous Homogeneous
10075999_0002					Crushed
S0001C	Floor,Terrazzo,Loc:1680,Female Staff Washroom	None Detected		100% Other	Gray Non-Fibrous Homogeneous
10075999_0003					Crushed
S0002A	Piping,Parging Cement,Loc:1659,Lobby	40% Chrysotile	20% Cellulose	40% Other	Gray Fibrous Homogeneous
10075999_0004					Dissolved
S0002B	Piping,Parging Cement,Loc:1677,Stage	Not Analyzed			
10075999_0005					
S0002C	Piping,Parging Cement,Loc:1662,Corridor - Gym/Offices	Not Analyzed			
10075999_0006					
S0003A - A	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Blue,Loc:1676,Gymnasium	None Detected		100% Other	Blue Non-Fibrous Homogeneous
10075999_0007	floor tile				Dissolved
S0003A - B	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Blue,Loc:1676,Gymnasium	2% Chrysotile		98% Other	Black Non-Fibrous Homogeneous
10075999_0067	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 SAI. 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%.

Patrick Yarnell (87)

Analyst

Nathaniel J. Durham

Approved Signatory



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and
40 CFR, Part 763, Subpart E, App.E



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Project: 352293.003

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0003B - A	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Blue,Loc:1676,Gymnasium	None Detected		100% Other	Blue
10075999_0008	floor tile				Non-Fibrous Homogeneous Dissolved
S0003B - B	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Blue,Loc:1676,Gymnasium	Not Analyzed			
10075999_0069	mastic				
S0003C - A	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Blue,Loc:1670,Kindergarten Classroom 1	None Detected		100% Other	Blue
10075999_0009	floor tile-ashed				Non-Fibrous Homogeneous Ashed
S0003C - B	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Blue,Loc:1670,Kindergarten Classroom 1	Not Analyzed			
10075999_0068	mastic				
S0004A	Wall,Mastic, Brown,Baseboard,Loc:1677, Stage	None Detected		100% Other	Brown
10075999_0010					Non-Fibrous Homogeneous Dissolved
S0004B	Wall,Mastic, Brown,Baseboard,Loc:1678, Gym Storage	None Detected		100% Other	Brown
10075999_0011					Non-Fibrous Homogeneous Dissolved
S0004C	Wall,Mastic, Brown,Baseboard,Loc:1679, Staff Kitchen	None Detected		100% Other	Brown
10075999_0012					Non-Fibrous Homogeneous Dissolved
S0005A	Wall,Masonry,White,Loc:1677,Stage	None Detected		100% Other	White
10075999_0013					Non-Fibrous Homogeneous Ashed

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Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and
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Project: 352293.003

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0005B	Wall,Masonry,Light Blue,Loc:1678,Gym Storage	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0014					Ashed
S0005C	Wall,Masonry,Off-white,Loc:1679,Staff Kitchen	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0015					Ashed
S0005D	Wall,Paint,Cream On Block Wall,Loc:1670,Kindergarten Classroom 1	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0016					Ashed
S0005E	Wall,Paint,White On Green On Block,Loc:1699,Girls Washroom	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0017					Ashed
S0005F	Wall,Paint,Pink On Black On Block,Loc:1673,Girls Kindergarten Washroom 2	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0018					Ashed
S0005G	Wall,Paint,Pink On Black On Block,Loc:1673,Girls Kindergarten Washroom 2	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0019					Ashed
S0006A	Wall,Caulking,White,Loc:1677,Stage	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0020					Ashed
S0006B	Wall,Caulking,White,Loc:1677,Stage	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0021					Ashed

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 heterogenous 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 SAI. 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%.

Patrick Yarnell (87)

Analyst

Nathaniel J. Durham

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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



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Analysis: PLM
Date Received: 02/26/2025
Date Reported: 03/05/2025

Project: 352293.003

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0006C	Wall,Caulking,White,Loc:1677,Stage	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0022					Ashed
S0007A	Wall,Drywall And Joint Compound,Loc:1677,Stage	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0023					Crushed
S0007B	Wall,Drywall And Joint Compound,Loc:1678,Gym Storage	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0024					Crushed
S0007C	Wall,Drywall And Joint Compound,Loc:1687,Storage Closet	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0025					Crushed
S0008A - A	Floor,Vinyl Floor Tile And Mastic,9x9 Beige W Blue Streaks,Loc:1678,Gym Storage	3% Chrysotile		97% Other	Beige Non-Fibrous Homogeneous
10075999_0026	floor tile				Dissolved
S0008A - B	Floor,Vinyl Floor Tile And Mastic,9x9 Beige W Blue Streaks,Loc:1678,Gym Storage	3% Chrysotile		97% Other	Black Non-Fibrous Homogeneous
10075999_0070	mastic				Dissolved
S0008B - A	Floor,Vinyl Floor Tile And Mastic,9x9 Beige W Blue Streaks,Loc:1678,Gym Storage	Not Analyzed			
10075999_0027	floor tile				
S0008B - B	Floor,Vinyl Floor Tile And Mastic,9x9 Beige W Blue Streaks,Loc:1678,Gym Storage	Not Analyzed			
10075999_0071	mastic				

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Patrick Yarnell (87)

Analyst

Nathaniel J. Durham

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.
151 York Boulevard Suite 200
Hamilton, ON L8R 3M2

Attn: Jessica Cozzitorto
Greg Forrest

Lab Order ID: 10075999
Analysis: PLM
Date Received: 02/26/2025
Date Reported: 03/05/2025

Project: 352293.003

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0008C - A	Floor, Vinyl Floor Tile And Mastic, 9x9 Beige W Blue Streaks, Loc: 1678, Gym Storage	Not Analyzed			
10075999_0028	floor tile				
S0008C - B	Floor, Vinyl Floor Tile And Mastic, 9x9 Beige W Blue Streaks, Loc: 1678, Gym Storage	Not Analyzed			
10075999_0072	mastic				
S0009A - A	Floor, Vinyl Floor Tile And Mastic, 9x9 Tan W White Streaks, Loc: 1679, Staff Kitchen	2% Chrysotile		98% Other	Tan Non-Fibrous Homogeneous
10075999_0029	floor tile				Dissolved
S0009A - B	Floor, Vinyl Floor Tile And Mastic, 9x9 Tan W White Streaks, Loc: 1679, Staff Kitchen	3% Chrysotile		97% Other	Black, Brown Non-Fibrous Homogeneous
10075999_0073	mastic				Dissolved
S0009B - A	Floor, Vinyl Floor Tile And Mastic, 9x9 Tan W White Streaks, Loc: 1679, Staff Kitchen	Not Analyzed			
10075999_0030	floor tile				
S0009B - B	Floor, Vinyl Floor Tile And Mastic, 9x9 Tan W White Streaks, Loc: 1679, Staff Kitchen	Not Analyzed			
10075999_0074	mastic				
S0009C - A	Floor, Vinyl Floor Tile And Mastic, 9x9 Tan W White Streaks, Loc: 1679, Staff Kitchen	Not Analyzed			
10075999_0031	floor tile				
S0009C - B	Floor, Vinyl Floor Tile And Mastic, 9x9 Tan W White Streaks, Loc: 1679, Staff Kitchen	Not Analyzed			
10075999_0075	mastic				

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Nathaniel J. Durham

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Bulk Asbestos Analysis

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Customer: Pinchin Ltd.
151 York Boulevard Suite 200
Hamilton, ON L8R 3M2

Attn: Jessica Cozzitorto
Greg Forrest

Lab Order ID: 10075999
Analysis: PLM
Date Received: 02/26/2025
Date Reported: 03/05/2025

Project: 352293.003

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0010A	Sink,Mastic, Silver,Loc:1679,Staff Kitchen	3% Chrysotile		97% Other	Black, Silver Non-Fibrous Homogeneous
10075999_0032					Dissolved
S0010B	Sink,Mastic, Silver,Loc:1670,Kindergarten Classroom 1	Not Analyzed			
10075999_0033					
S0010B	Sink,Mastic, Silver,Loc:1679,Staff Kitchen	Not Submitted			
10075999_0034	duplicate on coc				
S0010C	Sink,Mastic, Silver,Loc:1675,Kindergarten Classroom 2	Not Analyzed			
10075999_0035					
S0010C	Sink,Mastic, Silver,Loc:1679,Staff Kitchen	Not Submitted			
10075999_0036	duplicate on coc				
S0011A	Vinyl Sheet Flooring,Brown Square Pattern,Loc:1670,Kindergarte n Classroom 1	20% Chrysotile		80% Other	Gray, Tan Fibrous Homogeneous
10075999_0037	mastic inseparable				Teased
S0011B	Vinyl Sheet Flooring,Brown Square Pattern,Loc:1670,Kindergarte n Classroom 1	Not Analyzed			
10075999_0038	mastic inseparable				
S0011C	Vinyl Sheet Flooring,Brown Square Pattern,Loc:1670,Kindergarte n Classroom 1	Not Analyzed			
10075999_0039	mastic inseparable				

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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.
151 York Boulevard Suite 200
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Attn: Jessica Cozzitorto
Greg Forrest

Lab Order ID: 10075999
Analysis: PLM
Date Received: 02/26/2025
Date Reported: 03/05/2025

Project: 352293.003

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0012A - A	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0040	floor tile				Dissolved
S0012A - B	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten	None Detected		100% Other	Yellow Non-Fibrous Homogeneous
10075999_0076	mastic 1				Dissolved
S0012A - C	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten	None Detected		100% Other	Black Non-Fibrous Homogeneous
10075999_0077	mastic 2				Dissolved
S0012B - A	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten	None Detected		100% Other	White Non-Fibrous Homogeneous
10075999_0041	floor tile				Dissolved
S0012B - B	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten	None Detected		100% Other	Yellow Non-Fibrous Homogeneous
10075999_0078	mastic 1				Dissolved
S0012B - C	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten	None Detected		100% Other	Black Non-Fibrous Homogeneous
10075999_0079	mastic 2				Dissolved
S0012C - A	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten	None Detected		100% Other	Yellow Non-Fibrous Homogeneous
10075999_0042	floor tile - ashed				Ashed
S0012C - B	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten	None Detected		100% Other	Yellow Non-Fibrous Homogeneous
10075999_0080	mastic 1				Dissolved

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Patrick Yarnell (87)

Analyst

Nathaniel J. Durham

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.
151 York Boulevard Suite 200
Hamilton, ON L8R 3M2

Attn: Jessica Cozzitorto
Greg Forrest

Lab Order ID: 10075999
Analysis: PLM
Date Received: 02/26/2025
Date Reported: 03/05/2025

Project: 352293.003

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0012C - C	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten	None Detected		100% Other	Black
10075999_0081	mastic 2				Non-Fibrous Homogeneous Dissolved
S0013A - A	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Yellow,Loc:1675,Kindergarten Classroom 2	None Detected		100% Other	Yellow
10075999_0043	floor tile				Non-Fibrous Homogeneous Dissolved
S0013A - B	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Yellow,Loc:1675,Kindergarten Classroom 2	5% Chrysotile		95% Other	Black
10075999_0082	mastic				Non-Fibrous Homogeneous Dissolved
S0013B - A	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Yellow,Loc:1675,Kindergarten Classroom 2	None Detected		100% Other	Yellow
10075999_0044	floor tile				Non-Fibrous Homogeneous Dissolved
S0013B - B	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Yellow,Loc:1675,Kindergarten Classroom 2	Not Analyzed			
10075999_0083	mastic				
S0013C - A	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Yellow,Loc:1675,Kindergarten Classroom 2	None Detected		100% Other	Yellow
10075999_0045	floor tile-ashed				Non-Fibrous Homogeneous Dissolved
S0013C - B	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Yellow,Loc:1675,Kindergarten Classroom 2	Not Analyzed			
10075999_0084	mastic				
S0014A - A	Floor,Vinyl Floor Tile And Mastic,9x9 Red W White And Dark Red Streaka,Loc:1687,Storage Cl	1% Chrysotile		99% Other	Red
10075999_0046	floor tile				Non-Fibrous Homogeneous Dissolved

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Patrick Yarnell (87)

Analyst

Nathaniel J. Durham

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.
151 York Boulevard Suite 200
Hamilton, ON L8R 3M2

Attn: Jessica Cozzitorto
Greg Forrest

Lab Order ID: 10075999
Analysis: PLM
Date Received: 02/26/2025
Date Reported: 03/05/2025

Project: 352293.003

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0014A - B	Floor,Vinyl Floor Tile And Mastic,9x9 Red W White And Dark Red Streaka,Loc:1687,Storage Cl	5% Chrysotile		95% Other	Black
10075999_0085	mastic				Non-Fibrous Homogeneous Dissolved
S0014B - A	Floor,Vinyl Floor Tile And Mastic,9x9 Red W White And Dark Red Streaka,Loc:1687,Storage Cl	Not Analyzed			
10075999_0047	floor tile				
S0014B - B	Floor,Vinyl Floor Tile And Mastic,9x9 Red W White And Dark Red Streaka,Loc:1687,Storage Cl	Not Analyzed			
10075999_0086	mastic				
S0014C - A	Floor,Vinyl Floor Tile And Mastic,9x9 Red W White And Dark Red Streaka,Loc:1687,Storage Cl	Not Analyzed			
10075999_0048	floor tile				
S0014C - B	Floor,Vinyl Floor Tile And Mastic,9x9 Red W White And Dark Red Streaka,Loc:1687,Storage Cl	Not Analyzed			
10075999_0087	mastic				
S0015A	Wall,Cement Product,Transite Board,Loc:1699,Girls Washroom	15% Chrysotile		85% Other	Gray
10075999_0049					Non-Fibrous Homogeneous Dissolved
S0015B	Wall,Cement Product,Transite Board,Loc:1699,Girls Washroom	Not Analyzed			
10075999_0050					
S0015C	Wall,Cement Product,Transite Board,Loc:1699,Girls Washroom	Not Analyzed			
10075999_0051					

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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.
151 York Boulevard Suite 200
Hamilton, ON L8R 3M2

Attn: Jessica Cozzitorto
Greg Forrest

Lab Order ID: 10075999
Analysis: PLM
Date Received: 02/26/2025
Date Reported: 03/05/2025

Project: 352293.003

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0016A	Window Liner,Putty,Cementitious, Grey,Loc:1687,Storage Closet	2% Chrysotile		98% Other	Black Non-Fibrous Homogeneous
10075999_0052					Dissolved
S0016B	Window Liner,Putty,Cementitious, Grey,Loc:1687,Storage Closet	Not Analyzed			
10075999_0053					
S0016C	Window Liner,Putty,Cementitious, Grey,Loc:1687,Storage Closet	Not Analyzed			
10075999_0054					
S0017A	Wall,Door Frame,Caulking,Brown, Cementitious,Loc:1699,Girls Washroom	3% Chrysotile		97% Other	Brown Non-Fibrous Homogeneous
10075999_0055					Ashed
S0017B	Wall,Door Frame,Caulking,Brown, Cementitious,Loc:1699,Girls Washroom	Not Analyzed			
10075999_0056					
S0017C	Wall,Door Frame,Caulking,Brown, Cementitious,Loc:1699,Girls Washroom	Not Analyzed			
10075999_0057					
S0018A	Structure,Expansion Joint,Caulking,White,Loc:16 70,Kindergarten Classroom 1	2% Chrysotile		98% Other	White Non-Fibrous Homogeneous
10075999_0058					Ashed
S0018B	Structure,Expansion Joint,Caulking,White,Loc:16 70,Kindergarten Classroom 1	Not Analyzed			
10075999_0059					

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Patrick Yarnell (87)

Analyst

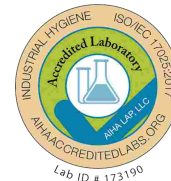
Nathaniel J. Durham

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Greg Forrest

Lab Order ID: 10075999
Analysis: PLM
Date Received: 02/26/2025
Date Reported: 03/05/2025

Project: 352293.003

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
S0018C	Structure,Expansion Joint,Caulking,White,Loc:1670,Kindergarten Classroom 1	Not Analyzed			
10075999_0060					
S0019A	Structure,Texture Coat,Loc:1659,Lobby	None Detected		100% Other	Gray Non-Fibrous Homogeneous
10075999_0061					Crushed
S0019B	Structure,Texture Coat,Loc:1659,Lobby	None Detected		100% Other	Gray Non-Fibrous Homogeneous
10075999_0062					Crushed
S0019C	Structure,Texture Coat,Loc:1659,Lobby	None Detected		100% Other	Gray Non-Fibrous Homogeneous
10075999_0063					Crushed
S0020A	Ceiling,Ceiling Tiles (lay-in),24x48 Pinhole W Lw Fissures,Loc:1685,Corridor - Gym/Classrooms	None Detected	45% Mineral Wool 45% Cellulose	10% Other	Brown Fibrous Homogeneous
10075999_0064					Ashed
S0020B	Ceiling,Ceiling Tiles (lay-in),24x48 Pinhole W Lw Fissures,Loc:1685,Corridor - Gym/Classrooms	None Detected	45% Mineral Wool 45% Cellulose	10% Perlite	Brown Fibrous Homogeneous
10075999_0065					Ashed
S0020C	Ceiling,Ceiling Tiles (lay-in),24x48 Pinhole W Lw Fissures,Loc:1685,Corridor - Gym/Classrooms	None Detected	45% Cellulose 45% Mineral Wool	10% Other	Brown Fibrous Homogeneous
10075999_0066					Ashed

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Patrick Yarnell (87)

Analyst

Nathaniel J. Durham

Approved Signatory

Analyzed by: 10075999
 Reviewed by: 10075999
 Report Sent by: _____

Pinchin Ltd. - Asbestos Laboratory Internal Asbestos Bulk Sample Chain of Custody

Special Instructions:

Client Name:		Project Address:	ON
Portfolio/Building No:		Pinchin File:	352293.003
Submitted by:	Greg Forrest	Email:	gforrest@pinchin.com
CC Results to:	Jessica Cozitorto	CC Email:	jcozzitorto@pinchin.com
Date Submitted:	February 24 2025	Required by:	March 4 2025
# of Samples:	66	Priority:	5 Day Turnaround
Year of Building Construction (Mandatory, Years ONLY):			
Do NOT Stop on Positive (Sample Numbers):			
Pinchin Group Company (Mandatory Field): Pinchin			
HMIS2 Building Reference #:		146304/202511831305587	

To be Completed by Lab Personnel Only:

Lab Reference #:	FEB 25 2025	Time:	24 hour clock
Received by:		Date:	Month Day Year
Name(s) of Analyst(s):			

Sample Prefix	Sample No.	Sample Suffix	Sample Description/Location (Mandatory)
S	0001	A	Floor, Terrazzo, Loc: 1681, Male Staff Washroom
S	0001	B	Floor, Terrazzo, Loc: 1681, Male Staff Washroom
S	0001	C	Floor, Terrazzo, Loc: 1680, Female Staff Washroom
S	0002	A	Piping, Parging Cement, Loc: 1659, Lobby
S	0002	B	Piping, Parging Cement, Loc: 1677, Stage
S	0002	C	Piping, Parging Cement, Loc: 1662, Corridor - Gym/Offices

Accepted
Rejected

B. Helly 2/26
1029 am

Sample Prefix	Sample No.	Sample Suffix	Sample Description/Location (Mandatory)
S	0003	A	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Blue,Loc:1676,Gymnasium
S	0003	B	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Blue,Loc:1676,Gymnasium
S	0003	C	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Blue,Loc:1670,Kindergarten Classroom 1
S	0004	A	Wall,Mastic, Brown,Baseboard,Loc:1677,Stage
S	0004	B	Wall,Mastic, Brown,Baseboard,Loc:1678,Gym Storage
S	0004	C	Wall,Mastic, Brown,Baseboard,Loc:1679,Staff Kitchen
S	0005	A	Wall,Paint,White,Loc:1677,Stage
S	0005	B	Wall,Paint,Light Blue,Loc:1678,Gym Storage
S	0005	C	Wall,Paint,Off-white,Loc:1679,Staff Kitchen
S	0005	D	Wall,Paint,Cream On Block Wall,Loc:1670,Kindergarten Classroom 1
S	0005	E	Wall,Paint,White On Green On Block,Loc:1699,Girls Washroom
S	0005	F	Wall,Paint,Pink On Black On Block,Loc:1673,Girls Kindergarten Washroom 2
S	0005	G	Wall,Paint,Pink On Black On Block,Loc:1673,Girls Kindergarten Washroom 2
S	0006	A	Wall,Caulking,White,Loc:1677,Stage
S	0006	B	Wall,Caulking,White,Loc:1677,Stage

10075999

Sample Prefix	Sample No.	Sample Suffix	Sample Description/Location (Mandatory)
S	0006	C	Wall,Caulking,White,Loc:1677,Stage
S	0007	A	Wall,Drywall And Joint Compound,Loc:1677,Stage
S	0007	B	Wall,Drywall And Joint Compound,Loc:1678,Gym Storage
S	0007	C	Wall,Drywall And Joint Compound,Loc:1687,Storage Closet
S	0008	A	Floor,Vinyl Floor Tile And Mastic,9x9 Beige W Blue Streaks,Loc:1678,Gym Storage
S	0008	B	Floor,Vinyl Floor Tile And Mastic,9x9 Beige W Blue Streaks,Loc:1678,Gym Storage
S	0008	C	Floor,Vinyl Floor Tile And Mastic,9x9 Beige W Blue Streaks,Loc:1678,Gym Storage
S	0009	A	Floor,Vinyl Floor Tile And Mastic,9x9 Tan W White Streaks,Loc:1679,Staff Kitchen
S	0009	B	Floor,Vinyl Floor Tile And Mastic,9x9 Tan W White Streaks,Loc:1679,Staff Kitchen
S	0009	C	Floor,Vinyl Floor Tile And Mastic,9x9 Tan W White Streaks,Loc:1679,Staff Kitchen
S	0010	A	Sink,Mastic, Silver,Loc:1679,Staff Kitchen
S	0010	B	Sink,Mastic, Silver,Loc:1670,Kindergarten Classroom 1
S	0010	C	Sink,Mastic, Silver,Loc:1675,Kindergarten Classroom 2
S	0011	A	Vinyl Sheet Flooring,Brown Square Pattern,Loc:1670,Kindergarten Classroom 1
S	0011	B	Vinyl Sheet Flooring,Brown Square Pattern,Loc:1670,Kindergarten Classroom 1


Sample Prefix	Sample No.	Sample Suffix	Sample Description/Location (Mandatory)
S	0011	C	Vinyl Sheet Flooring,Brown Square Pattern,Loc:1670,Kindergarten Classroom 1
S	0012	A	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten Classroom 1
S	0012	B	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten Classroom 1
S	0012	C	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten Classroom 1
S	0013	A	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Yellow,Loc:1675,Kindergarten Classroom 2
S	0013	B	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Yellow,Loc:1675,Kindergarten Classroom 2
S	0013	C	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Yellow,Loc:1675,Kindergarten Classroom 2
S	0014	A	Floor,Vinyl Floor Tile And Mastic,9x9 Red W White And Dark Red Streaka,Loc:1687,Storage Closet
S	0014	B	Floor,Vinyl Floor Tile And Mastic,9x9 Red W White And Dark Red Streaka,Loc:1687,Storage Closet
S	0014	C	Floor,Vinyl Floor Tile And Mastic,9x9 Red W White And Dark Red Streaka,Loc:1687,Storage Closet
S	0015	A	Wall,Cement Product,Transite Board,Loc:1699,Girls Washroom
S	0015	B	Wall,Cement Product,Transite Board,Loc:1699,Girls Washroom
S	0015	C	Wall,Cement Product,Transite Board,Loc:1699,Girls Washroom
S	0016	A	Window Liner,Putty,Cementitious, Grey,Loc:1687,Storage Closet
S	0016	B	Window Liner,Putty,Cementitious, Grey,Loc:1687,Storage Closet

10075999

Sample Prefix	Sample No.	Sample Suffix	Sample Description/Location (Mandatory)
S	0016	C	Window Liner, Putty, Cementitious, Grey, Loc: 1687, Storage Closet
S	0017	A	Wall, Door Frame, Caulking, Brown, Cementitious, Loc: 1699, Girls Washroom
S	0017	B	Wall, Door Frame, Caulking, Brown, Cementitious, Loc: 1699, Girls Washroom
S	0017	C	Wall, Door Frame, Caulking, Brown, Cementitious, Loc: 1699, Girls Washroom
S	0018	A	Structure, Expansion Joint, Caulking, White, Loc: 1670, Kindergarten Classroom 1
S	0018	B	Structure, Expansion Joint, Caulking, White, Loc: 1670, Kindergarten Classroom 1
S	0018	C	Structure, Expansion Joint, Caulking, White, Loc: 1670, Kindergarten Classroom 1
S	0019	A	Structure, Texture Coat, Loc: 1659, Lobby
S	0019	B	Structure, Texture Coat, Loc: 1659, Lobby
S	0019	C	Structure, Texture Coat, Loc: 1659, Lobby
S	0020	A	Ceiling, Ceiling Tiles (lay-in), 24x48 Pinhole W Lw Fissures, Loc: 1685, Corridor - Gym/Classrooms
S	0020	B	Ceiling, Ceiling Tiles (lay-in), 24x48 Pinhole W Lw Fissures, Loc: 1685, Corridor - Gym/Classrooms
S	0020	C	Ceiling, Ceiling Tiles (lay-in), 24x48 Pinhole W Lw Fissures, Loc: 1685, Corridor - Gym/Classrooms

10075999

Version 1-15-2012

Client: Pinchin Ltd. Contact: Greg Forrest Address: ON Phone: Fax: Email: gforrest@pinchin.com jcozzitorto@pinchin.com	*Instructions: Use Column "B" for your contact info To See an Example Click the bottom Example Tab.	
Project: 352293.003 Stop positive on all samples. Perform ashing on third vinyl floor tile if first two are ND.	66 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"	Scientific Analytical  Institute
Client Notes:	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.	4604 Dundas Dr. Greensboro, NC 27407 Phone: 336.292.3888 Fax: 336.292.3313 Email: lab@sailab.com
P.O. #: 352293.003 Date Submitted: 02-26-2025		
Analysis: PLM BULK EPA 600 TurnAroundTime: Regular TAT		

Sample Number	Loc	Material	Notes
---------------	-----	----------	-------

<<			
S0001A	Floor,Terrazzo,Loc:1681,Male Staff Washroom		
S0001B	Floor,Terrazzo,Loc:1681,Male Staff Washroom		
S0001C	Floor,Terrazzo,Loc:1680,Female Staff Washroom		
S0002A	Piping,Parging Cement,Loc:1659,Lobby		
S0002B	Piping,Parging Cement,Loc:1677,Stage		
S0002C	Piping,Parging Cement,Loc:1662,Corridor - Gym/Offices		
S0003A	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Blue,Loc:1676,Gymnasium		
S0003B	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Blue,Loc:1676,Gymnasium		
S0003C	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Blue,Loc:1670,Kindergarten Classroom 1		
S0004A	Wall,Mastic, Brown,Baseboard,Loc:1677,Stage		
S0004B	Wall,Mastic, Brown,Baseboard,Loc:1678,Gym Storage		
S0004C	Wall,Mastic, Brown,Baseboard,Loc:1679,Staff Kitchen		
S0005A	Wall,Masonry,White,Loc:1677,Stage		
S0005B	Wall,Masonry,Light Blue,Loc:1678,Gym Storage		
S0005C	Wall,Masonry,Off-white,Loc:1679,Staff Kitchen		
S0005D	Wall,Paint,Cream On Block Wall,Loc:1670,Kindergarten Classroom 1		
S0005E	Wall,Paint,White On Green On Block,Loc:1699,Girls Washroom		
S0005F	Wall,Paint,Pink On Black On Block,Loc:1673,Girls Kindergarten Washroom 2		
S0005G	Wall,Paint,Pink On Black On Block,Loc:1673,Girls Kindergarten Washroom 2		
S0006A	Wall,Caulking,White,Loc:1677,Stage		
S0006B	Wall,Caulking,White,Loc:1677,Stage		
S0006C	Wall,Caulking,White,Loc:1677,Stage		
S0007A	Wall,Drywall And Joint Compound,Loc:1677,Stage		
S0007B	Wall,Drywall And Joint Compound,Loc:1678,Gym Storage		
S0007C	Wall,Drywall And Joint Compound,Loc:1687,Storage Closet		
S0008A	Floor,Vinyl Floor Tile And Mastic,9x9 Beige W Blue Streaks,Loc:1678,Gym Storage		
S0008B	Floor,Vinyl Floor Tile And Mastic,9x9 Beige W Blue Streaks,Loc:1678,Gym Storage		
S0008C	Floor,Vinyl Floor Tile And Mastic,9x9 Beige W Blue Streaks,Loc:1678,Gym Storage		
S0009A	Floor,Vinyl Floor Tile And Mastic,9x9 Tan W White Streaks,Loc:1679,Staff Kitchen		
S0009B	Floor,Vinyl Floor Tile And Mastic,9x9 Tan W White Streaks,Loc:1679,Staff Kitchen		
S0009C	Floor,Vinyl Floor Tile And Mastic,9x9 Tan W White Streaks,Loc:1679,Staff Kitchen		
S0010A	Sink,Mastic, Silver,Loc:1679,Staff Kitchen		
S0010B	Sink,Mastic, Silver,Loc:1670,Kindergarten Classroom 1		
S0010B	Sink,Mastic, Silver,Loc:1679,Staff Kitchen		
S0010C	Sink,Mastic, Silver,Loc:1675,Kindergarten Classroom 2		
S0010C	Sink,Mastic, Silver,Loc:1679,Staff Kitchen		
S0011A	Vinyl Sheet Flooring,Brown Square Pattern,Loc:1670,Kindergarten Classroom 1		
S0011B	Vinyl Sheet Flooring,Brown Square Pattern,Loc:1670,Kindergarten Classroom 1		
S0011C	Vinyl Sheet Flooring,Brown Square Pattern,Loc:1670,Kindergarten Classroom 1		
S0012A	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten Classroom 1		
S0012B	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten Classroom 1		
S0012C	Floor,Vinyl Floor Tile And Mastic,12x12 Beige W Brown Fleck,Loc:1670,Kindergarten Classroom 1		
S0013A	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Yellow,Loc:1675,Kindergarten Classroom 2		
S0013B	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Yellow,Loc:1675,Kindergarten Classroom 2		
S0013C	Floor,Vinyl Floor Tile And Mastic,12x12 Mottled Yellow,Loc:1675,Kindergarten Classroom 2		
S0014A	Floor,Vinyl Floor Tile And Mastic,9x9 Red W White And Dark Red Streaks,Loc:1687,Storage Closet		
S0014B	Floor,Vinyl Floor Tile And Mastic,9x9 Red W White And Dark Red Streaks,Loc:1687,Storage Closet		
S0014C	Floor,Vinyl Floor Tile And Mastic,9x9 Red W White And Dark Red Streaks,Loc:1687,Storage Closet		
S0015A	Wall,Cement Product,Transite Board,Loc:1699,Girls Washroom		
S0015B	Wall,Cement Product,Transite Board,Loc:1699,Girls Washroom		
S0015C	Wall,Cement Product,Transite Board,Loc:1699,Girls Washroom		
S0016A	Window Liner,Putty,Cementitious, Grey,Loc:1687,Storage Closet		
S0016B	Window Liner,Putty,Cementitious, Grey,Loc:1687,Storage Closet		

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S0016C	Window Liner, Putty, Cementitious, Grey, Loc: 1687, Storage Closet
S0017A	Wall, Door Frame, Caulking, Brown, Cementitious, Loc: 1699, Girls Washroom
S0017B	Wall, Door Frame, Caulking, Brown, Cementitious, Loc: 1699, Girls Washroom
S0017C	Wall, Door Frame, Caulking, Brown, Cementitious, Loc: 1699, Girls Washroom
S0018A	Structure, Expansion Joint, Caulking, White, Loc: 1670, Kindergarten Classroom 1
S0018B	Structure, Expansion Joint, Caulking, White, Loc: 1670, Kindergarten Classroom 1
S0018C	Structure, Expansion Joint, Caulking, White, Loc: 1670, Kindergarten Classroom 1
S0019A	Structure, Texture Coat, Loc: 1659, Lobby
S0019B	Structure, Texture Coat, Loc: 1659, Lobby
S0019C	Structure, Texture Coat, Loc: 1659, Lobby
S0020A	Ceiling, Ceiling Tiles (lay-in), 24x48 Pinhole W Lw Fissures, Loc: 1685, Corridor - Gym/Classrooms
S0020B	Ceiling, Ceiling Tiles (lay-in), 24x48 Pinhole W Lw Fissures, Loc: 1685, Corridor - Gym/Classrooms
S0020C	Ceiling, Ceiling Tiles (lay-in), 24x48 Pinhole W Lw Fissures, Loc: 1685, Corridor - Gym/Classrooms

>>

APPENDIX II-B
Lead Analytical Certificates



Your Project #: 352293.003
Your C.O.C. #: N/A

Attention: Greg Forrest

Pinchin Ltd
2360 Meadowpine Blvd
Unit # 2
Mississauga, ON
CANADA L5N 6S2

Report Date: 2025/03/03
Report #: R8496105
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C521618

Received: 2025/02/25, 14:31

Sample Matrix: Paint
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Metals in Paint	5	2025/03/03	2025/03/03	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 #: 352293.003
Your C.O.C. #: N/A

Attention: Greg Forrest

Pinchin Ltd
2360 Meadowpine Blvd
Unit # 2
Mississauga, ON
CANADA L5N 6S2

Report Date: 2025/03/03
Report #: R8496105
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C521618

Received: 2025/02/25, 14:31

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Nilushi Mahathantila, Project Manager

Email: Nilushi.Mahathantila@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.

**ELEMENTS BY ATOMIC SPECTROSCOPY (PAINT)**

Bureau Veritas ID		AOMA48			AOMA49			
Sampling Date		2025/02/18			2025/02/18			
COC Number		N/A			N/A			
	UNITS	L0001, WALL, MASONRY, WHITE,LOC:1677,STA GE	RDL	MDL	L0002, WALL, MASONRY, LIGHT BLUE,LOC:1678,GYM STORAGE	RDL	MDL	QC Batch

Metals

Lead (Pb)	%	0.0073	0.00069	0.00021	0.0015	0.00061	0.00018	9883862
-----------	---	--------	---------	---------	--------	---------	---------	---------

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Bureau Veritas ID		AOMA50			AOMA51			
Sampling Date		2025/02/18			2025/02/18			
COC Number		N/A			N/A			
	UNITS	L0003, WALL, MASONRY, OFF-WHITE,LOC:1679, STAFF KITCHEN	RDL	MDL	L0004, WALL, MASONRY, CREAM,LOC:1670,KIN DERGARTEN CLASSROOM	RDL	MDL	QC Batch

Metals

Lead (Pb)	%	0.00080	0.00069	0.00021	0.032	0.0011	0.00033	9883862
-----------	---	---------	---------	---------	-------	--------	---------	---------

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Bureau Veritas ID		AOMA52			
Sampling Date		2025/02/18			
COC Number		N/A			
	UNITS	L0005, WALL, MASONRY, WHITE ON GREEN ON BLOCK,LOC:1699,G	RDL	MDL	QC Batch

Metals

Lead (Pb)	%	0.034	0.00078	0.00023	9883862
-----------	---	-------	---------	---------	---------

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch



BUREAU
VERITAS

Bureau Veritas Job #: C521618
Report Date: 2025/03/03

Pinchin Ltd
Client Project #: 352293.003
Sampler Initials: GF

TEST SUMMARY

Bureau Veritas ID: AOMA48
Sample ID: L0001, WALL, MASONRY, WHITE,LOC:1677,STAGE
Matrix: Paint

Collected: 2025/02/18
Shipped:
Received: 2025/02/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Paint	ICP	9883862	2025/03/03	2025/03/03	Thuy Linh Nguyen

Bureau Veritas ID: AOMA49
Sample ID: L0002, WALL, MASONRY, LIGHT BLUE,LOC:1678,GYM STORAGE
Matrix: Paint

Collected: 2025/02/18
Shipped:
Received: 2025/02/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Paint	ICP	9883862	2025/03/03	2025/03/03	Thuy Linh Nguyen

Bureau Veritas ID: AOMA50
Sample ID: L0003, WALL, MASONRY, OFF-WHITE,LOC:1679, STAFF KITCHEN
Matrix: Paint

Collected: 2025/02/18
Shipped:
Received: 2025/02/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Paint	ICP	9883862	2025/03/03	2025/03/03	Thuy Linh Nguyen

Bureau Veritas ID: AOMA51
Sample ID: L0004, WALL, MASONRY, CREAM,LOC:1670,KINDERGARTEN CLASSROOM
Matrix: Paint

Collected: 2025/02/18
Shipped:
Received: 2025/02/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Paint	ICP	9883862	2025/03/03	2025/03/03	Thuy Linh Nguyen

Bureau Veritas ID: AOMA52
Sample ID: L0005, WALL, MASONRY, WHITE ON GREEN ON BLOCK,LOC:1699,G
Matrix: Paint

Collected: 2025/02/18
Shipped:
Received: 2025/02/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Paint	ICP	9883862	2025/03/03	2025/03/03	Thuy Linh Nguyen



GENERAL COMMENTS

Sample AOMA48 [L0001, WALL, MASONRY, WHITE,LOC:1677,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 AOMA49 [L0002, WALL, MASONRY, LIGHT BLUE,LOC:1678,GYM STORAGE] : 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 AOMA50 [L0003, WALL, MASONRY, OFF-WHITE,LOC:1679, STAFF KITCHEN] : 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 AOMA51 [L0004, WALL, MASONRY, CREAM,LOC:1670,KINDERGARTEN CLASSROOM] : 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 AOMA52 [L0005, WALL, MASONRY, WHITE ON GREEN ON BLOCK,LOC:1699,G] : 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.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C521618

Report Date: 2025/03/03

QUALITY ASSURANCE REPORT

Pinchin Ltd

Client Project #: 352293.003

Sampler Initials: GF

QC Batch	Parameter	Date	Matrix Spike		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9883862	Lead (Pb)	2025/03/03	97	75 - 125	<0.00010	%	3.1	35	105	75 - 125

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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 #: C521618

Report Date: 2025/03/03

Pinchin Ltd

Client Project #: 352293.003

Sampler Initials: GF

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.



6740 Campobello Road, Mississauga, Ont
Phone: 905-817-5700 Fax: 905-817-57
CAM FCD-01191/6



NONT-2025-02-5082

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: _____		Quotation #: _____		<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses	
Contact Name: Greg Forrest; Jess Cozzitorto		Contact Name: _____		P.O. #/ AFE#: _____		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS	
Address: _____		Address: _____		Project #: 352293.003		Rush TAT (Surcharges will be applied)	
Phone: _____ Fax: _____		Phone: _____ Fax: _____		Site Location: _____		<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days	
Email: gforrest@pinchin.com; jcozzitorto@pinchin.com		Email: _____		Site #: _____		Date Required: 04-Mar-25	
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: ON		Rush Confirmation #: _____	
				Sampled By: Greg Forrest			
Regulation 153		Other Regulations		Analysis Requested		LABORATORY USE ONLY	
<input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		<input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQO Region _____ <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED) <input type="checkbox"/> REG 406 Table _____		# OF CONTAINERS SUBMITTED FIELD FILTERED (CIRCLE) Metals / Hg / CVI 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		CUSTODY SEAL Y / N Present Intact COOLER TEMPERATURES 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			
L0001, Wall, Masonry, White, Loc: 1677, Stage		2025-02-18		BULK			
L0002, Wall, Masonry, Light Blue, Loc: 1678, Gym Storage		2025-02-18		BULK			
L0003, Wall, Masonry, Off-white, Loc: 1679, Staff Kitchen		2025-02-18		BULK			
L0004, Wall, Masonry, Cream, Loc: 1670, Kindergarten Classro		2025-02-18		BULK			
L0005, Wall, Masonry, White On Green On Block, Loc: 1699, G		2025-02-18		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 #
		2025-02-24			2025-02-24	1431	

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>

C521618

2025/02/25 14:31

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.

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
BC	0.5% ¹	0.5%
Alberta	Any Amount ²	Any Amount ²
Saskatchewan	>0.5% ¹	>1%
Manitoba	0.1% ¹	1%
Ontario	0.5%	0.5%
Nova Scotia	0.5% ¹	0.5%
New Brunswick	1%	1%
Prince Edward Island	1%	1%
Newfoundland and Labrador	1%	1%
Yukon	1%	1%
Nunavut	1%	1%
Northwest Territories	1%	1%
Federal	1%	1%

* If there is a conflict between federal and provincial criteria, the more stringent will apply.

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.

Asbestos materials were evaluated in order to make recommendations regarding any remedial work. The priority for remedial action was based on several factors:

- Friability (friable or non-friable)
- Condition (good, fair, poor, debris)
- Accessibility (ranking from accessible to all building users to inaccessible)
- Visibility (whether the material is obscured by other building components)
- Efficiency of the work (for example, if damaged ACM is being removed in an area, it may be most practical to remove all ACM in the area even if it is in good condition)

¹ Or any amount if vermiculite

² The Government of Alberta in their guideline document entitled the “Alberta Asbestos Abatement Manual” (August 2019), defines an Asbestos-Containing Material as a product or building material that contains asbestos in any quantity or percentage.

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 EPA Method No. 3050B/EPA SW-846-6020B0B, inductively coupled plasma – mass spectrometry.

Analytical results were compared to the following criteria.

Jurisdiction*	Units (%)	Units (ppm) / (mg/kg)
British Columbia**	0.009	90
Alberta	0.009	90
Saskatchewan	0.009	90
Manitoba	0.009	90
Ontario	0.009	90
Nova Scotia	0.009	90
New Brunswick	0.009	90
Prince Edward Island	0.009	90
Newfoundland	0.009	90
Yukon	0.009	90
Nunavut	0.1	1,000
Northwest Territories	0.1	1,000
Federal	0.009	90

* If there is a conflict between federal and provincial criteria, the more stringent will apply.

** WorkSafe BC health and safety regulations do not numerically define what would be considered a lead-containing paint or coating. In general, paints containing lead >0.009% may require work procedures if disturbed.

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 ballast and 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.

Dry type transformers were presumed to be free of dielectric fluids and hence non-PCB.

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.

Template: Methodology for Hazardous Building Materials Assessment, HAZ, November 13 2024

APPENDIX IV
Location Summary Report

Client: Hamilton-Wentworth District School Board
Building Name: Richard Beasley Elementary School
Survey Date:
Building Phases: A:

Site: 80 Currie Street, Hamilton, ON
Last Re-Assessment:

Location No.	Name or Description	Area ft ²	Floor No.	Bldg. Phase	Notes
1659	Lobby	840		A	
1662	Corridor - Gym/Offices, room no. 101	450	1	A	
1667	Corridor - Gym/Kindergarten, room no. 106	475	1	A	
1668	Girls Kindergarten Washroom, room no. 107a	13	1	A	
1669	Boys Kindergarten Washroom, room no. 107b	13	1	A	
1670	Kindergarten Classroom 1, room no. 107	1100	1	A	
1671	Kindergarten Storage Room, room no. 107c	175	1	A	
1672	Storage Room, room no. 109	120	1	A	NO ACCESS
1673	Girls Kindergarten Washroom 2, room no. 108a	13		A	
1674	Boys Kindergarten Washroom 2, room no. 108b	13	1	A	
1675	Kindergarten Classroom 2, room no. 108	1100	1	A	
1676	Gymnasium, room no. 111	2360	1	A	
1677	Stage, room no. 111b	610	1	A	
1678	Gym Storage, room no. 111a	160	1	A	
1679	Staff Kitchen, room no. 110	100	1	A	
1680	Female Staff Washroom, room no. 113	42	1	A	
1681	Male Staff Washroom, room no. 112	42		A	
1685	Corridor - Gym/Classrooms, room no. 114	400	1	A	
1687	Storage Closet, room no. 128a	140	1	A	
1698	Corridor And Vestibule - Custodial Office, room no. 115	400		A	
1699	Girls Washroom, room no. 119	370	1	A	
1700	Boys Washroom, room no. 120	370	1	A	
1711	Corridor, room no. 118	800	1	A	

APPENDIX V

Hazardous Materials Summary Report / Sample Log

Client: Hamilton-Wentworth District School Board

Site: 80 Currie Street, Hamilton, ON

Building Name: Richard Beasley Elementary School

Survey Date:

HAZMAT	Sample No	System/Component/Material/Sample Description	Locations	Bldg. Phase	LF	SF	EA	%	Type	Positive	Friability
Asbestos	S0001 ABC	Floor Terrazzo	1659,1662,1667,1668,1669,1673,1674,1680,1681 1685,1698,1699,1700,1711	A	0	5593	0	0	None Detected	No	
Asbestos	S0002 ABC	Piping Radiator Parging Cement	1659,1662,1667,1671,1677,1678,1685,1698,1711	A	0	0	113	0	Chrysotile	Yes	F
Asbestos	S0003 ABC	Floor Vinyl Floor Tile And Mastic 12x12 Mottled Blue	1670,1676	A	0	2544	0	0	Chrysotile	Yes	NF
Asbestos	S0004 ABC	Wall Mastic, Brown Baseboard	1676,1677,1678,1679	A	342	0	0	0	None Detected	No	
Asbestos	S0005 ABCDEFG	Wall Masonry Cream On Block Wall	1662,1667,1668,1669,1670,1671,1673,1674,1675 1676,1677,1678,1679,1680,1681,1685,1698,1699 1700,1711	A	0	12265	0	0	None Detected	No	
Asbestos	S0006 ABC	Wall Caulking White	1677	A	75	0	0	0	None Detected	No	
Asbestos	S0007 ABC	Wall Drywall And Joint Compound	1677,1678,1687	A	0	63	0	0	None Detected	No	
Asbestos	S0008 ABC	Floor Vinyl Floor Tile And Mastic 9x9 Beige W Blue Streaks	1678	A	0	162	0	0	Chrysotile	Yes	NF
Asbestos	S0009 ABC	Floor Vinyl Floor Tile And Mastic 9x9 Tan W White Streaks	1679	A	0	100	0	0	Chrysotile	Yes	NF
Asbestos	S0010 ABC	Other Sink Mastic, Silver	1670,1675,1679	A	0	0	8	0	Chrysotile	Yes	NF
Asbestos	S0011 ABC	Other Vinyl Sheet Flooring Brown Square Pattern	1670,1675	A	0	92	0	0	Chrysotile	Yes	PF
Asbestos	S0012 ABC	Floor Vinyl Floor Tile And Mastic 12x12 Beige W Brown Fleck	1670,1671,1675	A	0	4470	0	0	None Detected	No	
Asbestos	S0013 ABC	Floor Vinyl Floor Tile And Mastic 12x12 Mottled Yellow	1675	A	0	0	0	0	Chrysotile	Yes	NF
Asbestos	S0014 ABC	Floor Vinyl Floor Tile And Mastic 9x9 Red W White And Dark Red Streaks	1687	A	0	420	0	0	Chrysotile	Yes	NF
Asbestos	S0015 ABC	Wall Cement Product Transite Board	1670,1675,1699,1700	A	0	72	0	0	Chrysotile	Yes	NF
Asbestos	S0016 ABC	Other Window Liner Putty Cementitious, Grey	1687	A	0	0	0	0	Chrysotile	Yes	NF
Asbestos	S0017 ABC	Wall Door Frame Caulking Brown, Cementitious	1699,1700	A	0	0	0	0	Chrysotile	Yes	NF
Asbestos	S0018 ABC	Structure Expansion Joint Caulking White	1670,1671,1675	A	0	0	0	0	Chrysotile	Yes	NF
Asbestos	S0019 ABC	Structure Texture Coat	1659	A	0	840	0	0	None Detected	No	
Asbestos	S0020 ABC	Ceiling Ceiling Tiles (lay-in) 24x48 Pinhole W Lw Fissures	1685	A	0	0	0	0	None Detected	No	
Asbestos	V9000	Structure Texture Coat	1659	A	0	840	0	0	Confirmed Asbestos	Yes	F
Asbestos	V0000	Duct Not Insulated	1659,1662,1667,1680,1681,1685,1698,1711	A	0	0	0	100	Non Asbestos	No	
Paint	L0001	Wall Masonry White	1676,1677	A	0	3750	0	0		No	-
Paint	L0002	Wall Masonry Light Blue	1662,1667,1669,1670,1674,1675,1678,1685,1698 1700,1711	A	0	3600	0	0		No	-

HAZMAT	Sample No	System/Component/Material/Sample Description	Locations	Bldg. Phase	LF	SF	EA	%	Type	Positive	Friability
Paint	L0003	Wall Masonry Off-white	1662,1667,1679,1680,1681,1685,1698,1711	A	0	4115	0	0		No	-
Paint	L0004	Wall Masonry Cream	1668,1670,1671,1673,1675,1677,1700	A	0	3500	0	0	Lead (Low)	Yes	-
Paint	L0005	Wall Masonry White On Green On Block	1699	A	0	1400	0	0	Lead (Low)	Yes	-
Lead Product	V9500	Batteries In Emer. Lights	1659,1667,1676	A	0	0	3	0	Presumed Lead Product	Yes	-
PCB	V9500	Light Ballasts	1659,1662,1667,1670,1671,1676,1677,1678,1679 1680,1681,1685,1687,1699,1700	A	0	0	114	33	Presumed PCB	Yes	-
Hg	V9500	Light Fixture	1662,1667,1668,1669,1670,1671,1673,1674,1675 1676,1677,1678,1679,1680,1681,1685,1687,1698 1699,1700	A	0	0	299	100	Presumed Hg	Yes	-
Hg	V9500	Mercury Vapour Lamp	1659	A	0	0	19	0	Presumed Hg	Yes	-
Hg	V0000	Thermostat	1667	A	0	0	2	0	-	No	-

Legend:

Sample number		Units		
S####	Asbestos sample collected	SF	Square feet	NF Non Friable material.
L####	Paint sample collected	LF	Linear feet	F Friable material
P####	PCB sample collected	EA	Each	PF Potentially Friable material
M####	Mould sample collected	%	Percentage	
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			

APPENDIX VI
HMIS All Data Report

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1659 : Lobby
Survey Date: 2025-02-18

Site: Schools
Floor:

Building Name: Richard Beasley Elementary School
Room #:
Last Re-Assessment: 0000-00-00
Area (sqft): 840

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 ph w ww fissure			C	Y		840								
Ceiling ²		Ceiling Tiles (lay-in), 24x48 ph w fleck			C	Y		840								
Duct		Not Insulated						100			%	V0000	Non-Asbestos		None	
Floor		Terrazzo			A	Y		840			SF	V0001	None Detected	N.D.	None	
Mechanical Equipment	Not Found															
Piping		Parging Cement			C	N		18(7)			EA	S0002A	Chrysotile	25-50%	Confirmed Asbestos	F
Structure		Steel, Red beams			C	N		100			%					
Structure		Texture Coat			C	N		840			SF	S0019ABC	None Detected	N.D.	None	
Structure ³		Texture Coat			C	N		840(7)			SF	V9000	Confirmed Asbestos		Confirmed Asbestos	F
Structure	Deck	Concrete (precast)						840			SF					
Wall		Wood, Wood panel			A	Y		800			SF					

1 - Stamped 10/26/93

2 - Stamped 07/28/3

3 - Based on asbestos inventory

Client: Hamilton-Wentworth District School Board
Location: #1659 : Lobby
Survey Date: 2025-02-18

Site: Schools
Floor:

Building Name: Richard Beasley Elementary School
Room #:
Last Re-Assessment: 0000-00-00
Area (sqft): 840

PB PRODUCTS				
Component	Quantity	Unit	Sample	Hazard
Batteries In Emer. Lights	1	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1659 : Lobby
Survey Date: 2025-02-18

Site: Schools
Floor:

Building Name: Richard Beasley Elementary School
Room #:
Last Re-Assessment: 0000-00-00
Area (sqft): 840

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Mercury Vapour Lamp	19	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1659 : Lobby
Survey Date: 2025-02-18

Site: Schools
Floor:

Building Name: Richard Beasley Elementary School
Room #:
Last Re-Assessment: 0000-00-00
Area (sqft): 840

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
Light Ballasts	14		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1662 : Corridor - Gym/Offices
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 101
Area (sqft): 450
Last Re-Assessment: 0000-00-00

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 ph w ww fissure			C	Y		840								
Duct		Not Insulated						100			%	V0000	Non-Asbestos		None	
Floor		Terrazzo			A	Y		840			SF	V0001	None Detected	N.D.	None	
Mechanical Equipment	Not Found															
Piping		Fibreglass		Canvas	C	N		400			LF					
Piping		Parging Cement			C	N		20(7)			EA	S0002C	Chrysotile	25-50%	Confirmed Asbestos	F
Structure		Steel, Red beams			C	N		100			%					
Structure	Deck	Concrete (precast)						840			SF					
Wall		Masonry, Off-White				A	Y		500			SF	V0005	None Detected	N.D.	None

1 - Stamped 10/26/93

Client: Hamilton-Wentworth District School Board
Location: #1662 : Corridor - Gym/Offices
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 101
Area (sqft): 450
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description		Amount	Hazard
Wall	Masonry	500		SF	V0003	Off-white		Pb: 0.00080 %	No
Wall	Masonry	400		SF	V0002	Light blue		Pb: 0.0015 %	No

Client: Hamilton-Wentworth District School Board
Location: #1662 : Corridor - Gym/Offices
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 101
Area (sqft): 450
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	4	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1662 : Corridor - Gym/Offices
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 101
Area (sqft): 450
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
Light Ballasts	4		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1667 : Corridor - Gym/Kindergarten
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 106
Area (sqft): 475
Last Re-Assessment: 0000-00-00

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 ph w ww fissure			C	Y		475								
Duct		Not Insulated						100			%	V0000	Non-Asbestos		None	
Floor		Terrazzo			A	Y		475			SF	V0001	None Detected	N.D.	None	
Mechanical Equipment	Radiator	Not Insulated			A	Y		2			EA					
Piping		Fibreglass			C	N		400			LF					
Piping		Parging Cement			C	N		40(7)			EA	V0002	Chrysotile	25-50%	Confirmed Asbestos	F
Structure		Steel, Red beams			C	N		100			%					
Structure	Deck	Concrete (precast)			C	N		475			SF					
Wall		Brick			A	Y		475								
Wall		Masonry, Off-White			A	Y		475			SF	V0005	None Detected	N.D.	None	

1 - Stamped 10/26/93

Client: Hamilton-Wentworth District School Board
Location: #1667 : Corridor - Gym/Kindergarten
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 106
Area (sqft): 475
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	475		SF	V0003	Off-white	Pb: 0.00080 %	No	
Wall	Masonry	500		SF	V0003	Off-white	Pb: 0.00080 %	No	
Wall	Masonry	400		SF	V0002	Light blue	Pb: 0.0015 %	No	

Client: Hamilton-Wentworth District School Board
Location: #1667 : Corridor - Gym/Kindergarten
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 106
Area (sqft): 475
Last Re-Assessment: 0000-00-00

PB PRODUCTS				
Component	Quantity	Unit	Sample	Hazard
Batteries In Emer. Lights	2	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1667 : Corridor - Gym/Kindergarten
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 106
Area (sqft): 475
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	18	EA	V9500	Presumed
Thermostat	2	EA	V0000	

Client: Hamilton-Wentworth District School Board
Location: #1667 : Corridor - Gym/Kindergarten

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 106
Area (sqft): 475

Survey Date: 2025-02-18

Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
Light Ballasts	7		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1668 : Girls Kindergarten Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 107a
Area (sqft): 13
Last Re-Assessment: 0000-00-00

ASBESTOS															
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard
Ceiling	Not Found														
Duct	Not Found														
Floor		Terrazzo			A	Y		13			SF	V0001	None Detected	N.D.	None
Mechanical Equipment	Not Found														
Structure	Deck	Concrete (precast)			C	Y		13			SF				
Wall		Masonry, Light blue			A	Y		100			SF				
Wall		Paint, Light blue			A	Y		100			SF	V0005	None Detected	N.D.	None

Client: Hamilton-Wentworth District School Board
Location: #1668 : Girls Kindergarten Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 107a
Area (sqft): 13
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	100		SF	V0004	Cream	Pb: 0.032 %	Lead (Low)	

Client: Hamilton-Wentworth District School Board
Location: #1668 : Girls Kindergarten Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 107a
Area (sqft): 13
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	2	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1668 : Girls Kindergarten Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 107a
Area (sqft): 13
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
	1		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1669 : Boys Kindergarten Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 107b
Area (sqft): 13
Last Re-Assessment: 0000-00-00

ASBESTOS															
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard
Ceiling	Not Found														
Duct	Not Found														
Floor		Terrazzo			A	Y		13			SF	V0001	None Detected	N.D.	None
Mechanical Equipment	Not Found														
Structure	Deck	Concrete (precast)			C	Y		13			SF				
Wall		Masonry, Light blue			A	Y		100			SF				
Wall		Paint, Light blue			A	Y		100			SF	V0005	None Detected	N.D.	None

Client: Hamilton-Wentworth District School Board
Location: #1669 : Boys Kindergarten Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 107b
Area (sqft): 13
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	100		SF	V0002	Light Blue	Pb: 0.0015 %	No	

Client: Hamilton-Wentworth District School Board
Location: #1669 : Boys Kindergarten Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 107b
Area (sqft): 13
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	2	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1669 : Boys Kindergarten Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 107b
Area (sqft): 13
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
	1		EA	V9500			Presumed

Client: Hamilton-Wentworth District School Board **Site:** Schools
Location: #1670 : Kindergarten Classroom 1 **Floor:** 1
Survey Date: 2025-02-18

Building Name: Richard Beasley Elementary School
Room #: 107 **Area (sqft):** 1100
Last Re-Assessment: 0000-00-00

ASBESTOS																
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard	Friable
Floor		Vinyl Floor Tile and Mastic, 12x12 mottled blue			A	Y		184(7)			SF	S0003C	Chrysotile	0.5-5%	Confirmed Asbestos	NF
Floor		Vinyl Floor Tile and Mastic, 12x12 beige w brown fleck			A	Y		2682			SF	S0012ABC	None Detected	N.D.	None	
Other ¹		Vinyl Sheet Flooring, Brown Square pattern			A	Y		69(7)			SF	S0011ABC	Chrysotile	10-25%	Confirmed Asbestos	PF
Other	Sink	Mastic, Silver			B	N		1(7)			EA	S0010B	Chrysotile	0.5-5%	Confirmed Asbestos	NF
Piping		Polyvinyl chloride (PVC)			C	Y		20			LF					
Structure		Concrete (precast)			C	Y		1100			SF					
Structure		Wood			C	Y		894			SF					
Structure	Beam	Steel, White			C	Y		1100			SF					
Structure	Expansion Joint	Caulking, White			C	Y						S0018ABC	Chrysotile	0.5-5%	Confirmed Asbestos	NF
Wall		Cement Product, Transite board			C	Y		12(7)			SF	V0015	Chrysotile	10-25%	Confirmed Asbestos	NF
Wall		Paint, Cream on block wall			A	Y		750			SF	S0005D	None Detected	N.D.	None	
Wall		Paint, Blue on block			A	Y		400			SF	V0005	None Detected	N.D.	None	

1 - Benches

Client: Hamilton-Wentworth District School Board **Site:** Schools
Location: #1670 : Kindergarten Classroom 1 **Floor:** 1
Survey Date: 2025-02-18

Building Name: Richard Beasley Elementary School
Room #: 107 **Area (sqft):** 1100
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	750		SF	L0004	Cream	Pb: 0.032 %	Lead (Low)	
Wall	Masonry	400		SF	V0002	Light blue	Pb: 0.0015 %	No	

Client: Hamilton-Wentworth District School Board **Site:** Schools
Location: #1670 : Kindergarten Classroom 1 **Floor:** 1
Survey Date: 2025-02-18

Building Name: Richard Beasley Elementary School
Room #: 107 **Area (sqft):** 1100
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	38	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board **Site:** Schools
Location: #1670 : Kindergarten Classroom 1 **Floor:** 1
Survey Date: 2025-02-18

Building Name: Richard Beasley Elementary School
Room #: 107 **Area (sqft):** 1100
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
Light Ballasts	19		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1671 : Kindergarten Storage Room
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 107c
Area (sqft): 175
Last Re-Assessment: 0000-00-00

ASBESTOS															
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard
Duct		Not Insulated			C	Y		100			%				
Floor		Vinyl Floor Tile and Mastic, 12x12 beige w brown fleck			A	Y		894			SF	V0012	None Detected	N.D.	None
Mechanical Equipment	Radiator	Not Insulated			C	Y		1			EA				
Piping		Polyvinyl chloride (PVC)			C	Y		20			LF				
Piping	Radiator	Parging Cement			C	Y		5(7)			EA	V0002	Chrysotile	25-50%	Confirmed Asbestos
Structure		Concrete (precast)			C	Y		175			SF				
Structure	Beam	Wood			C	Y		100			%				
Structure	Expansion Joint	Caulking, White			C	Y						V0018	Chrysotile	0.5-5%	Confirmed Asbestos
Wall		Paint, Cream on block wall			A	Y		750			SF	V0005	None Detected	N.D.	None
Wall		Paint, Blue on block			A	Y		400			SF	V0005	None Detected	N.D.	None

Client: Hamilton-Wentworth District School Board
Location: #1671 : Kindergarten Storage Room
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 107c
Area (sqft): 175
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	750		SF	V0004	Cream	Pb: 0.032 %	Lead (Low)	

Client: Hamilton-Wentworth District School Board
Location: #1671 : Kindergarten Storage Room
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 107c
Area (sqft): 175
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	4	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1671 : Kindergarten Storage Room
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 107c
Area (sqft): 175
Last Re-Assessment: 0000-00-00

PCB						
Component	Good	Poor	Unit	Sample	Sample Description	Amount
Light Ballasts	2		EA	V9500		Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1673 : Girls Kindergarten Washroom 2
Survey Date: 2025-02-18

Site: Schools
Floor:

Building Name: Richard Beasley Elementary School
Room #: 108a
Area (sqft): 13
Last Re-Assessment: 0000-00-00

ASBESTOS															
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard
Ceiling	Not Found														
Duct	Not Found														
Floor		Terrazzo			A	Y		13			SF	V0001	None Detected	N.D.	None
Mechanical Equipment	Not Found														
Structure	Deck	Concrete (precast)			C	Y		13			SF				
Wall		Paint, Pink on black on block			C	Y		150			SF	S0005FG	None Detected	N.D.	None

Client: Hamilton-Wentworth District School Board
Location: #1673 : Girls Kindergarten Washroom 2
Survey Date: 2025-02-18

Site: Schools
Floor:

Building Name: Richard Beasley Elementary School
Room #: 108a
Area (sqft): 13
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	100		SF	V0004	Cream	Pb: 0.032 %	Lead (Low)	

Client: Hamilton-Wentworth District School Board
Location: #1673 : Girls Kindergarten Washroom 2
Survey Date: 2025-02-18

Site: Schools
Floor:

Building Name: Richard Beasley Elementary School
Room #: 108a
Area (sqft): 13
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	2	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1673 : Girls Kindergarten Washroom 2
Survey Date: 2025-02-18

Site: Schools
Floor:

Building Name: Richard Beasley Elementary School
Room #: 108a
Area (sqft): 13
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
	1		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1674 : Boys Kindergarten Washroom 2
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 108b
Area (sqft): 13
Last Re-Assessment: 0000-00-00

ASBESTOS															
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard
Ceiling	Not Found														
Duct	Not Found														
Floor		Terrazzo			A	Y		13			SF	V0001	None Detected	N.D.	None
Mechanical Equipment	Not Found														
Structure	Deck	Concrete (precast)			C	Y		13			SF				
Wall		Masonry, Light blue			A	Y		100			SF				
Wall		Paint, Light blue			A	Y		100			SF	V0005	None Detected	N.D.	None

Client: Hamilton-Wentworth District School Board
Location: #1674 : Boys Kindergarten Washroom 2
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 108b
Area (sqft): 13
Last Re-Assessment: 0000-00-00

PAINT								
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard
Wall	Masonry	100		SF	V0002	Light Blue	Pb: 0.0015 %	No

Client: Hamilton-Wentworth District School Board
Location: #1674 : Boys Kindergarten Washroom 2
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 108b
Area (sqft): 13
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	2	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1674 : Boys Kindergarten Washroom 2
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 108b
Area (sqft): 13
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
	1		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1675 : Kindergarten Classroom 2
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 108
Area (sqft): 1100
Last Re-Assessment: 0000-00-00

ASBESTOS																
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard	Friable
Floor		Vinyl Floor Tile and Mastic, 12x12 mottled yellow										S0013ABC	Chrysotile	5-10%	Confirmed Asbestos	NF
Floor		Vinyl Floor Tile and Mastic, 12x12 beige w brown fleck			A	Y		894			SF	V0012	None Detected	N.D.	None	
Other ¹		Vinyl Sheet Flooring, Brown Square pattern			A	Y		23(7)			SF	V0011	Chrysotile	10-25%	Confirmed Asbestos	PF
Other	Sink	Mastic, Silver			B	N		1(7)			EA	S0010C	Chrysotile	0.5-5%	Confirmed Asbestos	NF
Piping		Polyvinyl chloride (PVC)			C	Y		20			LF					
Structure		Concrete (precast)			C	Y		1100			SF					
Structure		Wood			C	Y		894			SF					
Structure	Beam	Steel, White			C	Y		1100			SF					
Structure	Expansion Joint	Caulking, White			C	Y						V0018	Chrysotile	0.5-5%	Confirmed Asbestos	NF
Wall		Cement Product, Transite board			C	Y		12(7)			SF	V0015	Chrysotile	10-25%	Confirmed Asbestos	NF
Wall		Paint, Cream on block wall			A	Y		750			SF	V0005	None Detected	N.D.	None	
Wall		Paint, Blue on block			A	Y		400			SF	V0005	None Detected	N.D.	None	

1 - Benches

Client: Hamilton-Wentworth District School Board
Location: #1675 : Kindergarten Classroom 2
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 108
Area (sqft): 1100
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description		Amount	Hazard
Wall	Masonry	750		SF	V0004	Cream		Pb: 0.032 %	Lead (Low)
Wall	Masonry	400		SF	V0002	Light blue		Pb: 0.0015 %	No

Client: Hamilton-Wentworth District School Board
Location: #1675 : Kindergarten Classroom 2
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 108
Area (sqft): 1100
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	38	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1675 : Kindergarten Classroom 2
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 108
Area (sqft): 1100
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description		Amount
	19		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1676 : Gymnasium
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 111
Area (sqft): 2360
Last Re-Assessment: 0000-00-00

ASBESTOS																
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard	Friable
Ceiling	Not Found															
Duct	Not Found															
Floor		Vinyl Floor Tile and Mastic, 12x12 mottled blue			A	Y		2360(7)			SF	S0003AB	Chrysotile	0.5-5%	Confirmed Asbestos	NF
Mechanical Equipment	Not Found															
Piping	Not Found															
Structure	Beam	Wood			C	Y		100			%					
Structure	Deck	Concrete (precast)			C	Y		2360			SF					
Wall		Masonry			A	Y		3000			SF	V0005	None Detected	N.D.	None	
Wall		Mastic, Brown, Baseboard			A	Y		150			LF	V0004	None Detected	N.D.	None	

Client: Hamilton-Wentworth District School Board
Location: #1676 : Gymnasium
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 111
Area (sqft): 2360
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	3000		SF	V0001	White	Pb: 0.0073 %	No	

Client: Hamilton-Wentworth District School Board
Location: #1676 : Gymnasium
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 111
Area (sqft): 2360
Last Re-Assessment: 0000-00-00

PB PRODUCTS				
Component	Quantity	Unit	Sample	Hazard
Batteries In Emer. Lights	2		V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1676 : Gymnasium
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 111
Area (sqft): 2360
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	108	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1676 : Gymnasium
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 111
Area (sqft): 2360
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
Light Ballasts	54		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1677 : Stage
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 111b
Area (sqft): 610
Last Re-Assessment: 0000-00-00

ASBESTOS															
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard
Duct		Not Insulated			C	Y		60			LF				
Floor		Concrete (poured)			B	N		610			SF				
Floor		Wood			A	Y		610			SF				
Piping		Metal, Cast iron			B	N		10			LF				
Piping		Fibreglass			A	Y		40			LF				
Piping		Parging Cement			A	Y		9(5)			EA	S0002B	Chrysotile	25-50%	Confirmed Asbestos
Structure		Steel, Red beams			C	N		100			%				
Structure	Deck	Concrete (precast)						610			SF				
Wall ¹		Drywall and joint compound			A	Y		24			SF	S0007A	None Detected	N.D.	None
Wall		Masonry, White			A	Y		750			SF	S0005A	None Detected	N.D.	None
Wall ²		Caulking, White			C	Y		75			LF	S0006ABC	None Detected	N.D.	None
Wall		Mastic, Brown, Baseboard			A	Y		80			LF	S0004A	None Detected	N.D.	None

- 1 - Pipe chase
- 2 - Masonry joints at corners

Client: Hamilton-Wentworth District School Board
Location: #1677 : Stage
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 111b
Area (sqft): 610
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	750		SF	L0001	White	Pb: 0.0073 %	No	
Wall	Masonry	250		SF	V0004	Cream	Pb: 0.032 %	Lead (Low)	

Client: Hamilton-Wentworth District School Board
Location: #1677 : Stage
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 111b
Area (sqft): 610
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	36	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1677 : Stage
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 111b
Area (sqft): 610
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
Light Ballasts	18		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1678 : Gym Storage
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 111a
Area (sqft): 160
Last Re-Assessment: 0000-00-00

ASBESTOS															
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard
Duct		Not Insulated			C	Y		100			EA				
Floor		Vinyl Floor Tile and Mastic, 9x9 beige w blue streaks			B	Y		162(7)			SF	S0008ABC	Chrysotile	0.5-5%	Confirmed Asbestos
Piping	Radiator	Parging Cement			C	Y		4(7)			EA	V0002	Chrysotile	25-50%	Confirmed Asbestos
Structure		Steel, Red beams			C	N		100			%				
Structure	Deck	Concrete (precast)						160			SF				
Wall ¹		Drywall and joint compound			A	Y		15			SF	S0007B	None Detected	N.D.	None
Wall		Masonry, Light Blue			A	Y		400			SF	S0005B	None Detected	N.D.	None
Wall		Mastic, Brown, Baseboard			A	Y		72			LF	S0004B	None Detected	N.D.	None

1 - Pipe chase

Client: Hamilton-Wentworth District School Board
Location: #1678 : Gym Storage
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 111a
Area (sqft): 160
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description		Amount	Hazard
Wall	Masonry	400			L0002	Light blue		Pb: 0.0015 %	No

Client: Hamilton-Wentworth District School Board
Location: #1678 : Gym Storage
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 111a
Area (sqft): 160
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	8	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1678 : Gym Storage
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 111a
Area (sqft): 160
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description		Amount
Light Ballasts	4		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1679 : Staff Kitchen
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 110
Area (sqft): 100
Last Re-Assessment: 0000-00-00

ASBESTOS															
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard
Ceiling	Not Found														
Floor		Concrete (poured)		Vinyl Floor Tile and Mastic	D	N		100			SF				
Floor		Vinyl Floor Tile and Mastic, 9x9 tan w white streaks			A	Y		100(7)			SF	S0009ABC	Chrysotile	0.5-5%	Confirmed Asbestos
Mechanical Equipment	Radiator	Not Insulated			B	Y		1			EA				
Other	Sink	Mastic, Silver			B	N		6(7)			EA	S0010ABC	Chrysotile	0.5-5%	Confirmed Asbestos
Piping	Not Found														
Structure		Steel, Red beams			C	N		100			%				
Structure	Deck	Concrete (precast)						610			SF				
Wall		Masonry, Off-White			A	Y		500			SF	S0005C	None Detected	N.D.	None
Wall		Mastic, Brown, Baseboard			A	Y		40			LF	S0004C	None Detected	N.D.	None

Client: Hamilton-Wentworth District School Board
Location: #1679 : Staff Kitchen
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 110
Area (sqft): 100
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	500		SF	L0003	Off-white	Pb: 0.00080 %	No	

Client: Hamilton-Wentworth District School Board
Location: #1679 : Staff Kitchen
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 110
Area (sqft): 100
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	4	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1679 : Staff Kitchen
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 110
Area (sqft): 100
Last Re-Assessment: 0000-00-00

PCB						
Component	Good	Poor	Unit	Sample	Sample Description	Amount
Light Ballasts	1		EA	V9500		Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1680 : Female Staff Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 113
Area (sqft): 42
Last Re-Assessment: 0000-00-00

ASBESTOS															
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard
Duct		Not Insulated						100			%	V0000	Non-Asbestos		None
Floor		Terrazzo			A	Y		42			SF	S0001C	None Detected	N.D.	None
Mechanical Equipment	Not Found														
Piping		Not Insulated			A	Y		8			LF				
Structure		Steel, Red beams			C	N		100			%				
Structure	Deck	Concrete (precast)						42			SF				
Wall		Masonry, Off-White			A	Y		320			SF	V0005	None Detected	N.D.	None
Wall		Masonry, Brick			C	Y		20			SF				

Client: Hamilton-Wentworth District School Board
Location: #1680 : Female Staff Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 113
Area (sqft): 42
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description		Amount	Hazard
Wall	Masonry	320		SF	V0003	Off-white		Pb: 0.00080 %	No

Client: Hamilton-Wentworth District School Board
Location: #1680 : Female Staff Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 113
Area (sqft): 42
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	2	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1680 : Female Staff Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 113
Area (sqft): 42
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
Light Ballasts	1		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1681 : Male Staff Washroom
Survey Date: 2025-02-18

Site: Schools
Floor:

Building Name: Richard Beasley Elementary School
Room #: 112
Area (sqft): 42
Last Re-Assessment: 0000-00-00

ASBESTOS															
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard
Duct		Not Insulated						100			%	V0000	Non-Asbestos		None
Floor		Terrazzo			A	Y		84			SF	S0001AB	None Detected	N.D.	None
Mechanical Equipment	Not Found														
Piping		Not Insulated			A	Y		8			LF				
Structure		Steel, Red beams			C	N		100			%				
Structure	Deck	Concrete (precast)						42			SF				
Wall		Masonry, Off-White			A	Y		320			SF	V0005	None Detected	N.D.	None
Wall		Masonry, Brick			C	Y		20			SF				

Client: Hamilton-Wentworth District School Board
Location: #1681 : Male Staff Washroom
Survey Date: 2025-02-18

Site: Schools
Floor:

Building Name: Richard Beasley Elementary School
Room #: 112
Area (sqft): 42
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	320		SF	V0003	Off-white	Pb: 0.00080 %	No	

Client: Hamilton-Wentworth District School Board
Location: #1681 : Male Staff Washroom
Survey Date: 2025-02-18

Site: Schools
Floor:

Building Name: Richard Beasley Elementary School
Room #: 112
Area (sqft): 42
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	3	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1681 : Male Staff Washroom
Survey Date: 2025-02-18

Site: Schools
Floor:

Building Name: Richard Beasley Elementary School
Room #: 112
Area (sqft): 42
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
Light Ballasts	2		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1685 : Corridor - Gym/Classrooms
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 114
Area (sqft): 400
Last Re-Assessment: 0000-00-00

ASBESTOS																
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard	Friable
Ceiling		Ceiling Tiles (lay-in), 24x48 pinhole w lw fissures			C	Y						S0020ABC	None Detected	N.D.	None	
Ceiling ¹		Ceiling Tiles (lay-in), 24x48 ph w ww fissure			C	Y		840								
Duct		Not Insulated						100			%	V0000	Non-Asbestos		None	
Floor		Terrazzo			A	Y		840			SF	V0001	None Detected	N.D.	None	
Mechanical Equipment	Not Found															
Piping		Fibreglass		Canvas	C	N		400			LF					
Piping		Parging Cement			C	N		1(7)			EA	V0002	Chrysotile	25-50%	Confirmed Asbestos	F
Structure		Steel, Red beams			C	N		100			%					
Structure	Deck	Concrete (precast)						840			SF					
Wall		Masonry, Off-White			A	Y		500			SF	V0005	None Detected	N.D.	None	

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Client: Hamilton-Wentworth District School Board
Location: #1685 : Corridor - Gym/Classrooms
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 114
Area (sqft): 400
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	500		SF	V0003	Off-white	Pb: 0.00080 %	No	
Wall	Masonry	400		SF	V0002	Light blue	Pb: 0.0015 %	No	

Client: Hamilton-Wentworth District School Board
Location: #1685 : Corridor - Gym/Classrooms
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 114
Area (sqft): 400
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	100	%	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1685 : Corridor - Gym/Classrooms
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 114
Area (sqft): 400
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
Light Ballasts	100		%	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1687 : Storage Closet
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 128a
Area (sqft): 140
Last Re-Assessment: 0000-00-00

ASBESTOS																
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard	Friable
Floor		Vinyl Floor Tile and Mastic, 9x9 red w white and dark red streaka			A	Y		420(7)			SF	S0014ABC	Chrysotile	5-10%	Confirmed Asbestos	NF
Other	Window Liner	Putty, Cementitious, grey			A	Y						S0016ABC	Chrysotile	0.5-5%	Confirmed Asbestos	NF
Wall ¹		Drywall and joint compound			A	Y		24			SF	S0007C	None Detected	N.D.	None	

1 - Pipe chase

Client: Hamilton-Wentworth District School Board
Location: #1687 : Storage Closet
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 128a
Area (sqft): 140
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	4	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1687 : Storage Closet
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 128a
Area (sqft): 140
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
Light Ballasts	2		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board **Site:** Schools
Location: #1698 : Corridor And Vestibule - Custodial Office
Survey Date: 2025-02-18

Building Name: Richard Beasley Elementary School
Room #: 115
Last Re-Assessment: 0000-00-00

Area (sqft): 400

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 ph w ww fissure			C	Y		840								
Duct		Not Insulated						100			%	V0000	Non-Asbestos		None	
Floor		Terrazzo			A	Y		840			SF	V0001	None Detected	N.D.	None	
Mechanical Equipment	Not Found															
Piping		Fibreglass		Canvas	C	N		400			LF					
Piping		Parging Cement			C	N		1(7)			EA	V0002	Chrysotile	25-50%	Confirmed Asbestos	F
Structure		Steel, Red beams			C	N		100			%					
Structure	Deck	Concrete (precast)						840			SF					
Wall		Masonry, Off-White			A	Y		500			SF	V0005	None Detected	N.D.	None	

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Client: Hamilton-Wentworth District School Board **Site:** Schools
Location: #1698 : Corridor And Vestibule - Custodial Office
Survey Date: 2025-02-18

Building Name: Richard Beasley Elementary School
Room #: 115
Last Re-Assessment: 0000-00-00

Area (sqft): 400

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	500		SF	V0003	Off-white	Pb: 0.00080 %	No	
Wall	Masonry	400		SF	V0002	Light blue	Pb: 0.0015 %	No	

Client: Hamilton-Wentworth District School Board **Site:** Schools
Location: #1698 : Corridor And Vestibule - Custodial Office
Survey Date: 2025-02-18

Building Name: Richard Beasley Elementary School
Room #: 115
Last Re-Assessment: 0000-00-00

Area (sqft): 400

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	100	%	V9500	Presumed

Client: Hamilton-Wentworth District School Board **Site:** Schools
Location: #1698 : Corridor And Vestibule - Custodial Office
Survey Date: 2025-02-18

Building Name: Richard Beasley Elementary School
Room #: 115
Last Re-Assessment: 0000-00-00

Area (sqft): 400

PCB						
Component	Good	Poor	Unit	Sample	Sample Description	Amount
	100		%	V9500		Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1699 : Girls Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 119
Area (sqft): 370
Last Re-Assessment: 0000-00-00

ASBESTOS															
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard
Duct		Not Insulated			C	Y		100			%				
Floor		Terrazzo			A	Y		370			SF	V0001	None Detected	N.D.	None
Mechanical Equipment	Radiator	Not Insulated			A	Y		1			EA				
Piping		Fibreglass		Polyvinyl chloride (PVC)	C	Y		20			LF				
Structure		Steel, White beams			C	N		100			%				
Structure	Deck	Concrete (precast)			C	Y		370			SF				
Wall		Cement Product, Transite board			C	Y		36(7)			SF	S0015ABC	Chrysotile	10-25%	Confirmed Asbestos
Wall		Paint, White on green on block			C	Y		300			SF	S0005E	None Detected	N.D.	None
Wall	Door Frame	Caulking, Brown, cementitious			A	Y						S0017ABC	Chrysotile	0.5-5%	Confirmed Asbestos

Client: Hamilton-Wentworth District School Board
Location: #1699 : Girls Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 119
Area (sqft): 370
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	1400		SF	L0005	White on green on block	Pb: 0.034 %	Lead (Low)	

Client: Hamilton-Wentworth District School Board
Location: #1699 : Girls Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 119
Area (sqft): 370
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	12	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1699 : Girls Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 119
Area (sqft): 370
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
Light Ballasts	6		EA	V9500			Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1700 : Boys Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 120
Area (sqft): 370
Last Re-Assessment: 0000-00-00

ASBESTOS															
System	Component	Material	Item	Covering	A*	V*	AP*	Good	Fair	Poor	Unit	Sample	Asbestos Type	Amount	Hazard
Duct		Not Insulated			C	Y		100			%				
Floor		Terrazzo			A	Y		370			SF	V0001	None Detected	N.D.	None
Mechanical Equipment	Radiator	Not Insulated			A	Y		1			EA				
Piping		Fibreglass		Polyvinyl chloride (PVC)	C	Y		20			LF				
Structure		Steel, White beams			C	N		100			%				
Structure	Deck	Concrete (precast)			C	Y		370			SF				
Wall		Cement Product, Transite board			C	Y		12(7)			SF	V0015	Chrysotile	10-25%	Confirmed Asbestos
Wall		Paint, White on green on block			C	Y		300			SF	V0005	None Detected	N.D.	None
Wall	Door Frame	Caulking, Brown, cementitious			A	Y						V0017	Chrysotile	0.5-5%	Confirmed Asbestos

Client: Hamilton-Wentworth District School Board
Location: #1700 : Boys Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 120
Area (sqft): 370
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	600		SF	V0002	Light blue	Pb: 0.0015 %	No	
Wall	Masonry	800		SF	V0004	cream	Pb: 0.032 %	Lead (Low)	

Client: Hamilton-Wentworth District School Board
Location: #1700 : Boys Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 120
Area (sqft): 370
Last Re-Assessment: 0000-00-00

MERCURY				
Component	Quantity	Unit	Sample	Hazard
Light Fixture	12	EA	V9500	Presumed

Client: Hamilton-Wentworth District School Board
Location: #1700 : Boys Washroom
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 120
Area (sqft): 370
Last Re-Assessment: 0000-00-00

PCB						
Component	Good	Poor	Unit	Sample	Sample Description	Amount
Light Ballasts	6		EA	V9500		Presumed

ALL DATA REPORT

Client: Hamilton-Wentworth District School Board
Location: #1711 : Corridor
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 118
Area (sqft): 800
Last Re-Assessment: 0000-00-00

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 ph w ww fissure			C	Y		840								
Duct		Not Insulated						100			%	V0000	Non-Asbestos		None	
Floor		Terrazzo			A	Y		840			SF	V0001	None Detected	N.D.	None	
Mechanical Equipment	Not Found															
Piping		Fibreglass		Canvas	C	N		400			LF					
Piping		Parging Cement			C	N		15(7)			EA	V0002	Chrysotile	25-50%	Confirmed Asbestos	F
Structure		Steel, Red beams			C	N		100			%					
Structure	Deck	Concrete (precast)						840			SF					
Wall		Masonry, Off-White			A	Y		500			SF	V0005	None Detected	N.D.	None	

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Client: Hamilton-Wentworth District School Board
Location: #1711 : Corridor
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 118
Area (sqft): 800
Last Re-Assessment: 0000-00-00

PAINT									
System	Item	Good	Poor	Unit	Sample	Sample Description	Amount	Hazard	
Wall	Masonry	500		SF	V0003	Off-white	Pb: 0.00080 %	No	
Wall	Masonry	400		SF	V0002	Light blue	Pb: 0.0015 %	No	

Client: Hamilton-Wentworth District School Board
Location: #1711 : Corridor
Survey Date: 2025-02-18

Site: Schools
Floor: 1

Building Name: Richard Beasley Elementary School
Room #: 118
Area (sqft): 800
Last Re-Assessment: 0000-00-00

PCB							
Component	Good	Poor	Unit	Sample	Sample Description	Amount	PCB
	100		%	V9500			Presumed

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

PART 1 GENERAL

1.1 Requirements Included

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

1.2 Quality Assurance

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

1.3 Format

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

1.4 Contents Each Volume

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

1.5 Submission

- .1 Submit for review a digital pdf file of completed closeout documents in final form 15 days prior to substantial performance. For equipment put into use with Owner's permission during construction, submit Operating and Maintenance Manuals within 10 days after start-up. For items of Work delayed materially beyond date of Substantial Performance, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.
- .2 Consultant comments will be returned, and the contractor is to revise the content of documents as required prior to final submittal.
- .3 Submit one (1) digital copy of revised volumes of data in final form within ten days after final inspection.
- .4 For contract drawings (architectural, landscaping, structural, mechanical, electrical), transfer neatly as-built notations onto a digital set and submit to consultant.
- .5 Prepare digital pdf file for submission on USB of completed closeout documents.

1.6 Record Documents and Samples

- .1 In addition to requirements in General Conditions, maintain at the site for Owner one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda
 - .4 Change Orders and other modifications to the Contract.
 - .5 Reviewed shop drawings, product data and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
- .2 Manufacturer's certificates.
- .3 Store Record Documents and Samples in Field Office apart from documents used for construction. Provide files, racks, and secure storage.
- .4 Label and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "Project Record" in neat, large, printed letters.
- .5 Maintain Record Documents in a clean, dry, and legible condition. Do not use Record Documents for construction purposes.
- .6 Keep Record Documents and samples available for inspection by Consultant.

1.7 Recording As-Built Conditions

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

- .3 Record information concurrently with construction progress. Do not conceal work until required information is recorded.
- .4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measure depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.
- .5 Specifications: legibly mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalog number of each project actually installed particularly optional items and substitute items.
 - .2 Changes made by Addenda and Change Orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.8 Digital As-Built Drawings

- .1 Retain the services of a CAD drafting company acceptable to the consultant to prepare digital CAD As-Built documents for all Architectural and Engineering drawings.
- .2 After the consultant has found the Redlined As-Built drawings to be acceptable, transfer to digital file all information recorded on As-Built drawings. Layering of information as per consultant's instructions.

1.9 Equipment and Systems

- .1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panelboard Circuit Directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instruction. Include summer, winter, and any special operating instructions.
- .5 Maintain Requirements: include routine procedures and guide for troubleshooting; disassembly, repair and reassemble instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.

- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts lists, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide a list of the original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test balancing reports as specified in mechanical specifications.
- .15 Additional Requirements: As specified in individual specification sections.

1.10 Materials and Finishes

- .1 Building Products, Applied Materials, and Finishes: include product data, with catalog number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommend schedule for cleaning and maintenance.
- .4 Additional Requirements: as specified in individual specifications sections.

1.11 Guarantees, Warranties and Bonds

- .1 Separate each warranty or bond with index tab sheets keyed to the List of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal. Use Guarantee/Warranty Form as provided in Section 01721 whenever standard preprinted trade or manufacturer's Guarantee/Warranty forms are not available.
- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
- .4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.
- .5 Verify that documents are in proper form, contain full information, and are notarized.
- .6 Co-execute submittals when required.

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

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

1. Notes

1. To be made out on the letterhead of Guarantor or Warrantor which usually is a Subcontractor.
2. This format is to be used only when standard preprinted trade or manufacturer's forms are not available. Preprinted forms are to include all elements of information shown on this sample or as a minimum.
3. Comply with Requirements for Guarantee/Warranty as specified in Section 01 72 00, Article 10.

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

Date: _____

SECTION _____

TITLE _____

GUARANTEE/WARRANTY TO:

OWNER Hamilton Wentworth District School Board

PROJECT *Renovations at Richard Beasley School*

ARCHITECT *Barry Bryan Associates*

REFERENCE (to specifications or drawings)

TIME Period of Guarantee/Warranty: _____ years

GUARANTEE/
WARRANTY Starting Date: Substantial Performance as certified by Architect

Date: _____

(Description of Guarantee/Warranty)

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

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

SUBCONTRACTOR

Signature

Date

Authorized Signing
Officer:

(Name Printed)

Title

Name of Firm:

Address:

Telephone Number

CONTRACTOR

Signature

Date

Authorized Signing
Officer:

(Name Printed)

Title

Name of Firm:

SEAL

Address:

Telephone Number

End of Section

1. Notes

1. To be made out on the letterhead of Guarantor or Warrantor which usually is a Subcontractor.
2. This format is to be used only when standard preprinted trade or manufacturer's forms are not available. Preprinted forms are to include all elements of information shown on this sample or as a minimum.
3. Comply with Requirements for Guarantee/Warranty as specified in Section 01 72 00, Article 10.

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

Date: _____

SECTION _____

TITLE _____

GUARANTEE/WARRANTY TO:

OWNER Hamilton Wentworth District School Board

PROJECT *Renovations at Richard Beasley School*

ARCHITECT *Barry Bryan Associates*

REFERENCE *(to specifications or drawings)*

TIME Period of Guarantee/Warranty: _____ years

GUARANTEE/
WARRANTY Starting Date: Substantial Performance as certified by Architect

Date: _____

(Description of Guarantee/Warranty)

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

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

SUBCONTRACTOR

Signature

Date

Authorized Signing
Officer:

(Name Printed)

Title

Name of Firm:

Address:

Telephone Number

CONTRACTOR

Signature

Date

Authorized Signing
Officer:

(Name Printed)

Title

Name of Firm:

SEAL

Address:

Telephone Number

End of Section

PART 1 GENERAL

1.1 Maintenance Manual

- .1 On completion of project, submit to the Owner one (1) digital copy of Operations Data and Maintenance Manual in English, made up as follows:
 - .1 Enclose title sheet, labeled "Operation Data and Maintenance Manual", project name, date and list of contents.
 - .2 Organize content folders into applicable sections of work to parallel project specification break-down. Mark each section by labeled folder similar to the following example:
 - .3 The digital copy of all documents in the operations and manuals must be provided on a USB, format to be PDF.
- .2 Include the following information, plus data specified.
 - .1 Maintenance instructions for finished surface and materials.
 - .2 Copy of hardware and paint schedules.
 - .3 Description, operation and maintenance instructions for equipment and systems, including complete list of equipment and parts list. Indicate nameplate information such as make, size, capacity, serial number.
 - .4 Names, addresses and phone numbers of sub-contractors and suppliers.
 - .5 Guarantees, Warranties and bonds showing:
 - .1 Name and address of project.
 - .2 Guarantee commencement date (date of Final Certificate of Completion).
 - .3 Duration of guarantee.
 - .4 Clear indication of what is being guaranteed and what remedial action will be taken under guarantee.
 - .5 Signature and seal of Contractor.
 - .6 Additional material used in project listed under various Sections showing name of manufacturer and source of supply.
- .3 Neatly type lists and notes. Use clear drawings, diagrams or manufacturers' literature.
- .4 Include in the Manuals a complete set of final shop drawings indicating corrections and changes made during fabrication and installation.
- .5 Include in the manuals a complete set of final as-built red line drawings. Include each drawing sheet and indicate on the title block "As-Build Drawing"

PART 2 PRODUCTS

2.1 Not Used

- .1 Not Used.

PART 3 EXECUTION

3.1 Not Used

- .1 Not Used.

End of Section

PART 1 GENERAL

1.1 General

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

1.2 Standard Warranty

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

1.3 Extended Warranties

- .1 Refer to individual specification sections for requirements of extended warranties required for particular sections or items of work.
- .2 Extended warranties are required to be issued by manufacturers, fabricators, suppliers and/or installers, sometimes jointly, due to their unique position in the construction process and their ability to guarantee a particular section of work. Refer to individual requirements of extended warranties requested.
- .3 Unless specifically noted otherwise, all extended warranties shall commence on the date of Substantial Performance of the Work as certified by the Consultant.
- .4 All Extended Warranties shall be listed separately and included as a separate section in the operations and maintenance manuals provided to the HWDSB at project close out. Each Extended Warranty document shall include the vendor's contact information, date of warranty commencement and expiry as well as listing the specific product with extended warranty. This document shall clearly indicate if the warranty includes or excludes labour.
- .5 Listed below is a summary of extended warranties required for individual Sections. This list, if inconsistent with the specified requirements of individual extended warranties, shall be deemed correct with respect to the length of extended warranties. Extended warranties required shall include, but not be limited to, the following:

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

Modified Bituminous Sheet Air Barriers (Section 07 27 13)	3 years
Door Hardware (Closers only) (Section 08 71 10)	10 years
Ceramic Tiling (Section 09 30 13)	2 years
Resilient Sheet Flooring (Section 09 65 70)	5 years
Resinous Flooring (Section 09 67 23)	2 years
Metal Toilet Compartments (Section 10 21 13)	3 years
Vertical Wheelchair Lift (Section 14 42 16)	2 years
Cast-in-Place Tactile Warning Surfacing (Section 32 17 29)	5 years.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not Used.

PART 3 EXECUTION

3.1 Not Used

.1 Not Used.

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
- .2 Store volatile waste in covered metal containers and remove from premises daily.
- .3 Prevent accumulation of waste, which create hazardous conditions.
- .4 Provide adequate ventilation during use of volatile or noxious substances.
- .5 At no time shall waste be stored inside the school building. All waste and waste containers must be separated from general public and school occupants using properly secured and locking construction hoarding.

1.2 Materials

- .1 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .2 Provide on-site construction specific dump containers for collection of waste materials, and rubbish. The school waste bins, and garbage collection shall not be used to dispose of construction related waste materials, debris and/or rubbish.

1.3 Cleaning During Construction

- .1 Maintain project grounds, and public properties free from accumulations of waste materials and rubbish.
- .2 Remove waste materials, and rubbish from site.
- .3 Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for substantial completion or occupancy.
- .4 Schedule cleaning operations so that resulting dust and other contaminants will not fall on wet, newly painted surfaces.

1.4 Final Cleaning

- .1 At completion of Work, remove waste materials, rubbish, tools, equipment, machinery, and surplus materials, and clean all surfaces and leave project clean and ready for occupancy.
- .2 Employ experienced professional cleaners, for final cleaning.
- .3 In preparation for Substantial Performance or Fitness for Occupancy status, whichever occurs first, conduct final inspection of interior and exterior surfaces and of concealed spaces.
- .4 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from all interior and exterior finished surfaces; polish resilient and ceramic surfaces so designated to shine finish. Vacuum carpet.
- .5 Clean and polish glass and mirrors.

- .6 Repair, patch and touch-up marred surfaces to specified finish and to match new adjacent surfaces.
- .7 Broom-clean, magnet roll, and pressure wash all concrete and asphalt paved surfaces; rake clean other surfaces of grounds.
- .8 Clean exposed ductwork and structure.
- .9 Replace filters.
- .10 Clean bulbs and lamps and replace those burned out.
- .11 Clean diffusers and grilles.
- .12 Clean sinks, faucets, and water closets and controls.
- .13 Maintain cleaning until project, or portion thereof, is occupied by Owner.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not Used.

PART 3 EXECUTION

3.1 Not Used

- .1 Not Used.

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 References.
- .2 Submittals.
- .3 Definitions.
- .4 Waste Management Goals for the Project.
- .5 Documents.
- .6 Waste Management Plan.
- .7 Materials Source Separation Program.
- .8 Disposal of Wastes.
- .9 Scheduling.
- .10 Storage, Handling and Protection.
- .11 Application.
- .12 Diversion of Materials.

1.2 References

- .1 O. Reg. 102/94 Waste Audits and Waste Reduction Work Plans.
- .2 O. Reg. 278/05 Occupational Health and Safety Act

1.3 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit a completed Waste Management Plan (WMP) prior to project start-up.

1.4 Definitions

- .1 Waste Management Plan (WMP): Contractor's approved overall strategy for waste management including waste reduction workplan and materials source separation program.
- .2 Materials Source Separation Program (MSSP): Consists of a series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.
- .3 Separate Condition: Refers to waste sorted into individual types.

1.5 Waste Management Goals for the Project

- .1 The Owner has established that this Project shall generate the least amount of waste possible and that processes shall be employed that ensure the generation of as little waste as possible including prevention of damage due to mishandling, improper storage, contamination, inadequate protection or other factors as well as minimizing over packaging and poor quantity estimating.
- .2 Of the waste that is generated, the waste materials designated in this specification shall be salvaged for reuse and or recycling. Waste disposal in landfills or incinerators shall be minimized.

1.6 Waste Management Plan

- .1 Waste Management Plan: Submit a Waste Management Plan within 10 calendar days after receipt of Notice of Award of Contract, or prior to any waste removal, whichever occurs sooner. The Plan shall contain the following:
 - .1 Analysis of the proposed job site waste to be generated, including the types of recyclable and waste materials generated (by volume or weight). In the case of demolition, a list of each item proposed to be salvaged during the course of the project should also be prepared
 - .2 Alternatives to Land Filling: Contractor shall designate responsibility for preparing a list of each material proposed to be salvaged, reused, or recycled during the course of the Project.
- .2 Post WMP or summary where workers at site are able to review its content.

1.7 Materials Source Separation Program

- .1 The Waste Management Plan shall include a Source Separation Program for recyclable waste and shall be in accordance with the established policies currently in place at the local Municipality, and the requirements of O. Reg. 102/94.
- .2 Prepare MSSP and have ready for use prior to project start-up.
- .3 Implement MSSP for waste generated on project in compliance with approved methods and as approved by Consultant.
- .4 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and/or recyclable materials.
- .5 Provide containers to deposit reusable and/or recyclable materials.
- .6 Locate containers to facilitate deposit of materials without hindering daily operations.
- .7 Locate separated materials in areas which minimize material damage.
- .8 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.

1.8 Disposal of Wastes

- .1 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .2 Provide appropriate on-site containers for collection of waste materials and debris. Containers for volatile wastes shall be closed containers and shall be removed from site daily.
- .3 Provide and use clearly marked separate bins for recycling.
- .4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.
- .5 Remove waste material and debris from site and deposit in waste container at end of each working day.
- .6 Do not permit waste to accumulate onsite.

- .7 Burying of rubbish and waste materials is prohibited.
- .8 Disposal of waste into waterways, storm or sanitary sewers is prohibited.

1.9 Scheduling

- .1 Coordinate work with other activities at site to ensure timely and orderly progress of the Work.

1.10 Storage, Handling and Protection

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Owner.
- .2 Materials from building demolition to be salvaged or re-used are to be removed and salvaged.
- .3 Unless specified otherwise, materials for removal become Contractor's property.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Application

- .1 Do work in compliance with Waste Management Plan.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.
- .3 Source separate materials to be reused/recycled into specified sort areas.

3.2 Designated Substances

- .1 All designated substances abatement, removal and disposal shall be completed in accordance with O. Reg 278/05 and all other applicable legislation.

3.3 Diversion of Materials

- .1 Separate materials from general waste stream and stockpile in separate piles or containers, to approval of Owner, and consistent with applicable fire regulations. Mark containers or stockpile areas.
- .2 On-site sale of materials is not permitted.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 02 81 00 Hazardous Materials-General Provisions and Section 02 82 00.01 Asbestos Abatement – Type 1 (Low Risk) Procedures.
- .2 Section 02 82 00.02 Asbestos Abatement – Type 2 (Moderate Risk) Precautions
- .3 Section 02 82 00.04 Asbestos Abatement – Glove Bag
- .4 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

- .1 The National Building Code of Canada 2020, Part 8-Safety Measures on Construction and Demolition Sites.
- .2 CSA Group (CSA)
 - .1 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures
- .3 ASTM International (ASTM)
 - .1 ASTM F710-22 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
- .4 Ontario Provincial Regulations
 - .1 Ontario Regulation 102/94 Waste Audits and Waste Reduction Work Plans.
 - .2 Ontario Regulation 103/94 Environmental Protection Act.
 - .3 Ontario Regulation 213/07 The Fire Code.
 - .4 Ontario Regulation 232/98 Landfilling Sites.
 - .5 Ontario Regulation 278/05 Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations.
 - .6 Ontario Regulation 347 Environmental Protection Act, General — Waste Management.
 - .7 Ontario Regulation 332/12 The Building Code.
- .5 The Workplace Health and Safety Act, and Regulations for Construction Projects.
- .6 The Contractors Health and Safety Policy.
- .7 Laws, rules and regulations of other authorities having jurisdiction.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit detailed written schedule, methodology and proposed procedures for demolition, including a Safe Work Plan for review prior to commencement of demolition.
- .3 Where required by authorities having jurisdiction, submit for approval drawings, diagrams or details clearly showing sequence of disassembly work or supporting structures and underpinning.
- .4 Drawings for structural elements of the demolition process including shoring, underpinning and installation of new lintels or beams in existing load bearing walls, shall bear signature and stamp of qualified professional engineer registered in the Province of Ontario.
- .5 Submit proposed dust-control measures.
- .6 Submit proposed noise-control measures.

- .7 Submit schedule of demolition activities indicating the following:
 - .1 Detailed sequence of demolition and removal work, including start and end dates for each activity.
 - .2 Dates for shutoff, capping, and continuation of utility services.
- .8 If hazardous materials are encountered and disposed of, landfill records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
- .9 At Project Closeout: Submit record drawings in accordance with Section 01 78 00. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions

1.5 Permits

- .1 Obtain and pay for all permits and comply with all laws, rules, ordinances, and regulations relating to Demolition of Building and preservation of Public Health and Safety.
- .2 The Consultant will complete General Review during demolition in accordance with the Ontario Building Code. All other engineering required for shoring design and for other structural elements of the demolition work will be completed by the Contractor's own engineer and paid for by the Contractor.

1.6 Waste Management Plan

- .1 All work of this section shall be completed in accordance with the contractors approved Waste Management Plan specified in Section 01 74 19.

1.7 Definitions

- .1 Chemical Waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals and inorganic wastes.
- .2 Demolition Waste: Building materials and solid waste resulting from construction, remodeling, repair, cleanup, or demolition operations that are not hazardous. This term includes, but is not limited to, asphalt concrete, Portland cement concrete, brick, lumber, gypsum wallboard, cardboard and other associated packaging, roofing material, ceramic tile, carpeting, plastic pipe, and steel. The materials may include rock, soil, tree stumps, and other vegetative matter resulting from land clearing and landscaping for construction or land development projects.
- .3 Environmental Pollution and Damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human or animal life; affect other species of importance to humanity; or degrade the utility of the environment for aesthetic, cultural or historical purposes.
- .4 Inert Fill: A permitted facility that accepts inert waste such as asphalt and concrete exclusively for the purpose of disposal.
- .5 Inert Solids/Inert Waste: Non-liquid solid waste including, but not limited to, soil and concrete that does not contain hazardous substances or soluble pollutants at concentrations in excess of water-quality standards established by a regional water board and does not contain significant quantities of decomposable solid waste.
- .6 Landfill: A landfill that accepts non-hazardous materials such as household, commercial, and industrial waste, resulting from construction, remodeling, repair, and demolition operations. A

landfill must have a solid waste facilities permit from the Ministry of the Environment and be in conformance to O. Reg 232/98.

- .7 Recycling: The process of sorting, cleansing, treating and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.
- .8 Remove: Remove and legally dispose of items, except those identified for use in recycling, re-use, and salvage programs.
- .9 Reuse: The use, in the same or similar form as it was produced, of a material which might otherwise be discarded.
- .10 Solid Waste: All putrescible and non-putrescible solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, dewatered, treated, or chemically fixed sewage sludge which is not hazardous waste, manure, vegetable or animal solid and semisolid wastes, and other discarded solid and semisolid wastes. "Solid waste" does not include hazardous waste, radioactive waste, or medical waste as defined or regulated by law.

1.8 Quality Assurance

- .1 Demolition Firm Qualifications: Demolition contractor shall be an experienced firm that has successfully completed demolition Work similar to that indicated for this Project.
- .2 Regulatory Requirements: Comply with governing regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction. Obtain and pay for all permits required.
- .3 Pre-demolition Conference: Conduct a conference at Project site.
 - .1 Review the environmental goals of this Project and make a proactive effort to increase awareness of these goals among all labor forces on site.
 - .2 Review schedule and scheduling procedures.
 - .3 Review health and safety procedures.
 - .4 Review of Project conditions including review of record photographs.

1.9 Project Conditions

- .1 Construct safety barriers, barricades, fencing and hoarding to separate public from work areas as described in Section 01 56 00.
- .2 The Owner assumes no responsibility for the actual condition of the structures to be demolished.
- .3 Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner insofar as practicable. Variations within the structures may occur by the Owner's salvage operations prior to start of demolition.

1.10 Designated Substances

- .1 Refer to Materials Assessment (Pre-construction) Washroom and Stage Renovations Richard Beasley Elementary School 80 Currie Street, Hamilton, Ontario dated March 11, 2025 and prepared by Pinchin.

- .2 Should any other material not identified in the above referenced reports resembling asbestos or other hazardous substances be encountered in course of demolition work, immediately stop work and notify the Owner's Representative. Refer to Section 01 41 00.
- .3 All designated substances abatement, removal and disposal shall conform to the specifications prepared by Pinching All work shall be completed in accordance with O. Reg 278/05 and all other applicable legislation.
- .4 Refer to Sections:
 - .1 02 81 00 Hazardous Materials-General Provisions and Section 02 82 00.01 Asbestos Abatement – Type 1 (Low Risk) Procedures.
 - .2 02 82 00.02 Asbestos Abatement – Type 2 (Moderate Risk) Precautions
 - .3 02 82 00.04 Asbestos Abatement – Glove Bag

PART 2 PRODUCTS

2.1 Materials

- .1 Provide all materials necessary for temporary shoring. On completion, remove temporary materials from site.
- .2 All building materials removed from the building shall become the property of the Contractor unless specified otherwise and shall be reused in new construction or removed from the Site.
- .3 All concrete, masonry, asphalt and similar materials shall be crushed prior to disposal.

2.2 Salvage

- .1 All items of salvageable value must be salvaged.
- .2 Provide a schedule of items to be salvaged and clearly indicate which items are to be retained by Owner. Clearly identify and tag each salvageable item.
- .3 Transport salvaged items from the site as they are removed.
- .4 Items of salvageable value to the Contractor may be removed from the structure as the work progresses, if such items are not claimed by the Owner.

2.3 Reuse

- .1 Salvage and reuse materials as indicated on the drawings.

2.4 Recycle

- .1 All materials from demolition and land clearing which can be recycled through local municipal programs and which is not scheduled for salvage shall be sorted and separated in accordance with Regional, Provincial and Municipal standards and regulations.
- .2 Provide recycling receptacles for the duration of construction activities at the building site.

PART 3 EXECUTION

3.1 Examination

- .1 Survey existing conditions and correlate with requirements indicated to determine extent of demolition, salvage and recycling required.
- .2 Verify that utilities have been disconnected and capped.
- .3 Survey condition of the building to determine whether removing any element might result in a structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during demolition.
- .4 Retain a licensed and qualified civil or structural engineer to provide analysis, including calculations, necessary to ensure the safe execution of the demolition work.
- .5 Perform surveys and tests as the Work progresses to detect hazards resulting from demolition activities.
- .6 Preliminary Survey:
 - .1 The Demolition Plans indicate the general extent of existing conditions based upon drawings provided by the Owner and existing site conditions. Review all areas of work to determine full extent of areas to be demolished, altered or renovated and become familiar with actual conditions and extent of work required.
 - .2 Before commencing demolition operations, examine Site and provide engineering survey to determine type of construction, condition of structure, and Site conditions. Assess strength and stability of damaged or deteriorated structures.
 - .3 Assess potential effect of removal of any part or parts on the remainder of structure before such part(s) are removed.
 - .4 Assess effects of demolition at adjacent structures and consider need for underpinning, shoring and/or bracing.
 - .5 Investigate for following conditions:
 - .1 load bearing walls and floors
 - .2 structure suspended from another
 - .3 effects of soils, water, lateral pressures on retaining or foundations walls
 - .4 presence of tanks and other piping systems
 - .5 presence of designated substances and hazardous materials.
- .7 After determining demolition methods, determine area of possible vibration. Carefully inspect beyond those adjacent areas. List potential damage areas and photograph each for record purposes before starting work.

3.2 Preparation

- .1 Erect and maintain dustproof and weatherproof partitions as required to prevent spread of dust, fumes and smoke to other parts of building. Maintain fire exits. On completion, remove partitions and make good surfaces to match adjacent surfaces of building.
- .2 Provide all shoring and bracing required for the execution of the work.
- .3 Ensure all sedimentation controls as required are in place prior to commencement of demolition activities.

- .4 Before commencing demolition, verify that existing water, gas, electrical and other services in areas being demolished are cut off, capped diverted or removed as required. Post warning signs on electrical lines and equipment which must remain energized to serve adjacent areas during period of demolition.
- .5 Conduct demolition operations and remove materials from demolition to ensure minimum interference with roads, streets, walks, and other adjacent occupied and utilized facilities.
- .6 Do not close or obstruct streets, walks, or other adjacent occupied or utilized facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

3.3 Utilities

- .1 Contact authorities or utility companies for assistance in locating and marking services passing under, through, overhead or adjacent to structure to be demolished. Such services include:
 - .1 Electrical power lines
 - .2 Gas mains
 - .3 Communication cables
 - .4 Fibre optic cables
 - .5 Water lines.
 - .6 Drainage piping (storm and sanitary).
- .2 Before disconnecting, removing, plugging or abandoning any existing utilities serving the building:
 - .1 Notify the Owner, applicable utility companies, and local authorities having jurisdiction.
 - .2 Cut off and cap utilities at the mains on the property or in the street as required by the Owner and responsible utility company. Maintain fire protection to the existing buildings at all times.
 - .3 Remove, cut off and plug, or cap all utilities within the existing building areas to be demolished, except those designated to remain

3.4 Protection

- .1 Erect and maintain temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction. Maintain such areas free of snow, ice, water and debris. Lighting levels shall be equal to that prior to erection.
- .2 Provide safe access and egress from working areas using entrances, hallways, stairways or ladder runs, protected to safeguard personnel using them from falling debris.
- .3 Do not interfere with use and activities of adjacent buildings and site. Maintain free and safe passage to and from buildings.
- .4 Where demolition operations prevent normal access to adjacent properties, provide and maintain suitable alternative access.
- .5 Provide flagmen where necessary or appropriate, to provide effective and safe access to site to vehicular traffic and protection to Owner's personnel. Refer to Division 1 for safety requirements.
- .6 Protect existing site improvements, appurtenances, and landscaping that are designated to remain in place.

- .7 Ensure that all necessary controls are in place at the beginning of each work period which will prevent the spread of contaminated material beyond the work area limits. Stop work immediately if there exists any possibility of the spread of contaminated materials.
- .8 Keep dust from entering existing facilities and areas of building not affected by the Work. Comply with Ministry of Health requirements regarding debris control.
- .9 Ensure scaffolds, ladders, equipment and other such equipment are not accessible to public. Protect with adequate fencing or remove and dismantle at end of each day or when no longer required.
- .10 Take precautions to guard against movement, settlement or collapse of adjacent structures, services or driveways. Be liable for such movement, settlement or collapse caused by failure to take necessary precautions. Repair promptly such damage when ordered.
- .11 If Owner considers additional bracing and shoring necessary to safeguard and prevent such movement or settlement, install bracing or shoring upon Owner's orders.
- .12 Particular attention shall be paid to prevention of fire and elimination of fire hazards which would endanger new work or existing premises.
- .13 Protect existing adjacent work against damages which might occur from falling debris or other causes due to work of this Section.
- .14 At all times protect the structure from overloading.
- .15 Provide protection around floor and/or roof openings.
- .16 Protect from weather, parts of adjoining structures not previously exposed.
- .17 Protect interiors of building parts not to be demolished from exterior elements at all times.
- .18 At end of each day's work, leave work in safe condition so that no part is in danger of toppling or falling.

3.5 Temporary Ventilation

- .1 Provide all required temporary ventilation for demolition work.

3.6 Environmental Controls

- .1 Comply with provincial and municipal regulations pertaining to water, air, solid waste, recycling, chemical waste, sanitary waste, sediment and noise pollution.
- .2 Protection of Natural Resources:
 - .1 Preserve the natural resources.
 - .2 Confine demolition activities to areas defined by public roads, easements, and work area limits indicated on the drawings.
 - .3 Water Resources: Comply with applicable regulations concerning the direct or indirect discharge of pollutants to underground and natural surface waters. Provide sedimentation control where necessary.
 - .4 Store and service construction equipment at areas designated for collection of oil wastes.

- .5 Oily Substances: Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water in such quantities as to affect normal use, aesthetics, or produce a measurable ecological impact on the area.
- .3 Dust Control, Air Pollution, and Odour Control: Prevent creation of dust, air pollution and odors.
 - .1 Use temporary enclosures and other appropriate methods to limit dust and dirt rising and scattering in air to lowest practical level.
 - .2 Store volatile liquids, including fuels and solvents, in closed containers.
 - .3 Properly maintain equipment to reduce gaseous pollutant emissions.
- .4 Noise Control: Perform demolition operations to minimize noise.
 - .1 Provide equipment, sound deadening devices, and take noise abatement measures that are necessary to comply with municipal regulations.
- .5 Salvage, Re-Use, and Recycling Procedures:
 - .1 Identify re-use, salvage, and recycling facilities.
 - .2 Develop and implement procedures to re-use, salvage, and recycle demolition materials.
 - .3 Identify materials that are feasible for salvage, determine requirements for site storage, and transportation of materials to a salvage facility.
 - .4 Source-separate clean and uncontaminated demolition materials including, but not limited to the following types:
 - .1 Concrete, Concrete Block, Concrete Masonry Units (CMU), Brick.
 - .2 Metal (ferrous and non-ferrous).
 - .3 Wood.
 - .4 Glass.
 - .5 Plastics and Insulation.
 - .6 Gypsum Board.
 - .7 Porcelain Plumbing Fixtures.
 - .8 Fluorescent Light Tubes.
 - .9 Paper: Bond, Newsprint, Cardboard, Paper, Packaging Materials.
 - .10 Other materials as appropriate.

3.7 Performance

- .1 Ensure demolition work is supervised by competent foreman at all times.
- .2 Demolition shall proceed safely in systematic manner. Work on each floor level shall be complete before commencing work on supporting structure and safety of its supports are impaired. Parts of building which would otherwise collapse prematurely shall be securely shored. Walls and piers shall not be undermined.
- .3 Until acceptance, maintain and preserve active utilities traversing premises.
- .4 Provide enclosed chutes for disposal of debris from heights more than 1 storey in accordance with CSA S350.
- .5 Maintain safety of site by shoring below-grade-structures and excavations resulting from demolition against collapse.

3.8 Demolition

- .1 Review demolition procedures to ensure no personnel or equipment are located or working without additional safe working platforms or working surface adequate to support the operations.

- .2 Any damage caused to the adjacent buildings or properties by the neglect of the Contractor or any of his forces shall be made good at the expense of the Contractor including all costs and charges which may be claimed by the Owner for damages suffered.
- .3 Demolish in a manner to minimize dusting. Keep dusty materials wetted at all times.
- .4 Demolition: Use methods required to complete Work within limitations of governing regulations and as follows:
 - .1 Locate demolition equipment throughout the building and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - .2 Demolish concrete and masonry in sizes that will be suitable for acceptance at recycling or disposal facilities.
 - .3 Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - .4 Break up and remove concrete slabs on grade in small sizes, suitable for acceptance at recycling or disposal facilities, unless otherwise shown to remain.
 - .5 Remove all disconnected, abandoned utilities.
 - .6 Remove all finishes, fixtures, fittings and services as indicated
 - .7 Damages: Promptly repair damages to adjacent facilities caused by demolition operations.
 - .8 Prevent access to excavations by means of fences or hoardings.

3.9 Selective Demolition

- .1 Carefully dismantle and remove all items in as shown and as necessary to complete the work.
- .2 Salvage items scheduled for reuse or to be handed over to the Owner.
- .3 Particular attention shall be paid to prevention of fire and elimination of fire hazards which would endanger the existing buildings.
- .4 Where existing flooring is to be removed from floor slabs to remain, including ceramic tile flooring, carefully remove flooring, grout, adhesives, waterproofing membranes and the like down to the base slab. Patch and repair slab where damaged with concrete or acceptable leveling compound in accordance with new flooring manufacturer's instructions and ASTM F710. Refer to original building drawings and remove and replace existing concrete floor toppings as necessary and where required.
- .5 Return areas to condition existing prior to the start of the work unless indicated otherwise.
- .6 At exterior and interior bearing walls to be removed, include breaking out and removal of existing concrete foundations to a minimum of 200 mm below new finished floor level.

3.10 Handling of Demolished Materials

- .1 Conform to the approved Waste Management Plan.
- .2 Do not allow demolished materials to accumulate or be stored on-site for more than 5 days.
- .3 Do not burn, bury or otherwise dispose of rubbish and waste materials on project site.
- .4 Pallet and shrink-wrap materials scheduled for re-use and stockpile where directed on site.

- .5 Disposal: Transport demolished materials off Owner's property and legally reuse, salvage, recycle, or dispose of materials. Legally transport and dispose of materials that cannot be delivered to a source separated or mixed recycling facility to a transfer station or disposal facility that can legally accept the materials for the purpose of disposal.
- .6 Deliver to facilities that can legally accept new construction, excavation and demolition materials for purpose of re-use, recycling, composting, or disposal.

3.11 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean adjacent streets and driveways of dust, dirt and materials caused by demolition operations.
- .3 Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work.
- .4 Upon completion of demolition work, remove debris, trim surfaces and leave work site clean.
- .5 Video storm and sanitary sewers and jet clean where debris may have accumulated

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 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 (Pre-construction), Washroom and Stage Renovations, Richard Beasley Elementary School, 80 Currie Street, Hamilton Ontario”, dated March 11, 2025, prepared by Pinchin Ltd., file number 352293.003.

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. Work to be phased.

- .3 Install Hoarding Walls between Abatement Work Areas and Occupied Areas as required.
- .4 Refer to Contract Documents for phasing and schedule.
- .5 Using Type 1 procedures prescribed in the Section identified in Related Work, perform the following work:
 - .1 Remove and dispose of asbestos-containing vinyl floor tiles where scheduled to be removed.
 - .1 Include to remove vinyl floor tiles where present under millwork, partitions, plumbing fixtures/toilets, etc.
 - .2 Remove fasteners from partitions, millwork, and other items scheduled for demolition, where they are attached to flooring with asbestos-containing vinyl floor tiles. If removal using hand-held non-powered tools is not feasible, follow Type 2 procedures outlined in Section 02 82 00.02 and use power tools equipped with an effective HEPA dust collection device.
 - .3 Remove and dispose of asbestos-containing vinyl floor tiles where not scheduled to be removed but may be disturbed by demolition and or new.
 - .2 Remove and dispose of doors and/or windows with asbestos-containing caulking/putty where scheduled to be removed.
 - .1 Remove caulking completely from substrate.
 - .3 Remove and dispose of asbestos-containing Transite panels where present at doors scheduled to be removed.
 - .4 Remove and dispose of sinks with asbestos-containing mastic, where scheduled to be removed.
 - .5 Remove and dispose of asbestos-containing caulking/mortar present in siporex decking seams/joints where it may be disturbed by construction activities.
- .6 Using Type 2 procedures prescribed in the Section identified in Related Work, remove and dispose of asbestos-containing vinyl floor tile mastic using power tools/machines equipped with a HEPA filtered dust collection device. Site Isolation is to include visual barrier comprised of rip-proof polyethylene sheeting, where necessary and where occupants are present.
- .7 Using Type 2 procedures (with a full enclosure) prescribed in the Section identified in Related Work, remove and dispose of asbestos-containing texture coat as required to facilitate mechanical/electrical installations.
 - .1 Alternatively, follow Type 2 procedures using power tools equipped with a HEPA filtered dust collection device to remove/affix items to asbestos-containing texture coat as required. Site Isolation is to include visual barrier comprised of rip-proof polyethylene sheeting, where necessary and where occupants are present.
 - .2 Patch and make good all disturbed asbestos-containing surfaces.

- .8 Using Glove Bag procedures prescribed in the Section identified in Related Work, remove and dispose of asbestos-containing pipe insulation where scheduled to be removed or in tie-in locations.
 - .1 If for reasons of pipe geometry or access, Glove Bag procedures cannot be used, remove and dispose of asbestos-containing insulations in accordance with 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.
- .9 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.
- .10 Protect surfaces, building fabrics and items remaining within the Abatement Work Area.
- .11 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.
- .12 Isolate the Abatement Work Area from adjoining Occupied and Non-Occupied Areas whether present at an interior or exterior location.
- .13 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.
- .14 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.
- .15 Remove and dispose of as appropriate waste, building components, materials and items contaminated by hazardous materials that cannot be effectively cleaned.
- .16 Encapsulate remaining hazardous materials at locations where removal is deemed impractical by the Abatement Consultant.
- .17 Encapsulation will not be permitted where removal of building materials or structures scheduled for demolition will facilitate access to the asbestos materials in question.
- .18 Final clean work area to remove visible signs of asbestos and other hazardous materials, other debris or settled dust.
- .19 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.

- .20 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 Milestone Inspection: Inspection of the Abatement Work Area at a defined point in the abatement operation.
- .16 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.
- .17 Non-Friable Material: Material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
- .18 Occupied Area: Any area of the building or adjoining space outside the Abatement Work Area.
- .19 Personnel: All Contractor's employees, sub-contractors employees, supervisors.
- .20 PCM: Phase Contrast Microscopy.
- .21 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).
- .22 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, October 2014.
 - .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 workers have been certified under the Ministry of Training, Colleges and Universities course 253W.
 - .2 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.

- .3 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.
- .4 WHMIS training certificates for all personnel.
- .5 Certificate proving that each worker on site has been fit tested for the respirator appropriate for the work being performed.
- .3 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 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.
- .3 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, lead 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 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.
- .8 HEPA Vacuum: Vacuum with necessary fittings, tools and attachments. Discharged air must pass through a HEPA filter.
- .9 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.
- .10 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.
- .11 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.
- .12 Protective Clothing: Disposable coveralls complete with head covering and full body covering that fits snugly at the ankles, wrists and neck.
- .13 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.
- .14 Sprayer: Garden type portable manual sprayer or water hose with spray attachment if suitable.
- .15 Tape: Duct tape or tape suitable for sealing polyethylene to surfaces under both dry and wet conditions in the presence of Amended Water.
- .16 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

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 polyethylene drop sheets below areas of work.
- .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 HEPA vacuum floor on completion of work in area.

3.1 Asbestos Removal - Caulking and Putty

- .1 Wet all material to be disturbed.
- .2 Undo fasteners if necessary to remove material.
- .3 Break material only if unavoidable, and wet material if broken during work.
- .4 Use only non-powered hand-held tools to remove ACM.
- .5 Scrape to remove material adhered to substrate.
- .6 Place removed ACM directly into an asbestos waste container.
- .7 HEPA vacuum floor on completion of work in area.

3.2 Asbestos Removal – Transite Panels

- .1 Wet all material to be disturbed.
- .2 Undo fasteners if necessary to remove material.
- .3 Break material only if unavoidable, and wet material if broken during work.
- .4 Use only non-powered hand-held tools to remove ACM.
- .5 Place removed ACM directly into an asbestos waste container.
- .6 HEPA vacuum floor on completion of work in area.

3.3 Asbestos Removal – Sinks

- .1 Wet all material to be disturbed.
- .2 Undo fasteners if necessary to remove material.
- .3 Break material only if unavoidable, and wet material if broken during work.
- .4 Use only non-powered hand-held tools to remove ACM.
- .5 Place removed ACM directly into an asbestos waste container.
- .6 HEPA vacuum floor on completion of work in area.

3.4 Asbestos Removal - Removal of Other Non-Friable Asbestos Materials - Sinks

- .1 Wet all material to be disturbed.
- .2 Undo fasteners if necessary to remove material.
- .3 Break material only if unavoidable, and wet material if broken during work.
- .4 Use only non-powered hand-held tools to remove ACM.

- .5 Place removed ACM directly into an asbestos waste container.

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

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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 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 Type B Hoarding Wall: 38 mm x 89 mm wood or metal studs at 400 mm o/c with continuous sill and top plate, covered with one layer of rip-proof polyethylene sheeting on each side of wall.

- .3 Windows: Install sufficient transparent windows area in hoarding walls to allow observation of entire work area from outside the enclosure where existing solid walls do not make up the perimeter.

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 one layer 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.
 - .1 Install polyethylene sheeting on floors of Abatement Work Area. Cover floors first so that polyethylene on walls is overlapped by at least 305 mm.
- .4 Construct Hoarding Walls between Abatement Work Area perimeter and occupied areas, as required.
- .5 Install polyethylene sheeting at openings in walls (as required) and seal.
- .6 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.
- .7 Provide a completely sealed polyethylene top for free standing enclosures.
- .8 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.
- .9 Install Curtained Doorways.
- .10 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 Electrical Equipment.
 - .5 Mechanical Equipment.
- .11 Install temporary lighting in enclosure to a level that will provide for safe and efficient use of work area - minimum 550 LUX.
- .12 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.
- .13 Place required tools to complete the abatement with the Abatement Work Area.
- .14 Install Signage in clearly visible locations and in sufficient numbers to adequately warn of an asbestos 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 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.

3.5 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.
- .10 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 – Asbestos-Containing Vinyl Floor Tile Mastic with HEPA Filtered Power Tools/Machine

- .1 Use the procedures described above under *Site Preparation – Enclosure Required*.
- .2 Wet all material to be disturbed.
- .3 Turn on HEPA vacuum. Vacuum to remain in operation throughout work.
- .4 Grind mastic completely to bare concrete using a grinder with a HEPA filtered dust collection device.
- .5 Place removed ACM directly into an asbestos waste container.
- .6 If power tool can disconnect from HEPA vacuum, remove tool, and HEPA vacuum tool and bit, blade, etc, and shrouds.
- .7 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.
- .8 HEPA vacuum or wet wipe entire work area on completion of work.

3.7 Asbestos Disturbance – Removal/Installation of Items Affixed to Texture Coat with HEPA Filtered Power Tools

- .1 Use the procedures described above under *Site Preparation – Enclosure Required*.
- .2 Wet all material to be disturbed.

- .3 Turn on HEPA vacuum. Vacuum to remain operational throughout work.
- .4 Remove/install items to texture coat.
- .5 Place removed ACM directly into an asbestos waste container.
- .6 If power tool can disconnect from HEPA vacuum, remove tool, and HEPA vacuum tool and bit, blade, etc, and shrouds.
- .7 Remove items and turn over to owner and/or protect where not scheduled for removal.
- .8 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.

3.8 Asbestos Removal –Texture Coat

- .1 Use the procedures described above under *Site Preparation – Enclosure Required*.
- .2 Wet all material to be disturbed.
- .3 Scrape texture coat in sufficient quantity to facilitate work.
- .4 Place removed ACM directly into an asbestos waste container.
- .5 Lag exposed edges of ACM.
- .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.

3.9 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.

3.10 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 Place contaminated materials including polyethylene sheeting, drop sheets, seals, tape, disposable coveralls, and other contaminated waste in asbestos waste containers.

3.11 Waste and Material Handling

- .1 Refer to Section 02 81 00.

3.12 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 Remove and disconnect tags and locks from electrical panels and re-energize equipment and items.
 - .3 Remove negative air discharge panel and reinstall glazing to match existing.
 - .4 Reinstall ducts removed to perform cleaning of ducts or to access ACM.
 - .5 Clean, mop and vacuum Abatement Work Area and area beneath Decontamination Facilities.
 - .6 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 as per Section 02 82 11 for less than 1 square meter, or Section 02 82 13 for 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 Use existing lighting or install temporary lighting to a level that will provide for safe and efficient use of work area - minimum 550 LUX.
- .8 Provide Amended Water for wetting ACM, in garden sprayers. Provide one garden sprayer for each worker.
- .9 Do not use compressed air to clean or remove dust or debris when completing work of this section.
- .10 Place HEPA Vacuum in Abatement Work Area for each worker.
- .11 Place required tools to complete the abatement within the Abatement Work Area.
- .12 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 or unjacketed 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, 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 Clean and vacuum Abatement Work Area.

END OF SECTION

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PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .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 31 23 10 Excavating, Trenching and Backfilling

1.3 References

- .1 American Concrete Institute (ACI)
 - .1 ACI 117-10 Specifications for Tolerances for Concrete Construction and Materials.
 - .2 ACI 347R-14 Guide to Formwork for Concrete
 - .3 ACI SP-4-14 Formwork for Concrete
- .2 CSA Group (CSA)
 - .1 CSA A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete
 - .2 CSA B111-1974 (R2003) Wire Nails, Spikes and Staples
 - .3 CSA O86:19 Engineering Design in Wood
 - .4 CSA O121-2017 (R2022) Douglas Fir Plywood
 - .5 CSA O141:23 Canadian Standard Lumber
 - .6 CSA S269.1-16 (R2021) Falsework and Formwork

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit shop drawings showing type, extent and locations of items to be built into concrete.
 - .2 Sleeving Drawings: Submit drawings showing sleeves required through floors, roof and other structural members.
 - .3 Submit drawings showing size and spacing of conduits and piping.
 - .4 Coordinate with other Divisions prior to submittal.
 - .5 Do not commence placing sleeves, conduits, or piping before drawings have been reviewed and Consultant's comments incorporated on drawings issued to site.
 - .6 Assume responsibility for accuracy of Work. Review of submitted shop drawings does not relieve Contractor from compliance with requirements of Contract Documents.
- .3 Required by Regulatory Agencies: Submit shop drawings bearing signature and seal of Professional Engineer responsible for formwork design, as may be required by regulatory Agencies. Proceed with construction of formwork only with their approval.

1.5 Quality Assurance

- .1 Obtain a copy of CSA A23.1/A23.2 and maintain on site
- .2 Design of Formwork: Assume full responsibility for complete structural design and construction of formwork in accordance with CSA S269.1 and CSA O86, as applicable.

- .1 The design and engineering of the formwork, as well as its' construction, shall be the responsibility of the Contractor.
 - .3 Formwork shall be designed for the loads and lateral pressures outlined in the ACI publication "SP-4 Formwork for Concrete" and wind pressures and allowable stresses as set down in the National Building Code and in accordance with CSA A23.1 and A23.2. Formwork shall be of sufficient strength and rigidity to support all concrete and construction loads, taking into account proposed rate and method of pouring concrete so that the resultant finished concrete shall conform to the shapes, lines and dimensions of the members shown on the drawings.
- 1.6 Shipping, Handling and Storage
- .1 Refer to Section 01 61 00 – Common Product Requirements.
 - .2 Protect formwork to prevent functional damage and damage to faces affecting appearance of concrete surfaces exposed to view.
- 1.7 Waste Management and Disposal
- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 All materials shall be new, in accordance with referenced standards.
- .2 Plywood: Douglas Fir, conforming to CSA O121. Sound undamaged sheets finished one side, fabricated especially for use as concrete form panels, with sealed edges. Minimum 17mm thickness.
- .3 Lumber: Conforming to CSA O141, with grade stamp clearly visible.
- .4 Chamfers: Cut from 19mm x 19mm wood, smooth with no open defects.
- .5 Joint Tape: non-staining, water impermeable, self-release.
- .6 Nails, Spikes and Staples: Galvanized, conforming to CSA B111.
- .7 Form Release Agent: Colourless mineral oil which will not stain concrete.
- .8 For concrete surfaces exposed to view, provide panels smooth and free of defects which would be reproduced as concrete blemishes.

PART 3 EXECUTION

3.1 Examination

- .1 Before starting this work, examine work done by others which affects this work.
- .2 Notify the Consultant of any conditions which would prevent proper completion of this work.
- .3 Commencement of work implies acceptance of existing conditions.

3.2 Erection

- .1 Verify lines, levels and centres before proceeding with formwork. Ensure dimensions agree with drawings.
- .2 Align joints and make watertight, to prevent leakage of cement paste and disfiguration of concrete.
- .3 Construct formwork to produce concrete with dimensions, lines and levels within tolerances specified in ACI 347R-14.
- .4 Provide formed openings where required for pipes, conduits, sleeves and other work to be embedded in and passing through concrete members.
- .5 Install chamfers at all external corners exposed to view.
- .6 Adequately brace and shore formwork to sustain loads (both concrete and working loads) applied during construction.
- .7 Be responsible for safety of the structure both before and after the removal of forms, until the concrete has reached its specified 28 day strength.

3.3 Built-In Work

- .1 Form openings and build in anchors, inserts, sub-frames, key-ways, sleeves, miscellaneous metal items, reglets and similar items furnished under Work of other Sections, which are indicated on Drawings and on shop drawings of other trades, and as required for proper completion of Work.
- .2 Do not embed wood in concrete.
- .3 Anchor Bolts: Tie anchor bolts securely in position to prevent movement during concrete placing. Use template to locate bolts. Verify that bolts have specified projection above concrete.
- .4 Openings or Sleeves Not Shown on Structural Drawings:
 - .1 Obtain Consultant's written approval before forming openings of sleeves through columns and beams, or through slabs within 1800 mm of their supports.
 - .2 Obtain Consultant's written approval before forming openings or sleeves larger than 200 mm square in any location.
- .5 Embedded Pipe or Conduit Not Shown or Detailed on Structural Drawings:
 - .1 Obtain Consultant's written approval before placing conduit or pipe which would be embedded in finished structure.
- .6 Confirm that built-in items that penetrate surface waterproofing are installed to meet requirements of waterproofing trade.

3.4 Construction Joints

- .1 Form construction and expansion joints with bulkheads to ensure straight lines. Immediately before subsequent pour at construction joint, remove bulkhead and tighten forms so that concrete surfaces will be on same plane with no overlapping of concrete.
- .2 Review with Consultant proposed location and details of construction joints in walls, columns, beams and slabs.
 - .1 Construction joints shall present appearance of normal form panel joint.

- .2 Install continuous shear key in construction joints in walls and framed floors which are 152mm or more thick.
- .3 Provide vertical construction joints in walls at not more than 20 metres centre to centre.
- .4 Provide waterstops in accordance with manufacturer's instructions at construction joints in walls which retain earth. Waterstops shall be continuous.

3.5 Treatment of Formwork Surfaces

- .1 Form Release Agent:
 - .1 Coat formwork with form release agent before reinforcement, anchors, accessories, and other built in items are installed.
 - .2 Do not coat plywood forms pre-treated with release agent.
 - .3 On surfaces to receive finish materials, adhesives, sealers, paint or other coatings or materials, use a compatible release agent.

3.6 Stripping of Formwork

- .1 Strip formwork on vertical surfaces when concrete has hardened sufficiently that no damage will result from stripping operations.
- .2 Do not remove plywood formwork by jerking loose or by metal pinch bars. Use wood wedges and gradually force panels loose. Leave plywood forms in place as long as possible to permit maximum shrinkage away from concrete.
- .3 Take particular care not to damage external corners when stripping formwork.
- .4 When forms are stripped during curing period, cure and protect exposed concrete in accordance with Section 03 30 00 - Cast-in-Place Concrete.

3.7 Defective Work

- .1 Movement and displacement of formwork during construction, variations in excess of specified tolerances, marked and disfigured surfaces, and failure of materials or workmanship to meet requirements of this specification, and which cannot be repaired by approved methods, will be considered defective work.
- .2 Replace defective work, as directed by Consultant.
- .3 Pay for additional inspection and testing, redesign, corrective measures, and related expenses, if work has proven to be deficient.
- .4 Reconstruct defective formwork and replace concrete and reinforcement placed in defective formwork at no additional cost.

3.8 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 10 00 Concrete Forming and Accessories
- .2 Section 03 30 00 Cast-in-Place Concrete
- .3 Section 04 05 19 Masonry Anchorage and Reinforcing
- .4 Section 04 22 00 Concrete Unit Masonry
- .5 Section 04 27 00 Multiple Wythe Unit Masonry
- .6 Section 05 50 00 Metal Fabrications
- .7 Section 32 16 23 Sidewalks

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A143/A143M-07(2020) Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
 - .2 ASTM A1064/A1064M-22 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- .2 American Concrete Institute (ACI)
 - .1 ACI SP-66 (04) ACI Detailing Manual
- .3 CSA Group (CSA)
 - .1 CSA A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete
 - .2 CSA A23.3:19 Design of Concrete Structures
 - .3 CSA G30.18:21 Carbon Steel Bars for Concrete Reinforcement
 - .4 CSA G40.20-13/G40.21-13 (R2018) General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .5 CSA W186:21 Welding of Reinforcing Bars in Reinforced Concrete Construction
- .4 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC Reinforcing Steel Manual of Standard Practice

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit shop drawings, including placing drawings and bar lists.
 - .2 Prepare placing drawings and bar lists in accordance with the American Concrete Institute (ACI) Detailing Manual, and the Reinforcing Steel Institute of Canada (RSIC) Reinforcing Steel Manual of Standard Practice and the typical details included with Contract Documents.
 - .3 Prepare placing drawings to minimum scale of 1:50.
 - .4 Submit placing drawings and bar lists sufficiently detailed and dimensioned to permit correct placement of reinforcement and accessories without reference to architectural or structural Drawings.
 - .5 Show reinforcement, including dowels, in elevation on placing drawings for wall reinforcement.
 - .6 Show concrete cover to reinforcement.
 - .7 Show location of construction joints.
- .3 Inspection Reports: Inspection and Testing Company shall:

- .1 Submit written reports of inspection and tests.
- .2 Distribute reports as follows:
 - .1 Consultant.
 - .2 Contractor.
- .4 Quality Assurance Submittals:
 - .1 Mill Test Report: provide Consultant with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.
 - .2 Submit in writing proposed source of reinforcement material to be supplied.

1.5 Quality Assurance

- .1 Obtain a copy of CSA A23.1/A23.2 and maintain on site.
- .2 Qualifications: Welding: Undertake welding of reinforcement only by a fabricator or Subcontractor approved by Canadian Welding Bureau to requirements of CSA W186.
- .3 Source Quality Control: Source Quality Control may be performed by an Inspection and Testing Company appointed by Consultant.
- .4 Review provided by Inspection and Testing Company does not relieve Contractor of his sole responsibility for quality control over Work. Performance or non-performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the Specification.
- .5 Identify and correlate reinforcing steel from Canadian mills with test reports for compliance with requirements specified.
- .6 Test unidentified reinforcing steel at expense of Contractor. Perform testing for each 1 tonne or part thereof supplied for incorporation in Work.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 In accordance with reference standards.
- .2 Substitute different size bars only if permitted in writing by Consultant.
- .3 Bar Reinforcing Steel:
 - .1 Bars which are to be welded by arc-welding process: to CSA G30.18, Grade 400W.
 - .2 Other bars: to CSA G30.18, Grade 400R.
- .4 Plain round bars: to CSA G40.20-04/G40.21.

- .5 Welded Wire Fabric: to ASTM A1064/A1064M and in flat sheets, not rolls.
- .6 Cold-drawn annealed steel wire ties: to ASTM A497.
- .7 Chairs, bolsters, bar supports, spacers: to CSA A23.1.
- .8 Mechanical splices: subject to approval of Consultant.

2.2 Fabrication

- .1 Fabricate reinforcing steel only in permanent fabricating shop.
- .2 Fabricate reinforcing steel in accordance with shop drawings.
- .3 Tag reinforcing bars to indicate placement as designated on shop drawings.
- .4 Splices:
 - .1 Provide splices only where specifically indicated on Drawings.
 - .2 Stagger alternate mechanical splices 750 mm apart.
 - .3 Stagger alternate end bearing splices 750 mm apart.
 - .4 Install on threaded splices, plastic internal coupler thread protector and plastic bar end thread protector.

PART 3 EXECUTION

3.1 Examination

- .1 Before starting this work, examine work done by others which affects this work.
- .2 Examine formwork to verify that it has been completed, and adequately braced in place.
- .3 Notify the Consultant of any conditions which would prejudice proper completion of this work.
- .4 Commencement of work implies acceptance of existing conditions.

3.2 Installation

- .1 Place reinforcing steel in accordance with reviewed placing drawings, typical details, and CSA A23.3.
- .2 Adequately support reinforcing and secure against displacement within tolerances permitted.
- .3 Place reinforcing steel to provide minimum spacing and proper concrete cover as noted on drawings.
- .4 Do not cut reinforcement to incorporate other Work.
- .5 Relocate or rebend bars only on written instructions of Consultant.
- .6 Tie reinforcement in place. Do not weld.

3.3 Adjusting

- .1 Adjust and secure reinforcement in correct position immediately before concrete is placed.
- .2 Remove contaminants which lessen bond between concrete and reinforcement.

3.4 Field Quality Control

- .1 Provide competent supervisor, with at least three years of experience in reinforcement placement, to direct placement of reinforcement.
- .2 Inspect placement of reinforcement for conformance with Drawings and Specifications, before each concrete placement, and correct as necessary.
- .3 Consultant's periodic review of selected areas of reinforcement are for verification of conformity to design concept and general arrangement only and shall not relieve Contractor of responsibility for quality control, errors, or omissions, or conformance with requirements of Contract Documents.

3.5 Defective Work

- .1 Incorrectly fabricated, misplaced or omitted reinforcement will be considered defective Work.
- .2 Replace or adjust defective reinforcement before concrete is placed as directed by Consultant.
- .3 Replace or strengthen concrete work which is deficient as a result of incorrectly fabricated, misplaced, or omitted reinforcement, which was not corrected before concrete was placed.
- .4 Pay for additional inspection and testing, redesign, corrective measures, and related expenses, if Work has proven to be deficient.

3.6 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 10 00 Concrete Forming and Accessories
- .2 Section 03 20 00 Concrete Reinforcing
- .3 Section 03 41 16 Precast Concrete Slabs
- .4 Section 04 05 19 Masonry Anchorage and Reinforcing
- .5 Section 04 22 00 Concrete Unit Masonry
- .6 Section 04 27 00 Multiple Wythe Unit Masonry
- .7 Section 05 31 00 Steel Deck
- .8 Section 05 50 00 Metal Fabrications
- .9 Section 07 92 00 Joint Sealants
- .10 Section 10 80 00 Miscellaneous Specialties
- .11 Section 32 16 23 Sidewalks

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C260/C260M-10a (2016) Standard Specification for Air Entraining Admixtures for Concrete
 - .2 ASTM C295/C295M-19 Standard Guide for Petrographic Examination of Aggregates for Concrete
 - .3 ASTM C309-19 Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete
 - .4 ASTM C330/C330M-17a Standard Specification for Lightweight Aggregates for Structural Concrete
 - .5 ASTM C494/C494M-19 Standard Specification for Chemical Admixtures for Concrete
 - .6 ASTM C881/C881M-20a Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
 - .7 ASTM C1017/C1017M-13e1 Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - .8 ASTM C1107/C1107M-20 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
 - .9 ASTM D412-16 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
 - .10 ASTM D570-98(2018) Standard Test Method for Water Absorption of Plastics
 - .11 ASTM D624-00(2020) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 - .12 ASTM D638-14 Standard Test Method for Tensile Properties of Plastics
 - .13 ASTM D1259-06(2018) Standard Test Methods for Nonvolatile Content of Resin Solutions
 - .14 ASTM D1751-18 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
 - .15 ASTM D2240-15e1 Standard Test Method for Rubber Property—Durometer Hardness
 - .16 ASTM D5329-20 Standard Test Methods for Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphalt Pavements and Portland Cement Concrete Pavements
- .2 American Concrete Institute (ACI)
 - .1 ACI 117-10 Specifications for Tolerances for Concrete Construction and Materials.
 - .2 ACI 232.1R-12 Report on the Use of Raw or Processed Natural Pozzolans in Concrete
- .3 CSA Group (CSA)

- .1 CSA A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete.
- .2 CSA A283:19 Qualification Code for Concrete Testing Laboratories.
- .3 CSA A3000-18 Cementitious Materials Compendium
- .4 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 1010 Material Specification for Aggregates - Granular A, B, M and Select Subgrade Material.
 - .2 OPSS 1212 Material Specification for Hot-Poured Rubberized Asphalt Joint Sealing Compound.
- .5 Government of Canada Treasury Board Secretariat (TBS)
 - .1 Standard on Embodied Carbon in Construction

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Samples: Submit for inspection, material samples of specified mix designs.
- .3 Concrete Mix Designs:
 - .1 Submit concrete mix designs for review. Specify intended use for each mix design.
 - .2 Review of mix design does not relieve Contractor from responsibility for compliance with Contract Documents.
 - .3 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CSA A23.1. Mix design shall be adjusted to prevent alkali aggregate reactivity problems.
 - .4 Provide certification that plant, equipment, and all materials to be used in concrete comply with the requirements of CSA A23.1.
 - .5 Submit written requests for use of admixtures not specified, for site mixing of concrete, and for use of bonding agents.
 - .6 Submit in writing, proposed method of in-situ strength testing.
- .4 Inspection Reports: Inspection and Testing Company shall:
 - .1 Submit written reports of inspection and tests.
 - .2 Distribute reports as follows:
 - .1 Consultant;
 - .2 Contractor.
 - .3 On concrete cylinder test reports, include:
 - .1 Specific location of concrete represented by sample
 - .2 Design strength.
 - .3 Unit weight of sample
 - .4 Class of exposure
 - .5 Aggregate size and mixtures incorporated
 - .6 Date, hour and temperature at time sample taken
 - .7 Percentage air content
 - .8 Test strength of cylinder
 - .9 Type of failure if test fails to meet specification.

1.5 Quality Assurance

- .1 Obtain a copy of CSA A23.1/A23.2 and maintain on site.
- .2 Pre-Construction Conference:
 - .1 At least 35 days prior to the start of concrete construction schedule, conduct a meeting to review proposed mix designs and to discuss detailed requirements of the proposed concrete

operations. Review requirements for submittals, coordination, and availability of materials. Establish work progress and sequencing schedules and procedures for material testing, inspection and certifications.

.3 Source Quality Control:

- .1 Both source quality control, and field quality control specified in Article 1.5.4, may be performed by an Inspection and Testing Company appointed by Consultant.
- .2 Review provided by Inspection and Testing Company does not relieve the Contractor of his sole responsibility for quality control over Work. Performance or non- performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the Specification.
- .3 Inspection and Testing Company shall be certified under CSA A283, Qualification Code for Concrete Testing Laboratories, for Category 1 Certification.
- .4 Payment for specified Work performed by Inspection and Testing Company will be made from Cash Allowance.
- .5 Payment for additional tests (including testing of structure and its performance and load testing) required by changes of materials or mix design requested by Contractor, and failure of completed Work to meet specified requirements, shall be made at Contractor's expense.
- .6 Perform Work of source quality control in accordance with CSA A23.2 and to include:
 - .1 Verification that ready-mix supplier is qualified to supply concrete in accordance with Specification.
 - .2 Review of proposed concrete mix designs.
 - .3 Sampling, inspection, and testing of materials as may be required.

.4 Field Quality Control:

- .1 Inspection and Testing Company, when appointed as specified for Source Quality Control, shall perform sampling, inspection and testing of concrete work at site.
- .2 Perform sampling, inspection and testing in accordance with CSA A23.2, and to include:
 - .1 Making of standard slump tests.
 - .2 Obtaining of three standard specimens for strength tests from each 100 m of concrete, or fraction thereof, of each mix design of concrete placed in any one day. In addition, for slabs-on-grade, obtain beam specimens for determination of modulus of rupture.
 - .3 Verification that test specimens are stored within an enclosure, maintained at specified temperatures.
 - .4 Making compression tests of each set of three specimens, one at 7 days and two at 28 days; modulus of rupture tests at 90 days.
 - .5 Verification of air content of air-entrained concrete.
 - .1 For Class of exposure F-1, and C-2, test at frequency in accordance with CSA A23.1.
 - .2 Make first test before placing any concrete.
 - .3 After stable air content has been established, frequency of tests will be determined by Consultant.
 - .4 For other Classes of exposure, test at time of obtaining strength test specimens.
- .3 Inspection for Tolerances:
 - .1 Confirm that concrete work meets specified tolerance requirements.
 - .2 Use the elevation survey records of elevations of finished concrete surfaces specified in Section 03 10 00 and this section as basis for judging compliance.
 - .3 Use approved aluminum straightedge to judge compliance with specified slab tolerances, except use dipstick equipment where F-number tolerance is specified.
- .4 Slabs-on-Grade:
 - .1 Observe application of curing compound to sample slab, recording rate of application.
 - .2 Monitor on a random basis acceptable to the Consultant, that slab is being saw cut before slab temperature starts to fall.

- .3 Qualifications: Floor finishing shall be undertaken only by contractors with at least 10 years of experience.
- .4 Sample of Finish Flooring:
 - .1 Finish an area of floor slab where directed by Consultant to provide sample of finish for approval.
 - .2 Protect new sample area until finish is approved.
 - .3 If liquid membrane curing compound is to be used on Project, determine and apply correct quantity required to meet rate of coverage recommended by manufacturer for measured test area.
 - .4 Approved sample will provide standard by which subsequent finishing will be judged and will be incorporated into Work.

1.6 Tolerances

- .1 In accordance with ACI 117 and CSA A23.1.
- .2 Difference between elevation of high point and low point in specified area not to exceed:
 - .1 In any bay up to 100 m²: 12 mm.
 - .2 In any bay up to 400 m²: 25 mm.
- .3 Straightedge method: Finish floor slabs to meet following tolerances when measured at 72 +/- 12 hours after completion of floor finishing, before shores are removed from formed slabs, by placing a freestanding unlevelled straight edge anywhere on slab and allowing it to rest on two high points. Gap between straightedge placed on two high points and slab not to exceed:
 - .1 3 metre straightedge: 8 mm (Class A).
 - .2 2 metre straightedge: 4 mm.

1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.

1.8 Job Conditions

- .1 Protect floor slabs, and concrete surfaces exposed to view or on which finishes are to be applied, from grease, oil, and other soil which will affect the appearance of the concrete, or impair the bond of finish material.
- .2 Environmental Conditions: In addition to Cold Weather and Hot Weather Requirements of CSA A23.1, the following shall apply to Work of this Section:
 - .1 Provide protection or heat, or both, so that temperature of concrete at surfaces is maintained at not less than 21 ° C for three days after placing, not less than 10 ° C for the next two days and above freezing for the next two days.
 - .2 Do not permit alternate freezing and thawing for fourteen days after placing.
 - .3 Vent exhaust gases from combustion type heaters to atmosphere outside protection enclosures.
 - .4 Provide protection to maintain concrete continuously moist during curing period.
 - .5 For field cured cylinders representing strength development of in-situ concrete, provide same specified hot and cold weather protection for storage of each concrete compression specimen as for concrete from which it was taken, until it is sent to testing laboratory.
 - .6 Do not place concrete during rain. Should rain commence during placing, cover freshly placed concrete.
 - .7 Do not place bonded toppings on rough slabs that are less than 15 °C.

- .8 Do not grout at ambient air temperatures or concrete surface temperatures less than 5 ° C, or when temperature is forecast to fall to less than 5 ° C within 24 hours of grouting.
- .9 Do not apply sealants at ambient air temperatures or concrete surface temperatures less than 5 ° C.

1.9 Project Records

- .1 Maintain record of all concrete pour related to time, date, delivery slip serial number and location of each concrete pour and identify related test cylinders. Keep records on site until project is completed.
- .2 Delivery Records: File duplicate copies of concrete delivery slips on which shall be recorded: supplier, serial number of slip, date, truck number, contractor, Project, Class of exposure, cementing materials content, air content, volume in load, and time of first mixing of aggregate, cementing materials and water.
- .3 Record Drawings:
 - .1 Record on a set of Drawings:
 - .1 founding elevations of all footings
 - .2 variations of foundation Work from that indicated on Drawings.
 - .2 Make record drawings available for Consultant's inspection at all times.

1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 To meet specified requirements of referenced Standards.
- .2 Cement:
 - .1 Portland Cement: to CSA A3000.
 - .2 Cementitious Hydraulic Slag: to ACI 232.1R
- .3 Fine Aggregate: For slabs-on-grade, fineness modulus of fine aggregate to be between 2.7 and 3.1.
- .4 Coarse Aggregates:
 - .1 20 mm to 5 mm (No. 4 sieve) except as specified below.
 - .2 For slabs-on-grade 125 mm and thicker: 40 mm to 5 mm (No. 4 sieve); combine at least two of the single sizes specified in Table 5 Group II of CSA A23.1, one of which is to be 40 mm, to obtain maximum bulk density (unit weight) and optimum grading, in accordance with an approved procedure.
 - .3 For slabs-on-grade: Abrasion loss not to exceed 35%. Petrographic number of aggregate not to exceed 125 when tested in accordance with ASTM C295.
 - .4 For toppings 50 mm thick and less and for slabs over open web steel joists: 12 mm to 5 mm (No. 4 sieve).
- .5 Admixtures:
 - .1 Conform to Reference Standards for chemical and air-entraining admixtures.
 - .2 Provide only admixtures that are free of chlorides.

- .3 When requested, provide evidence acceptable to Consultant that superplasticizer does not increase shrinkage of concrete.
- .6 Curing-Sealing Compound: Membrane curing-sealing compound formulated from chlorinated rubber resins, or acrylic emulsion, solvent free for use in occupied buildings, to ASTM C309, type 1.
 - .1 Basis-of-Design Product: Euclid Chemical Company; Diamond Clear 350 or a comparable product by one of the following:
 - .1 BASF Corporation - Construction Systems.
 - .2 Sika Corporation
 - .3 W.R. Meadows
- .7 Bonding Agent: To ASTM C881, 100% reactive, 2 component, low viscosity, high modulus bonding adhesive.
- .8 Saw Cut Filler: Semi-rigid epoxy or polyurea in accordance with ACI 302.1R for joint fillers used in control and construction joints.
 - .1 Basis of Design Euco 700 or Euco QWIKjoint UVR by Euclid Chemical.
- .9 Premoulded Joint Fillers: Bituminous impregnated fiber board: to ASTM D1751.
- .10 Sealant: Refer to Section 07 92 00 – Joint Sealants
- .11 Mechanical Anchors: 'Kwik' Bolts, 'Cinch' Anchors or Parabolts.
- .12 Weep hole tubes: plastic.
- .13 Dovetail anchor slots: minimum 0.6 mm thick galvanized steel with insulation filled slots.
- .14 Stair Tread Inserts:
 - .1 Abrasive stair tread inserts for exterior concrete steps as specified in Section 10 80 00.

2.2 Concrete Mixes

- .1 Ready Mix, with 28 day compressive strength as indicated on Drawings.
- .2 Design concrete mix in conformance with CSA A23.1, Tables 1, 2, 5 (Alternative 1) and 17, and as follows. Provide concrete meeting water/cementing materials ratio and air content of Table 14 in accordance with Class of exposure specified in following sub-paragraphs, and minimum strength specified on Drawings. Note that concrete designed in accordance with water/cementing materials ratio of Table 14 may yield strength exceeding minimum strength specified on Drawings.
 - .1 Class of exposure C-2 with 25 percent Portland cement replaced with cementitious hydraulic slag: for pavements, sidewalks, curbs and gutters.
 - .2 Class of exposure F-2 with 25 percent Portland cement replaced with cementitious hydraulic slag: for grade beams, and for exposed exterior beams, columns, walls and slabs.
 - .3 Slabs-on-Grade:
 - .1 Use type 20 Portland cement, or replace 35 percent Portland cement with cementitious hydraulic slag.
 - .2 When mean daily temperature exceeds 25 ° C at time of placement, replace 25 percent of type 20 cement, or 50 percent of type 10 cement, with cementitious hydraulic slag.
 - .3 Use water/cementing materials ratio 0.45 maximum.
 - .4 Use aggregates specified in paragraphs 2.1.3.
 - .5 Cementing materials content 325 kg/m.
 - .6 Modulus of rupture 3.5 MPa average, 3.0 MPa minimum.

- .7 Slump at delivery, before addition of superplasticizer, 50 mm; add superplasticizer, not water, to bring slump to level acceptable to floor finisher for placement.
- .4 Interior Concrete, other than specified above, and not exposed to freezing and thawing or the application of deicing chemicals: select water/cementing materials ratio and cementing materials content on basis of strength, workability, and finishing requirements.
- .3 Submit evidence, and material samples, if requested, acceptable to the Inspection and Testing Company, to verify that the proposed concrete mix design will produce specified quality of concrete.
- .4 List all proposed admixtures in mix design submission. Do not change or add admixtures to approved design mixes without Consultants approval.
- .5 Concrete Weight: Air dry unit weight: minimum 2,300 kg/m³; adjusted proportionally for maximum air content listed in CSA A23.1, Clause 15, Table 10.
- .6 Concrete supplier to provide documentation indicating the requirements of TBS Standard on Embodied Carbon in Construction have been met.

2.3 Admixtures

- .1 Chemical Admixture: To ASTM C494. Incorporate water-reducing admixture, type WN, in all concrete.
- .2 Air Entraining Agent: To ASTM C260. Incorporate air-entraining agent in addition to chemical admixture in concrete of relevant Class of exposure, in accordance with CSA A23.1, Clause 15, Table 10.
- .3 Chloride: Do not use calcium chloride or admixtures containing chloride in concrete.

2.4 Concrete Toppings

- .1 Provide topping with minimum 28 day compressive strength of 32 MPa.

2.5 Premixed Grout

- .1 Non-Shrink Metallic: Non-catalyzed metallic grout to ASTM C1107, Compressive strength at 28 days: 48 MPa.
- .2 Non-Shrink, Non Stain, Non-Metallic: to ASTM C1107. Compressive strength at 28 days: 59 MPa.
- .3 Flowable Grout: High-tolerance Non-shrink, Non-metallic shrinkage compensating grout to ASTM C1107. Compressive strength at 28 days: 59 MPa.

PART 3 EXECUTION

3.1 Examination

- .1 Before starting this work, examine work done by others which effects this work.
- .2 Notify Consultant of any condition which would prejudice proper completion of this work.
- .3 Confirm that surfaces on which concrete is to be placed are free of frost and water before placing.

- .4 Confirm that reinforcement, dowels, control joints, inserts and all other built in work are in place and secured.
- .5 Commencement of work implies acceptance of existing conditions.

3.2 Treatment of Formed Surfaces

- .1 Conform to the requirements of CSA A23.1, and as additionally specified herein.
- .2 Treat concrete surfaces which will be exposed or painted in the completed building to provide a "Smooth Rubbed Finish" in accordance with CSA A23.1, uniform in colour and texture.
- .3 Plugs at Recessed Ties:
 - .1 Clean tie holes to remove all foreign matter.
 - .2 Coat plugs by dipping in adhesive and insert in hole.
 - .3 Remove excess adhesive immediately with thinner which will not stain concrete, as recommended by manufacturer.
- .4 Obtain Consultant's approval of finished exposed concrete and grind or otherwise correct to the satisfaction of the Consultant.

3.3 Placing Concrete

- .1 Place concrete in accordance with requirements CSA A23.1/A23.2.
- .2 Notify Consultant and inspection and testing firm at least 24 hours prior to commencement of concrete placing operation and 24 hours before wall forms are closed in.
- .3 Obtain Geotechnical Engineer's confirmation that thickness, elevation and compaction of sub-grade meets specifications before placing concrete.
- .4 Do not place concrete in water or open frozen surfaces.
- .5 Remove contaminants which lessen concrete bond to reinforcement before concrete is placed.
- .6 Maintain accurate records of cast in place concrete items. Record date, location of pour, quantity, air temperature and test samples taken.
- .7 Ensure that reinforcement, inserts, embedded items, formed expansion joints and the like, are not disturbed during concrete placement.
- .8 Joint fillers:
 - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Consultant.
 - .2 When more than one piece is 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 within 12 mm of finished slab surface unless indicated otherwise.

- .9 Provide construction joint as indicated on the drawings. Ensure dowels are adequately anchored and placed at right angles to the joint before placing concrete.
- .10 Place floor slabs to depth indicated on the drawings with 25 MPa minimum concrete unless otherwise noted on drawings but consistent with minimum cement content specified for exposed floors in this specification.
- .11 Sloping Surfaces and Slabs: commence concrete placement at bottom of sloping surfaces.

3.4 Finishing Concrete

- .1 Perform finishing operations on plastic concrete surfaces in accordance with CSA A23.1, and as specified herein.
- .2 Refer to the drawings for floor finishes and coverings.
- .3 Screed the top of rough floor slabs to an even level or sloping surface at the proper elevation to receive the finish or topping specified on the drawings and in finish schedule.
- .4 Provide a smooth steel trowel finish on all areas scheduled to receive a covering, or painted finish.
- .5 Exposed Floor Surfaces: Provide hard, smooth, dense, steel troweled surface, free from blemishes, and of uniform appearance.
- .6 Non-slip Surfaces: Provide swirl trowel or broom finish of texture acceptable to Consultant.
- .7 Curb Edging: Finish external corners of curbs rounded and smooth.

3.5 Curing

- .1 Cure concrete in accordance with CSA A23.1 and as specified herein.
- .2 Curing Compound Method:
 - .1 Use curing and sealing compound specified except:
 - .1 On surfaces to receive epoxy or similar paint finish.
 - .2 On surfaces to which architectural finishes will be adhered, the adhesives for which are incompatible with the curing compound.
 - .3 Air-entrained concrete for exterior slabs and sidewalks placed between October 1st and March 31st.
- .3 Select acrylic water compound except that if ambient conditions extend drying time unduly and if area is well ventilated and unoccupied by other workers, solvent based compound may be used.
- .4 Apply curing compound in accordance with manufacturer's instructions, increasing application rate as necessary to cover surface completely.
- .5 Curing Blanket or Wet Burlap Method: For exterior sidewalks and other finished concrete surfaces that will be exposed to freezing and thawing or deicing chemicals:
 - .1 Cover with curing blanket or wet burlap overlaid with 0.102 mm thick polyethylene and maintain in place for the additional curing for durability period in accordance with CSA A23.1 but in no case for less than 7 days.
 - .2 Wet blanket or burlap regularly to maintain in moist condition. Do not allow to dry out.

- .6 Cure finished concrete surface with an approved curing and sealing compound which will leave the surface with a uniform appearance and with a minimum of discolouration after drying. Ensure that the curing compound will be compatible with the architectural finishes or adhesives for finishes to be applied later. Apply the compound in strict accordance with the manufacturer's instructions.
- .7 Protect surface which will be exposed to direct sunlight during the curing period, with a light coloured, laminated waterproof paper immediately after the curing and sealing compound has hardened sufficiently for the paper to be placed without damage to the sealed surface. Lap the paper a minimum of 100 mm and seal the laps. Leave the paper in place for at least seven days.

3.6 Grouting

- .1 Mix prepackaged grout with water in accordance with manufacturer's printed instructions.
- .2 Dampen concrete surfaces immediately before installing grout.
- .3 Use non-shrink and shrinkage-compensating grouts only when grout will be contained against expansion and self-disintegration.
- .4 Slope grout beyond edge of plate at 45 degrees.
- .5 Provide same environmental protection and curing as specified for concrete.

3.7 Joint Sealant

- .1 Apply sealant specified in Section 07 92 00 to thoroughly dry surfaces only, at ambient air temperatures above 5 ° C.
- .2 Provide sealant on top of joint filler with a polyethylene bond breaker between joint filler and joint sealant applied in accordance with manufacturer's direction.
- .3 Confirm that preformed joint filler and backer rod are compatible with sealant.
- .4 Caulk joints in accordance with the following:
 - .1 Do not commence joint preparation until concrete is at least 28 days old.
 - .2 Thoroughly clean sides of joints with mason's router, or power saw, equipped with double blade where necessary to suit joint width.
 - .3 Blow clean with compressed air with oil trap on line, or vacuum clean.
 - .4 Install backer rod of diameter 25 percent greater than joint width, and type recommended by sealant manufacturer to be compatible with sealant. Locate backer rod to provide for sealant depth of one-half joint width, but not less than 12 mm.
 - .5 Prime joint if required, as recommended by sealant manufacturer.

3.8 Defective Work

- .1 Variations in excess of specified tolerances and marked and disfigured surfaces that cannot be repaired by approved methods will be considered defective work.
- .2 Replace or modify concrete that is out of place or does not conform to lines, detail or grade as directed by the Consultant.
- .3 Replace or repair defectively placed or finished concrete as directed by the Consultant.

- .4 Testing and Replacement of Deficient Concrete in Place:
 - .1 Pay for additional testing and related expenses if concrete has proven to be deficient.
 - .2 Replace or strengthen deficient concrete work as directed by the Consultant, and pay for all testing and related expenses for replaced work until approved by the Consultant.

3.9 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clear away from the building site excess and waste materials and debris resulting from Work of this Section.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

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

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C779/C779M-19 Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces
- .2 CSA Group (CSA)
 - .1 CSA A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete
- .3 American Concrete Institute (ACI)
 - .1 ACI 308 Standard Specification for Curing Concrete
- .4 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1113-96 Architectural Coatings.
 - .2 SCAQMD Rule 1168-03 Adhesives and Sealants Applications

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit product data and application instructions for concrete floor treatments.

1.5 Performance Requirements

- .1 Product quality and quality of work in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

1.6 Project Conditions

- .1 Temperature: Maintain ambient temperature of not less than 10°C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.
- .2 Work area: Make the work area watertight protected against rain and detrimental weather conditions.
- .3 Moisture: Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer.
- .4 Ventilation:
 - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
 - .2 Provide continuous ventilation during and after coating application.

1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction 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.
- .4 Dispose of surplus chemical and finishing materials in accordance with federal, provincial and municipal regulations.

PART 2 PRODUCTS

2.1 Sealing Compounds

- .1 Surface sealers may not be formulated with aromatic solvents, mercury, formaldehyde halogenated solvents, lead, cadmium, hexavalent chromium and their compounds.
- .2 Liquid densifier/sealer: VOC Compliant, high performance, deep penetrating concrete densifier; an odourless, colourless and non-yellowing blend of silicate and silicate designed to harden, dustproof and protect concrete floors.
- .3 Basis of Design Product: Euco Diamond Hard by The Euclid Chemical Co.
 - .1 Acceptable alternate:
 - .1 Liqui- Hard by W.R. Meadows
 - .2 Sikafloor 3S by Sika Canada.
 - .3 MasterTop 333 by BASF
- .4 Compliance:
 - .1 Maximum VOC content: 400 g/L
 - .2 VOC Content: 0 g/L.
 - .3 USDA approved.
 - .4 Ultraviolet resistant.
 - .5 Blush resistant.
 - .6 Non-yellowing.
 - .7 No odour.

2.2 Mixes

- .1 Mixing, ratios and application in accordance with manufacturer's instructions.

PART 3 EXECUTION

3.1 Examination

- .1 Examine concrete surfaces to receive sealer. Notify Consultant if surfaces are not acceptable.

- .2 Do not begin surface preparation or application until unacceptable conditions are corrected.

3.2 Surface Preparation

- .1 Prepare concrete surfaces in accordance with manufacturer's instructions.
- .2 Cure concrete in accordance with ACI 308 and as specified in Section 03 30 00.

3.3 Application

- .1 Apply sealer to concrete surfaces in accordance with manufacturer's instructions.
- .2 Do not leave excess sealer residue on treated concrete surfaces. Remove excess hardened sealer.
- .3 Do not use as a curing compound.
- .4 Do not dilute sealer.
- .5 After floor treatment is dry, seal control joints and joints at junction with vertical surfaces with sealant.

3.4 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean overspray. Clean sealant from adjacent surfaces.

3.5 Protection

- .1 Protect finished installation in accordance with manufacturer's instructions.
- .2 Protect horizontal surfaces from traffic until sealer has cured.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 04 22 00 Concrete Unit Masonry
- .2 Section 04 27 00 Multiple Wythe Unit Masonry

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A153/A153M-23 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- .2 CSA Group (CSA)
 - .1 CSA A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete.
 - .2 CSA S304-14 (R2019) Design of Masonry Structures.
 - .3 CAN/CSA A371-14 (R2019) Masonry Construction for Buildings.
 - .4 CSA G30.3-M1983 (R1998) Cold-Drawn Steel Wire for Concrete Reinforcement.
 - .5 CSA G30.18-09 (R2014) Carbon Steel Bars for Concrete Reinforcement
 - .6 CSA W186-M1990 (R2016) Welding of Reinforcing Bars in Reinforced Concrete Construction
- .3 American Concrete Institute (ACI)
 - .1 Detailing Manual
- .4 Reinforcing Steel Institute of Canada (RSIC)
 - .1 Reinforcing Steel Manual of Standard Practice

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit the following samples:
 - .1 Two of each type of masonry reinforcing specified.
- .3 Product Data: Submit manufacturer's printed product literature, specifications and data sheets.
- .4 Shop Drawings:
 - .1 Submit shop drawings for all masonry reinforcing. Include placing drawings, bar lists and details. Indicate clearly reinforcing bar sizes, spacing, bending details, lap details, dowels to adjacent construction location and quantities of reinforcement.
 - .2 Prepare placing drawings and bar lists in accordance with the American Concrete Institute (ACI) Detailing Manual, and the Reinforcing Steel Institute of Canada (RSIC) Reinforcing Steel Manual of Standard Practice, the typical details included with Contract Documents.
 - .3 Prepare placing drawings to minimum scale of 1:50.
 - .4 Submit placing drawings and bar lists sufficiently detailed and dimensioned to permit correct placement of reinforcement and accessories without reference to architectural or structural Drawings.
 - .5 Show reinforcement, including dowels, in elevation on placing drawings for wall reinforcement.
 - .6 Show cover to reinforcement
 - .7 Show location of construction joints.

1.5 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.6 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 All metal components: hot dipped zinc galvanized to CSA S304 unless otherwise indicated.
- .2 Bar Reinforcement: To CSA A371 and CSA G30.18, grade 400R, deformed billet steel bars.
- .3 Wire Reinforcement: To CSA A371 and CSA G30.3.
 - .1 Masonry Veneer Walls: To CSA A370, hot dipped galvanized to ASTM A153, Class B2, 4.76 mm wire diameter, to suit overall wall thickness. BL-42 Ladder Reinforcement and System 2000 Seismic Adjustable Tie by Blok-Lok Ltd.
 - .2 Interior walls: hot dipped galvanized to CSA S304
 - .1 4.76 mm wire diameter hot dipped galvanized to CSA S304 for interior bearing walls.
 - .2 3.66 mm wire diameter bright wire finish, standard duty for interior non-bearing walls and partitions
 - .3 Truss Type: Blok-Trus BL-30 by Blok-Lok Ltd. for non-vertically reinforced walls
 - .4 Ladder Type: Blok-Trus BL-10 by Blok-Lok Ltd. for vertically reinforced walls
- .4 Equivalent products as manufactured by the following manufacturer's may be used subject to submission and acceptance by the Consultant of technical data:
 - .1 Hohmann and Barnard Inc.
- .5 Epoxy Adhesive: Hilti HIT-HY 2270 Adhesive anchor.

2.2 Fabrication

- .1 Fabricate reinforcing in accordance with CSA A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Ontario.
- .2 Obtain Consultant's approval for locations of reinforcement splices other than shown on placing drawings.
- .3 Upon approval of Consultant, weld reinforcement in accordance with CSA W186.
- .4 Ship reinforcement clearly identified in accordance with drawings.

PART 3 EXECUTION

3.1 Installation

- .1 Install masonry reinforcement and anchors in accordance with CSA A370, CSA A371, CSA A23.1

and CSA S304 unless indicated otherwise.

3.2 Reinforcement

- .1 Unless otherwise noted, all masonry walls shall be reinforced with joint reinforcement.
- .2 Reinforcement shall be installed in the first and second bed joints, 200 mm apart immediately above lintels and below sill at openings, and in bed joints at 400 mm vertical intervals elsewhere. Reinforcement in the second bed joint above or below openings shall extend 600 mm beyond the jambs. All other reinforcement shall be continuous except that it shall not pass through vertical masonry control joints. Side rods shall be lapped at least 150 mm at splices.
- .3 Use prefabricated corner and tee sections for continuous reinforcement at corners and intersecting walls.
- .4 Vertical reinforcement shall have a minimum clearance of 13 mm from the masonry and not less than one bar diameter between bars.
- .5 All block cores containing vertical reinforcing and/or anchor bolts shall be solidly filled with non-shrink grout.
- .6 Place reinforcement and ties in grout spaces prior to grouting.
- .7 Cleanouts: Provide cleanouts in the bottom course of masonry for each grout pour when the grout pour height exceeds 1.5 m.
- .8 Construct cleanouts so that the space to be grouted can be cleaned and inspected. In solid grouted masonry, space cleanouts horizontally a maximum of 800 mm on center.
- .9 Construct cleanouts with an opening of sufficient size to permit removal of debris. The minimum opening dimension shall be 76 mm.
- .10 After cleaning, close cleanouts with closures braced to resist grout pressure.

3.3 Bonding and Tying

- .1 Bond walls of two or more wythes using ladder type reinforcement in accordance with CSA S304, CSA A371 and as indicated.
- .2 Tie masonry veneer to backing in accordance with CSA S304, CSA A371 and as indicated.
- .3 Masonry ties shall be installed as per the requirements of CSA A371 with maximum spacing of 400 mm vertically and 400 mm horizontally.

3.4 Reinforced Lintels and Bond Beams

- .1 Reinforce masonry lintels and bond beams as indicated.
- .2 Place and grout reinforcement in accordance with CSA S304.

3.5 Metal Anchors

- .1 Do metal anchors as indicated.

3.6 Lateral Support and Anchorage

- .1 Do lateral support and anchorage in accordance with CSA S304 and as indicated.
- .2 Anchor new masonry to existing with steel dowels as indicated. Drill into existing masonry and set reinforcing bars in epoxy adhesive in accordance with manufacturer's instructions.

3.7 Control Joints

- .1 Terminate reinforcement 25 mm short of each side of control joints unless otherwise indicated.
- .2 Control joints shall be stepped to avoid cutting lintel beams. Under no circumstance shall the control joints be placed to compromise the bearing for the lintel.

3.8 Field Bending

- .1 Do not field bend reinforcement except where indicated or authorized by Consultant.
- .2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
- .3 Replace bars which develop cracks or splits.

3.9 Field Touch Up

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

3.10 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 10 00 Concrete Forming and Accessories
- .2 Section 03 20 00 Concrete Reinforcing
- .3 Section 03 30 00 Cast-in-Place Concrete
- .4 Section 04 05 19 Masonry Anchorage and Reinforcing
- .5 Section 04 27 00 Multiple Wythe Unit Masonry
- .6 Section 06 10 00 Rough Carpentry
- .7 Section 07 84 00 Firestopping
- .8 Section 07 92 00 Joint Sealants
- .9 Section 08 11 00 Metal Doors and Frames
- .10 Section 09 91 23 Interior Painting

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C90-22 Standard Specification for Loadbearing Concrete Masonry Units
 - .2 ASTM C129-22 Standard Specification for Nonloadbearing Concrete Masonry Units
 - .3 ASTM C150/C150M-22 Standard Specification for Portland Cement
 - .4 ASTM C207-18 Standard Specification for Hydrated Lime for Masonry Purposes.
 - .5 ASTM D2240-15(2021) Standard Test Method for Rubber Property—Durometer Hardness.
 - .6 ASTM D5249-10(2021) Standard Specification for Backer Material for Use with Cold and Hot Applied Joint Sealants in Portland Cement Concrete and Asphalt Joints.
- .2 CSA Group (CSA)
 - .1 CSA A23.1-14/A23.2:19 Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete.
 - .2 CSA A165 Series-14 (R2019) CSA Standards on Concrete Masonry Units.
 - .3 CSA A179-14 (R2019) Mortar and Grout for Unit Masonry
 - .4 CSA A370-14 (R2018) Connectors for Masonry.
 - .5 CSA A371-14 (R2019) Masonry Construction for Buildings.
 - .6 CSA S304-14 (R2019) Design of Masonry Structures.
- .3 Canadian Concrete Masonry Producers Association (CCMPA) Quality Assurance Program.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Data: Submit manufacturer's printed product literature, specifications and data sheets
- .3 Submit the following samples:
 - .1 Two (2) of each type of concrete masonry units specified.
 - .2 Two (2) of each type of masonry accessory specified.
- .4 Submit shop drawings for all masonry reinforcing. Include placing drawings, bar lists and details. Indicate clearly reinforcing bar sizes, spacing, bending details, lap details, dowels to adjacent construction location and quantities of reinforcement and connectors.

- .5 Submit engineered temporary bracing design drawings for temporary support of masonry walls. Drawings shall be prepared by, and bear the seal of a Professional Engineer, licensed in the Province of Ontario.
- .6 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .7 Inspection Reports: Inspection and Testing Company shall submit reports of inspections and tests.
 - .1 Distribute inspection reports as follows:
 - .1 Consultant.
 - .2 Structural Engineer
 - .3 Contractor.

1.5 Quality Assurance

- .1 The masonry sub-contractor shall have a minimum of five years of continuous documented Canadian experience in work of the type and quality shown and specified. Proof of experience shall be submitted when requested by the Consultant and shall be subject to the approval of the Consultant.
- .2 Pre-installation meeting: conduct pre-installation meeting to verify project requirements manufacturer's instructions and manufacturer's warranty requirements.
- .3 Field Quality Control:
 - .1 Inspection and testing will be carried out by Testing Laboratory designated by Owner.
 - .2 Payment for specified Work performed by Inspection and Testing Company will be made from Cash Allowance.
 - .3 Inspection and Testing Company shall perform sampling, inspection and testing of masonry work at site, in accordance with referenced standards, including but not limited to the following:
 - .1 Masonry Placement Inspection
 - .2 Reinforcing Steel Placement
 - .3 Grout and Mortar Testing
 - .4 CMU Testing
 - .4 Review provided by Inspection and Testing Company does not relieve Contractor of his sole responsibility for quality control over Work. Performance or non-performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the Specification.
 - .5 Provide access to Work for inspectors.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Materials shall be kept clean and dry.
- .4 Deliver cement, lime and mortar ingredients with manufacturer's seal and labels intact.
- .5 Cementitious material and aggregates shall be stored in accordance with the requirements of CSA A23.1.

- .6 Exposed units which become stained or chipped, surface marked or scratched, and materials which are affected by inadequate protection shall be replaced, at no additional expense to the Owner.

1.7 Project Conditions

- .1 Provide heat enclosures and heat as required.
- .2 Work to be undertaken shall be carried out according to CAN3-A371, Clause 5.15.2.
- .3 Maintain temperature of mortar between 5 ° C and 50 ° C until batch is used.
- .4 Keep masonry dry using secure waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven snow, rain and dirt, until masonry work is completed and protected by flashings or other permanent construction.
- .5 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Masonry Units: Concrete Block: Modular, conforming to CCMPA requirements and CSA A165.1.
 - .1 H/20/A/M concrete masonry units to be used at all load bearing masonry walls.
 - .2 H/15/A/M concrete, masonry units, at all other locations unless noted otherwise.
 - .3 Special shapes: provide special shapes indicated or required including bullnose and corner blocks, base blocks, fillers, and the like as may be required. Provide purpose made shapes for lintels and bond beams.
 - .4 Exposed block shall all be made by one manufacturer and shall be uniform in colour, shade and texture.
- .2 Bar Reinforcement, wire reinforcement, connectors and ties: as specified in Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .3 Control Joint Filler: to ASTM D5249-10, Type 1, Round, flexible, continuous-length, nonabsorbent, nongassing, nonstaining, and nonshrinking. Extruded from a cross-linked polyethylene. Flexible foam, heat-Resistant Backer Rod. 9.5 mm thick by width of wall.
- .4 Pre-manufactured Masonry Control Joint: Pre-manufactured polyvinylchloride control joints may be used in lieu of the specified built-up type of joint.
- .5 Mortar: Conforming to CSA A179.
 - .1 Use same brand of material and source of aggregate for entire project.
 - .2 Aggregate: CSA A179, fine grain aggregates.
 - .3 Cement: normal Portland to ASTM C150, Type 10.
 - .4 Water shall be clean, potable and free of deleterious amounts of acid, alkalies, or organic materials.
 - .5 Hydrated Lime: Type 'S' to ASTM C207.

- .6 Type 'S' mortar shall be used for all concrete block masonry work.
- .7 Proprietary Mortar Mixes: conform to mix requirements specified
- .8 Mortar colour for concrete unit masonry work shall be grey.
- .9 Admixtures of any kind are not allowed.

- .6 Grout: to CSA A179, Table 3: Premixed, non-shrink non-metallic grout.
- .7 Other materials not specifically described but required for a complete and proper installation of masonry, shall be as selected by the Contractor subject to approval by the Consultant

2.2 Mixes

- .1 Mixing: Prepare and mix mortar materials under strict supervision, and in small batches only for immediate use.
- .2 Mix proprietary mortars in strict accordance with manufacturer's instructions to produce the specified mortar types in accordance with CSA A179. Do not use re-tempered mortars.
- .3 Take representative samples for testing consistency of strength and colour according to CSA A179.

2.3 Damp Course and Flashings

- .1 Peel and stick modified SBS bitumen membrane reinforced with proprietary glass screen, minimum thickness of 1.0 mm.
- .2 Lap Sealant: recommended by flashing manufacturer.

2.4 Accessories

- .1 Mechanical Fasteners: As recommended by manufacturer of material to be fastened, and in accordance with the reference standards, corrosion resistant.

PART 3 EXECUTION

3.1 Examination

- .1 Examine work of other trades for defects or discrepancies and report same in writing to Consultant.
- .2 Installation of any part of this work shall constitute acceptance of such surfaces as being satisfactory.

3.2 General

- .1 Do masonry work in accordance with CSA A371 except where specified otherwise.
- .2 A competent masonry foreman shall supervise and direct the work and only skilled masons shall execute the work of this Section.
- .3 Coordinate work of this Section with others such as, field welding of anchors to steel work, insulation application, and the like. Prepare all items for built-in as the work proceeds, either supplied and installed by other trades or installed under this Section.

- .4 Unless otherwise indicated on the drawings, all interior masonry partitions shall extend from floor level to the underside of floor or roof structures above.

3.3 Installation

- .1 Build masonry plumb, level, and true to line, with vertical joints in alignment.
- .2 Lay out coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.
- .3 Lay block with webs to align plumb over each other with thick ends of webs up. The top course of all partitions which do not pass through a ceiling or up to the underside of a roof deck shall have the open cells filled solid.
- .4 Cut exposed block with power driven abrasive cutting disc or diamond cutting wheel for flush mounted electrical outlets, grilles, pipes, conduits, leaving 3 mm maximum clearance.
- .5 Fill all vertical and bed joints, including plain end faces, through the entire wall thickness solidly with mortar.
- .6 Do not break bond of exposed walls where partitions intersect and if bond would show through on exposed face of walls. Bond these partitions to walls they intersect with prefabricated intersection masonry reinforcement in each course.
- .7 Bond intersecting block walls in alternate courses.
- .8 Terminate non load bearing walls within 20 mm of structure above unless indicated otherwise.
- .9 Where walls are pierced by structural members, ducts, pipes, fill voids with mortar to within 20 mm of such members.
- .10 Buttering corners of units, throwing mortar droppings into joints, deep or excessive furrowing of bed joints, is not permitted. Do not shift or tap units after mortar has taken initial set. Where adjustment must be made after mortar has started to set, remove mortar and replace with fresh supply.
- .11 Do not wet concrete masonry before or during laying in wall.
- .12 Bed and vertical joints shall be evenly and solidly filled with mortar.
- .13 Provide reinforced bond beams where indicated on structural drawings.
- .14 Provide vertical reinforcement as indicated on structural drawings. Fill all reinforced cores solid with grout as indicated. Provide cleanout port at bottom of each grouted core when required by Consultant.

3.4 Exposed Masonry

- .1 Do not use chipped, cracked or stained, and otherwise damaged units or unsatisfactory material in exposed and load bearing masonry walls.
- .2 Lay all joints 10 mm thick (uniform). All joints shall be full of mortar except where specifically designated to be left open.

- .3 All joints shall be slightly concave. Use sufficient force to press mortar tight against masonry units on both sides of joints. Remove excess material or burrs left after jointing by means of a trowel or rubbing with burlap bag.

- .4 Provide bullnose block at all exposed masonry corners.

3.5 Tolerances

- .1 Tolerances in notes to Clause 5.3 of CSA A371 apply.

3.6 Reinforcement and Connectors

- .1 Refer to Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.7 Concrete Masonry Lintels

- .1 Refer to Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .2 Lintels in non-load-bearing walls shall be constructed with special bond or lintel block units unless shown otherwise on plans. Lintels shall bear 200 mm minimum and bearing shall be isolated with two layers of heavy asphalt coated paper.
- .3 Reinforcing steel in lintels shall be 2 x 20 M bars minimum specified under Section 04 05 19 - Masonry Anchorage and Reinforcing, or as noted on drawings.
- .4 Concrete fill for lintels shall be 25 MPa or as noted on the drawings. Concrete shall be as specified in Section 03 30 00.

3.8 Loose Steel Lintels

- .1 Install loose steel lintels. Centre over opening width.
- .2 Lintels supplied under Section 05 50 00 – Metal Fabrications.

3.9 Control Joints

- .1 Provide continuous joints as indicated and at spacing not to exceed 6000 mm c/c unless noted otherwise on drawings.
- .2 Break vertical mortar bond with extruded neoprene gasket or building paper.
- .3 Prime control joint to prevent drying out of caulking material.

3.10 Support of Loads

- .1 Use 25 MPa concrete unless specified otherwise on the Drawings, where concrete fill is used in lieu of solid units.
- .2 Use grout to CSA A179 where grout is used in lieu of solid units.
- .3 Install building paper below voids to be filled with grout. Keep paper 25 mm back from face of units.

3.11 Lateral Support and Anchorage

- .1 Do lateral support and anchorage of masonry in accordance with CSA S304.1 and as indicated.

3.12 Grouting

- .1 Grout masonry in accordance with CSA S304.1 and as indicated.

3.13 Temporary Wall Bracing

- .1 Design and provide all required temporary engineered wall bracing.
- .2 Brace masonry walls to resist wind pressure and other lateral loads during construction period.
- .3 Provide temporary bracing of masonry work during and after erection until mortar has cured and permanent lateral support is in place

3.14 Built-ins

- .1 Build in items required to be built into masonry and provided by other Sections, including bearing plates, door frames, anchor bolts, sleeves and inserts. Build in items to present a neat, rigid, true and plumb installation. Leave wall openings required for ducts, grilles, pipes and other items.
- .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 voids between masonry and metal frames with masonry mortar or insulation, as indicated on drawings or as required to provide a neat, finished appearance.
- .4 Set wall plates on masonry in non-shrink grout in accordance with manufacturer's instructions.
- .5 Do all cutting, fitting, drilling, patching and making good for other trades in masonry work.

3.15 Protection

- .1 Protect masonry units from damage resulting from subsequent construction operations.
- .2 Use protection materials and methods which will not stain or damage masonry units.
- .3 Remove protection materials upon Substantial Performance, or when risk of damage is no longer present.

3.16 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Allow mortar droppings on unglazed concrete masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block and finally by brushing.
- .3 Remove mortar from concrete floor slabs and leave entire area vacuum clean.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 20 00 Concrete Reinforcing
- .2 Section 03 30 00 Cast-in Place Concrete
- .3 Section 04 05 19 Masonry Anchorage and Reinforcing
- .4 Section 04 22 00 Concrete Unit Masonry
- .5 Section 05 50 00 Metal Fabrications
- .6 Section 06 10 00 Rough Carpentry
- .7 Section 07 21 13 Building Insulation
- .8 Section 07 27 13 Modified Bituminous Sheet Air Barriers
- .9 Section 07 84 00 Firestopping
- .10 Section 07 92 00 Joint Sealants
- .11 Section 08 50 00 Aluminum Doors, Windows and Screens

1.3 References

- .1 Canadian Concrete Masonry Producers Association (CCMPA) Quality Assurance Program.
- .2 ASTM International (ASTM)
 - .1 ASTM C90-22 Standard Specification for Loadbearing Concrete Masonry Units
 - .2 ASTM C129-22 Standard Specification for Nonloadbearing Concrete Masonry Units
 - .3 ASTM C207-18 Standard Specification for Hydrated Lime for Masonry Purposes
 - .4 ASTM D2240-15(2021) Standard Test Method for Rubber Property-Durometer Hardness
 - .5 ASTM D5249-10(2021) Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints
- .3 American Concrete Institute (ACI)
 - .1 ACI 530.1-05/ASCE 6-05/TMS 602-05 Specification for Masonry Structures.
- .4 CSA Group (CSA)
 - .1 CSA A165 Series-14 (R2019) CSA Standards on Concrete Masonry Units.
 - .2 CSA A179-14 (R2019) Mortar and Grout for Unit Masonry
 - .3 CSA A370-14 (R2018) Connectors for Masonry
 - .4 CSA A3000-18 Cementitious Materials Compendium
 - .5 CSA A371-14 (R2019) Masonry Construction for Buildings.
 - .6 CSA S304-14 (R2019) Design of Masonry Structures

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit full range of manufacturer's standard colour samples of coloured mortar for selection of colours by the Consultant.
- .3 Data: Submit manufacturer's printed product literature, specifications and data sheets
- .4 Submit the following samples:
 - .1 Two of each type of concrete masonry units specified.
 - .2 Submit samples of coloured mortar selected by the Consultant.

1.5 Quality Assurance

- .1 The masonry sub-contractor shall have a minimum of five (5) years of continuous documented Canadian experience in work of the type and quality shown and specified. Proof of experience shall be submitted when requested by the Consultant and shall be subject to the approval of the Consultant.
- .2 Mockup
 - .1 Prior to proceeding with the work of this section, construct a 1200 mm long x 1000 mm high panel mock-up, to establish for the Consultant's review and acceptance, the general construction and appearance of the installed masonry walls including mortar colours. Mock-up panel shall incorporate each type of masonry unit, use of reinforcement, connectors, through wall flashings, air barriers, weep holes, jointing, coursing, mortar and workmanship.
 - .2 Allow 24 hours for inspection of mock-up by Consultant before proceeding with the work.
 - .3 Erect as many panels as are necessary to obtain Consultant's acceptance without additional cost to the Owner. Remove rejected panels from site.
 - .4 Upon the Consultant's acceptance, complete all masonry work in strict accordance with the standards established in the mock-up.
 - .5 The accepted mock-up panel shall remain intact until the work of this Section has been accepted by the Consultant and shall serve as the basis of standard for the work.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Materials shall be kept clean and dry.
- .4 Deliver cement, lime and mortar ingredients with manufacturer's seal and labels intact.
- .5 Cementitious material and aggregates shall be stored in accordance with the requirements of CAN A23.1.
- .6 Exposed units which become stained or chipped, surface marked or scratched, and materials which are affected by inadequate protection shall be replaced.
- .7 Masonry units shall be delivered to site in protective film and shall be stored without contact with ground or ground water.

1.7 Cold Weather Requirements

- .1 Provide heat enclosures and heat as required.
- .2 Work to be undertaken shall be carried out according to CAN3-A371, Clause 5.15.2.
- .3 Maintain temperature of mortar between 5 °C and 50 °C until batch is used.

1.8 Hot Weather Requirements

- .1 Protect freshly laid masonry from drying too rapidly by means of waterproof, non-staining coverings.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Concrete Masonry Units:
- .1 Concrete Block: Modular, conforming to CCMPA requirements and CSA A165.
 - .2 H/20/A/M concrete masonry units to be used at all multiple wythe exterior walls.
 - .3 Special shapes: provide special shapes indicated or required including bullnose and corner blocks, base blocks, fillers, and the like as may be required. Provide purpose made shapes for lintels and bond beams.
 - .4 Exposed block shall all be made by one manufacturer and shall be uniform in colour, shade and texture.
- .2 Facebrick: burned clay to CSA A82.1 and ASTM C216, ASW grade. Premier Plus size (90 x 79 x 257 mm) Legacy Series as manufactured by Brampton Brick or approved equivalent.
- .1 Colour to be "Old Chicago" Legacy Series or equivalent.
- .3 Masonry Reinforcement and Connectors: Bar Reinforcement, wire reinforcement, connectors and ties: as specified in Section 04 05 19.
- .4 Control Joint Filler: to ASTM D5249, Type 1, Round, flexible, continuous-length, nonabsorbent, non-gassing, non-staining, and non-shrinking. Extruded from a cross-linked polyethylene. Flexible foam, heat-Resistant Backer Rod. 9.5 mm thick by width of wall: Sealtight Cera-Rod by W. R. Meadows Canada Limited.
- .5 Mortar and Grout:
- .1 Conforming to CSA A179
 - .2 Use same brand of material and source of aggregate for entire project.
 - .3 Aggregate: CSA A179 coarse sharp clean sand, free from salt, alkaline or other organic substances, specifically graded for masonry use.
 - .4 Cement: To CSA A3000, masonry cement. Type S. Blended mixes of Portland cement to CSA A3000 and double hydrated lime to ASTM C207.
 - .5 Water shall be clean, potable and free of deleterious amounts of acid, alkalies, or organic materials.
 - .6 Hydrated Lime: Type 'S' to ASTM C207.
 - .7 Type 'S' mortar shall be used for all masonry work.
 - .8 Proprietary Mortar Mixes: St. Lawrence Cement Company, Blue Circle Cement, Daubois Inc., Lafarge Canada. Mortar mixes shall conform to mix requirements specified.
 - .9 Mortar colour for concrete block masonry work shall be grey.
 - .10 Mortar for facebrick units shall be natural grey.
 - .11 Admixtures of any kind are not allowed except as specified for coloured mortar.
 - .12 Grout: to CSA A179, Table 3.
 - .13 Premixed, non-shrink non-metallic grout: Non Shrink Grout by C.P.D., V3 Grout by W.R. Meadows of Canada, NS Grout by Euclid.
 - .14 Parging Mortar: Type N, to CSA A179.
- .6 Other Materials: all other materials not specifically described but required for a complete and proper installation of masonry, shall be as selected by the Contractor subject to approval by the Consultant.

2.2 Mixes

- .1 Mixing: Prepare and mix mortar materials under strict supervision, and in small batches only for immediate use. Mix proprietary mortars in strict accordance with manufacturer's instructions to produce the specified mortar types in accordance with CSA A179. Do not use retempered mortars.
- .2 Admixtures: in accordance with manufacturer's printed directions.
- .3 Use mortar within 2 hours after mixing at temperatures of 26 °C, or 2-1/2 hours at temperatures under 10 °C.
- .4 Take representative samples for testing consistency of strength and colour according to CSA A179.

2.3 Damp Course and Flashings

- .1 Fully compatible with air barrier membrane specified in Section 07 27 13. Self-adhesive modified SBS bitumen membrane reinforced with proprietary glass screen, minimum thickness of 1.0 mm:
 - .1 Vedagard Non-slip by Bakor Inc.
 - .2 Perm-A-Barrier Wall Flashing by W.R. Grace & Co.
 - .3 Mel-Dek by W.R. Meadows
 - .4 Enverge Flashguard by Firestone.
- .2 Lap Sealant: recommended by flashing manufacturer.
- .3 Surface primers and conditioners as recommended by membrane manufacturer.

2.4 Accessories

- .1 Cavity Vents and Weepholes: purpose made PVC vents, with pest resisting design, size to suit masonry units. Cell-Vent with mortar net, or Mor-Control by Dur-O-Wal Inc. Colour to match mortar colour.
- .2 Cell vents: polypropylene plastic, honeycomb design.
 - .1 Size: to suit.
 - .2 Colour: as selected by Consultant.
- .3 Mortar diverters: shaped and sized to suit cavity spaces.
 - .1 Manufactured from recycled material.
- .4 Grout Screens: 6 mm square monofilament screen fabricated from high-strength, non-corrosive polypropylene polymers to isolate flow of grout in designated areas.
- .5 Mechanical Fasteners: As recommended by manufacturer of material to be fastened, and in accordance with the reference standards, corrosion resistant.
- .6 Packing Insulation: loose glass fibre insulation or mineral wool with minimum density of 17.6 kg/m³.

2.5 Fabrication

- .1 Lintels in non-load-bearing walls shall be constructed with special bond or lintel block units unless shown otherwise on plans. Lintels shall bear 150 mm minimum and bearing shall be isolated with two layers of heavy asphalt coated paper.

- .2 Reinforcing steel in lintels shall be 2 x 20 M bars or as noted on drawings.
- .3 Concrete fill for lintels shall be 20 MPA or as noted on the drawings. Concrete shall be as specified in Section 03 30 00.

PART 3 EXECUTION

3.1 Existing Conditions

- .1 Examine work of other trades for defects or discrepancies and report same in writing to Consultant.
- .2 Installation of any part of this work shall constitute acceptance of such surfaces as being satisfactory.

3.2 General

- .1 Do masonry work in accordance with CSA A371 except where specified otherwise.
- .2 Refer to structural drawings for additional requirements for load bearing masonry walls.
- .3 Build masonry plumb, level and true to line, with vertical joints in alignment.
- .4 Lay out coursing and bond to achieve correct coursing heights and continuity of bond above and below openings, with minimum cutting.
- .5 A competent masonry foreman shall supervise and direct the work and only skilled masons shall execute the work of this Section. The workmanship in construction of exposed masonry walls shall be of highest calibre and first class in all respects.
- .6 Chipped, cracked or stained, and unsatisfactory material or workmanship of all masonry work shall be replaced with undamaged units.
- .7 Co-ordinate work of this Section with others such as, field welding of anchors to steel work, insulation application, installation of conduit and the like. Prepare all items to built-in as the work proceeds, either supplied and installed by other trades or installed under this Section.
- .8 Walls shall be constructed as true planes and when tested with a 3 metre straight edge placed anywhere on the wall in any direction shall be true within 3 mm.
- .9 Variation in the Sizes of Wall Openings: A 6 mm maximum variation is allowed from the actual designated size of wall openings.
- .10 Buttering corners of units, throwing mortar droppings into joints, deep or excessive furrowing of bed joints, will not be permitted. Do not shift or tap units after mortar has taken initial set. Where adjustment must be made after mortar has started to set, remove mortar and replace with fresh supply. Bed and vertical joints shall be evenly and solidly filled with mortar.
- .11 All mortar shall be used and placed in final position within 2 hours of mixing. Mortar not used within this time limit shall be discarded.
- .12 Lay all joints 10 mm thick (uniform) unless otherwise specified or otherwise indicated on drawings. All joints shall be full of mortar except where specifically designated to be left open.

- .13 All joints shall be slightly concave. Use sufficient force to press mortar tight against masonry units on both sides of joints. Remove excess material or burrs left after jointing by means of a trowel or rubbing with burlap bag.
- .14 Coordinate with Electrical and Mechanical trades and set smooth faced block at locations of all outlets, boxes, switches, thermostats and other devices.

3.3 Blockwork

- .1 Provide special shapes and sizes as required such as halves, jambs, lintels, solids, corners, bullnoses and double bullnoses, semi-solids, ashlar, etc.
- .2 Lay block with webs to align plumb over each other with thick ends of webs up.
- .3 Cut exposed block with power driven abrasive cutting disc or diamond cutting wheel for flush mounted electrical outlets, grilles, pipes, conduits, leaving 3 mm maximum clearance.
- .4 Do not wet concrete masonry before or during laying in wall.
- .5 Fill all vertical and bed joints, including plain end faces, through the entire wall thickness solidly with mortar.
- .6 Bond intersecting block walls in alternate courses.
- .7 Provide bullnose block at all exposed masonry corners.
- .8 Provide reinforced bond beams where indicated on structural drawings.
- .9 Provide vertical reinforcement as indicated on structural drawings.
- .10 Where walls are pierced by structural members, ducts, pipes, fill voids with mortar to within 20 mm of such members.
- .11 All exposed interior block corners shall be bullnose.

3.4 Exterior Walls

- .1 Exterior wall construction shall be erected as shown on the drawings of exterior clay brick veneer and concrete block back-up with a nominal 75 mm cavity and 50 mm rigid polyisocyanurate insulation.
- .2 Veneer in double wythe masonry wall construction shall be tied to block backup together with adjustable truss type masonry reinforcing as specified in Section 04 05 19.
- .3 Bond walls of two or more wythes and tie masonry veneer to backing in accordance with NBC, CSA S304, CSA A371, and as indicated.
- .4 Masonry units shall be laid up in running bond unless indicated otherwise.
- .5 Place continuous dampcourse and flashing membrane at the bottom of all exterior walls, including at bottom of walls and over all openings. Extend flashing from exterior face of exterior wythe, turned up backing face minimum 150 mm and built into the first horizontal block joint or bonded to sheathing with adhesive, unless otherwise indicated. Lap all joints 150 mm and seal with adhesive.

- .6 Jointing: allow joints to dry just enough to remove excess water, then tool with round jointer to provide smooth, compressed, uniformly concave joints.

3.5 Air Barriers and Rigid Insulation

- .1 Apply air barriers and rigid insulation over exterior face of concrete block inner wythe as specified in Sections 07 27 13 and 07 21 29. Do not proceed with veneer application until insulation and air barrier have been inspected and approved.

3.6 Placement – Veneer Wythe

- .1 Use full-size clay brick units without cutting if possible. If cutting is required, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying. Install cut units with cut surfaces concealed.
- .2 Mixing and Blending: mix masonry units within each pallet and with other pallets to ensure uniform blend of colour, size and texture.
- .3 Install brick to patterns shown on the drawings.
- .4 Comply with tolerances in ACI 530.1-05/ASCE 6-05/TMS 602-05.
- .5 Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets.
- .6 Avoid using less-than-half-size units, particularly at corners, jambs, and where possible, at other locations.
- .7 Bond Pattern: Unless otherwise indicated, lay masonry in running bond, do not use units with less than nominal 100 mm horizontal face dimensions at corners or jambs.

3.7 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 diverters in cavities where indicated and as directed, size and shape to suit purpose and function.

3.8 Reinforcement

- .1 Refer to Section 04 05 19 and structural drawings.

3.9 Connectors

- .1 Refer to Section 04 05 19.

3.10 Control Joints

- .1 Provide continuous joints as indicated.

- .2 Joints shall be full height and thickness of wall and shall be 10 mm wide.
- .3 Break vertical mortar bond with extruded neoprene gasket or building paper.
- .4 Prime control joint to prevent drying out of caulking material.

3.11 Concrete Masonry Lintels

- .1 Install reinforced concrete block lintels over openings in masonry walls where steel or reinforced concrete lintels are not indicated.
- .2 End bearing: not less than 200 mm.
- .3 Refer to Section 04 05 19 and drawings.

3.12 Loose Steel Lintels

- .1 Install loose steel lintels. Centre over opening width. Lintel sizes indicated on structural drawings and supplied under Section 05 50 00.

3.13 Grouting

- .1 Grout masonry in accordance with CSA S304 and as indicated.

3.14 Support of Loads

- .1 Use 20 MPa concrete unless specified otherwise on the Drawings, where concrete fill is used in lieu of solid units. Refer to structural drawings.
- .2 Use grout to CSA A179 where grout is used in lieu of solid units.
- .3 Install building paper below voids to be filled with grout. Keep paper 25 mm back from face of units.

3.15 Lateral Support and Anchorage

- .1 Refer to Section 04 05 19.

3.16 Temporary Wall Bracing

- .1 Design and provide all required temporary engineered wall bracing.
- .2 Brace masonry walls to resist wind pressure and other lateral loads during construction. Bracing of all masonry walls during construction and prior to completion of supporting structures is a mandatory requirement.

3.17 Built-Ins

- .1 Build in items provided by other Sections, including bearing plates, door frames, anchor bolts, sleeves, inserts and loose steel lintels. Build in items to present a neat, rigid, true and plumb installation. Leave wall openings required for ducts, grilles, pipes and other items.
- .2 Fill voids between masonry and metal frames with masonry mortar or insulation, as indicated on drawings or as required to provide a neat finished appearance.

- .3 Set wall plates on masonry in non-shrink grout in accordance with manufacturer's instructions.
- .4 Do all cutting, fitting, drilling, patching and making good for other trades in masonry work.
- .5 Consultant's approval shall be obtained before cutting.

3.18 Protection

- .1 Keep masonry dry using secure waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from snow, rain and dirt, until masonry work is completed and protected by flashings or other permanent construction.
- .2 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.
- .3 Protect masonry units from damage resulting from subsequent construction operations.
- .4 Use protection materials and methods which will not stain or damage masonry units.
- .5 Remove protection materials upon Substantial Performance of the Work, or when risk of damage is no longer present.

3.19 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Obtain and follow material manufacturer's written instructions for Cleaning. Test sample area, 3.0 m x 3.0 m, to judge effectiveness of cleaning procedures.
- .3 Keep wall clean and free of mortar stains during laying.
- .4 Protect windows, trim and metal.
- .5 Remove mortar with wood paddles and scrapers before wetting. Saturate masonry with clean water and flush off loose mortar and dirt. Clean masonry work using water, scrubbing brushes and wood paddles only.
- .6 Remove mortar from concrete floor slabs and finished surfaces.
- .7 Leave entire area vacuum clean.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 04 22 00 Concrete Unit Masonry
- .3 Section 05 50 00 Metal Fabrications

1.3 References

- .1 ASTM International, (ASTM)
 - .1 ASTM A108-18 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
 - .2 ASTM A123/A123M-17 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - .3 ASTM A153/A153M-23 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - .4 ASTM A307-21 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
 - .5 ASTM A653/A653M-23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .6 ASTM A1011/A1011M-23 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
 - .7 ASTM F3125/F3125M-22 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 CSA Group (CSA)
 - .1 CSA G40.20/G40.21-13 (R2018) General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .2 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA S16:19 Design of Steel Structures.
 - .4 CSA S136-16 North American Specification for the Design of Cold Formed Steel Structural Members
 - .5 CSA W47.1:19 Certification of Companies for Fusion Welding of Steel Structures.
 - .6 CSA-W48.1-M1991 (R1998) Carbon Steel Covered Electrodes for Shielded Metal Arc Welding
 - .7 CSA-W55.3-08 (R2013) Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .8 CSA W59-18 Welded Steel Construction (Metal Arc Welding).
 - .9 CSA W178.1-18 Certification of Welding Inspection Organizations.
 - .10 CSA W178.2-18 Certification of Welding Inspectors.
- .3 American Welding Society (AWS)
 - .1 AWS A2.4:2020 Standard Symbols for Welding, Brazing, and Nondestructive Examination
- .4 Structural Steel Painting Council
 - .1 SSPC-SP 6-91 Commercial Blast Cleaning.
- .5 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)
 - .1 CISC/CPMA 1-73a Quick-Drying, One-Coat Paint for Use on Structural Steel.

- .6 American Institute of Steel Construction (AISC)
 - .1 Code of Standard Practice for Steel Buildings and Bridges, Section 10, Architectural Exposed Structural Steel, latest edition.
- .7 The National Building Code of Canada.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit shop and erection drawings. Submit typical details of connections and any special connections for review before preparation of shop drawings. Assume responsibility for the accuracy of Work. Review of submitted shop drawings is to ensure only that the Contract Documents are being correctly interpreted.
- .3 Professional Engineer responsible for connection design shall sign and seal each shop drawing.
- .4 Show on shop drawings the size, spacing, and the location of structural steel members; connections; attachments; reinforcing; anchorage and required inserts; and all necessary plans, elevations and details.
- .5 Show splice locations and details.
- .6 Welded connections shall be designated by welding symbols in compliance with AWS A2.4:2020 and indicate clearly net weld lengths.
- .7 Submit design calculations if requested by the Consultant.
- .8 Submit diagrams showing methods of erection.
- .9 Field Work Drawings shall be submitted as shop drawings.
- .10 Notify Consultant in writing of any deviations in shop drawings from the requirements of the Contract Documents.
- .11 Submit a schedule of fabrication to the Consultant and the Testing Agency, prior to commencement of fabrication.

1.5 Qualifications

- .1 Undertake welding and/or welding inspection by welders fully approved to one or more of the reference codes and standards where applicable.

1.6 Quality Assurance

- .1 Connections:
 - .1 Connections designed by Engineer: Submission of shop drawings for connection which have been detailed on Drawings shall represent acceptance by Contractor that connection can be executed successfully.
 - .2 Design of other connections which cannot be selected from standard designs tabulated in CISC Handbook of Steel Construction shall be by a Professional Engineer, licensed in the Province of Ontario, experienced in structural steel connection design.
 - .3 Consultant will review connection arrangement to verify general conformance with overall design concept of structure.

- .4 Connection design engineer shall be insured for professional liability in accordance with section 74 subsection (1) of Regulation 941 of the Ontario Professional Engineers Act. The alternative of compliance with subsection (2) is not acceptable.
- .5 Provide connections adequate to resist reaction of beam, when beam is loaded to maximum flexural capacity under uniformly distributed load, unless reaction or connection detail is shown on Drawings.
 - .1 Provide flexible beam connections for unrestrained members in accordance with CSA S16.1, unless shown otherwise on Drawings.
 - .2 Select connections, wherever possible, from standard designs tabulated in current edition of CISC Handbook of Steel Construction, except that length of beam web angles shall not be less than half the depth of beam, and single angles shall not be used.
 - .3 Provide direct connections to flanges of spandrel beams (exterior perimeter beams) to restrain twisting.
- .2 Design:
 - .1 Connections:
 - .1 Provide bolted or welded connections, unless shown otherwise on Drawings.
 - .2 Use high strength bolts to ASTM F3125 for all connections.
 - .3 Use slip resistant (friction-type) connections for bolted joints designed to resist reversible forces.
 - .4 Provide tension adjustment hardware at rod type bracing and at flat bar type bracing.
 - .5 Do not permit connections to encroach on clearance lines required for installation of Work of other Sections.
 - .3 Random Splicing: Obtain in writing from Consultant, prior to commencement of shop drawings, special requirements that will be imposed as a necessary condition of acceptance of members with randomly located butt welded splices.
 - .4 All edge perimeter angles and bent plates installed at roof framing level shall be joined by butt weld splices designed for full tension capacity of members being joined.

1.7 Tolerances

- .1 In addition to tolerances specified in CSA S16, erect shelf angles and sash angles attached to steel frame within a tolerance of 3 mm plus or minus, with abutting ends of members at the same level.

1.8 Inspection and Testing

- .1 Inspection and testing of materials and shop fabrication of Work of this Section, and field quality control, will be performed by an independent Inspection and Testing Company'
- .2 The Inspection and Testing Company shall meet qualification requirements of CSA W178.1 and shall be certified by the Canadian Welding Bureau in Category 1 Buildings.
- .3 Welding Inspectors and supervisors shall be certified by Canadian Welding Bureau to CSA W178.2, to minimum level 2 certification.
- .4 Provide free access for inspectors to all places work is being performed, whether on site or off.
- .5 Mill inspection shall ensure that materials conform to specified requirements. Mill test reports, properly correlated to the materials, will be accepted in lieu of physical tests.

- .6 Shop inspection shall ensure that structural steel is fabricated in accordance with the shop drawings, and the specified fabrication and welding procedures.
- .7 The cost of inspection and testing of splices introduced by the fabricator and not required on the Contract Documents will be paid by the Contractor.
- .8 Inspection and Testing Company when appointed shall carry out shop inspection to verify:
 - .1 Structural materials and paint conform to Specifications. Mill test reports, properly correlated to the materials, will be accepted in lieu of physical tests of structural materials.
 - .2 Fabrication and welding conforms to Specifications and dimensioned shop drawings.
 - .3 Shop cleaning and preparation and prime painting to conform to specified requirements.
 - .4 Surfaces inaccessible for cleaning and painting after assembly are treated before assembly.
 - .5 For surfaces painted with zinc rich paint or zinc primer, specified surface preparation is followed and specified paint thickness is applied.
- .9 Non-destructive Testing of Welded Connections: Carry out non-destructive testing of welded connections chosen at random as follows:
 - .1 Check and record steel member sizes for 20% of columns, beams and girders.
 - .2 Check 5% of all welds by magnetic particle inspection.
 - .3 Check 25% of moment connections and all connections subject to direct tension involving use of full penetration groove welds by ultrasonic testing.
 - .4 Check 10% (minimum 2 per connection) in accordance with Section 23 of CSA S16 of pretensioned connections including main building bracing connections.
- .10 More frequent testing and inspection shall be completed if random tests described above are not satisfactory. These costs are to be paid by the Contractor.

1.9 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver products that are only supplied under work of this Section to those who are responsible for their installation, to the work site as directed and to meet construction schedule.
- .3 Handle and store structural steel in such a manner that no damage, including corrosion, is caused to the stored or erected work, or to other property.
- .4 Store structural steel off of ground on timber supports.

1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Rolled shapes, hollow structural sections, plates and rods: new steel, in compliance with CSA and/or ASTM Standards indicated on Structural Drawings.
- .2 Welding Electrodes: to meet the requirements set forth in the applicable standard of the CSA W48 Series on welding electrodes. (Any process which produces deposited weld metal meeting

the requirements of the applicable W48 Series Standard for any grade of arc welding electrodes shall be accepted as equivalent to the use of such electrodes.)

- .3 High Strength Bolts: to meet specified requirements of ASTM F3125
- .4 Machine Bolts: to meet specified requirements of ASTM A307.
- .5 Anchor Bolts: To CSA-G40.20/G40.21, Grade 300W.
- .6 Shop Coat Paint:
 - .1 Interior structural steel: To meet specified requirements of CISC/CPMA 1-73a and compatible with Master Painters Institute INT 5.1S or 5.1X Institutional low odour/low VOC semi-gloss finish. Colour to be grey.
- .7 Galvanizing: hot dipped with zinc coating to CSA G164, ASTM A123 or ASTM A153.

PART 3 EXECUTION

3.1 Fabrication

- .1 Fabricate work of this Section in compliance with CSA S16, and as specified following.
- .2 Connections:
 - .1 Make bolted or welded connections.
 - .2 Use high strength bolts unless otherwise noted on Drawings.
 - .3 Use friction type high strength bolts for the connections of bracing members (diagonal kickers) resisting the effects of applied lateral loads. Provide tension adjustment at flat bar and rod type lateral bracing.
 - .4 Do not permit connections to encroach on the clearance lines required for the installation of work of this Section.
- .3 Beam Connections:
 - .1 Provide beam connections adequate to resist the reactions produced by the framing or load conditions.
 - .2 Provide beam to column connections that apply vertical reaction with negligible eccentricity at the connecting face of the column, such as single or double beam web connections, end plate connections or un-stiffened seats, unless otherwise shown on Drawings. Submit for review, in advance of the preparation of shop drawings, connections which do not meet these requirements.
 - .3 Provide connections complying with the requirements of the CISC Handbook of Steel Construction, except that the length of beam web angles shall not be less than half the depth of the beam and single angles shall not be used.
 - .4 Provide direct connections to flanges of spandrel beams to restrain twisting.
- .4 Holes in Structural Members:
 - .1 Punch holes 11 mm to 27 mm in diameter as required for attaching the work of other Sections to structural steel members. Locate holes so that no appreciable reduction of the strength of members is caused.
 - .2 Provide holes for pipes and ducts, and reinforce openings as indicated on drawings. Cutting of holes in structural members in the field will not be permitted except with written approval of the Consultant.
 - .3 Provide effective drainage holes to prevent the accumulation of water in tubular members.

- .5 Member Separators: Provide separators at approximate spacing of 1200 mm o.c. for double beams and channels as follows:
 - .1 For beams and channels 225 mm or less in depth: one or two rows of pipe separators.
 - .2 For beams and channels over 225 mm in depth: channel separators, unless otherwise detailed on Drawings.
- .6 Built up Compression Members General Requirements: Comply with the requirements of CSA-S16, for all built up compression members.
- .7 Column Bearing Plates: Mill column bearing plates under column bearing unless plate is sufficiently flat to give adequate contact bearing between column and plate.
- .8 Structural Steel Painting: All prime painting shall be shop applied and the responsibility of the steel fabricator. Refer to specific priming requirements specified in Section 09 91 23 - Interior Painting.
 - .1 Paint in accordance with manufacturer's published directions. Paint steel in the shop under cover. Keep painted members under cover until the paint has dried.
 - .2 Clean and prepare surfaces, as appropriate for paint specified, in accordance with Commercial Blast Cleaning is only required where zinc rich paint is to be applied. All other steel to be or clean steel in compliance with SSPC SP6 where zinc rich paint is shop applied.
 - .3 Where paint is applied adjacent to welded joints, remove it to bare metal for a distance of at least 50 mm beyond sides of joints.
 - .4 Do not paint surfaces and edges to be field welded, contact surfaces of friction type connections assembled by high strength bolts, surfaces encased in or in contact with concrete.
- .9 Galvanizing: Galvanize members as indicated and in accordance with reference standards, after shop welding is complete.
 - .1 Steel members, fabrications, and assemblies shall be galvanized after fabrication by the hot dip process in accordance with CSA G164 or ASTM A123.
 - .2 Bolts, nuts, washers, iron, and steel hardware components shall be galvanized in accordance with CSA G164 or ASTM A153.
 - .3 Coating Requirements:
 - .1 Weight: the weight of the galvanized coating shall conform with Table 1 of CSA G164 or paragraph 6.1 of ASTM A123 and Table 1 of ASTM A153 (as appropriate).
 - .2 Surface Finish: The galvanized coating shall be continuous, adherent, as smooth and evenly distributed as possible and free from any defect that is detrimental to the stated end use of the coated article.
 - .4 The integrity of the coating shall be determined by visual inspection and coating thickness measurements.
 - .5 Adhesion: the galvanized coating shall be sufficiently adherent to withstand normal handling.

3.2 Examination

- .1 Verify, before delivery of structural steel, that work of other Sections on which work of this Section is dependent is correctly installed and located.

3.3 Preparation

- .1 Supply anchor bolts, base and bearing plates and other members to be built in under work of other Sections as the work progresses. Cooperate with installers of this work and provide instructions for setting items to be built in.

3.4 Erection

- .1 Comply with CSA S16 and work site safety plans in erection of work of this Section.
- .2 Make adequate provision for horizontal and vertical erection loads and for sufficient temporary bracing to keep structural frame plumb and in true alignment until the completion of erection, and the installation of masonry, concrete work, and floor and roof decks which provide the necessary permanent bracing.
- .3 Provide temporary steel members as may be required for erection purposes and remove them when no longer required.
- .4 Installation of Bearing and Column Base Plates: Install bearing plates and standard wall anchors for beams bearing on masonry or concrete.
 - .1 Set loose beam bearing plates and column base plates, at proper elevation, true and level, with steel shims, ready for grouting as specified under work of other Sections.
 - .2 Set loose bearing plates and/or levelling plates to be cast into concrete.

3.5 Coating Touch-Up

- .1 Clean welds with wire brushes and wash down with clean water to ensure no residue from electrodes is present.
- .2 After erection, give one coat of prime coat or zinc rich paint as applicable and specified for shop coat to field bolts, field connections, burnt areas, and abrasions or damage to shop coats.
- .3 Touch up all areas with a specified paint film thickness.
- .4 Give areas of bare metal on galvanized members two coats of zinc-rich paint. Repair coating on architecturally exposed galvanized metals in accordance with reference standards and as directed by the Consultant. Replace any materials where damage cannot be repaired to the satisfaction of the Consultant.

3.6 Field Quality Control

- .1 Inspection and Testing Company, when appointed as specified in Source Quality Control elsewhere in this Section, shall perform:
 - .1 Inspection of erection and fit-up, including placing, plumbing, levelling and temporary bracing and conformance with specified tolerances.
 - .2 Inspection of bolted connections, including verification that ASTM A307, ASTM F3125 snug tight only bolts, and ASTM F3125 pre-tensioned bolts have been installed and used appropriately, and that threads are excluded from shear plane where required.
 - .3 Inspection of welded joints, including slag removal.
 - .4 General inspection of field cutting and alterations; report immediately to Consultant, any alterations or cutting not shown on reviewed shop drawings.
 - .5 General inspection of shop coating touch-up.
 - .6 Inspection of zinc primer and zinc-rich paint, including surface preparation and coating thickness.

3.7 Defective Work

- .1 Variations in excess of specified tolerances, and failure of materials or workmanship to meet requirements of this specification, and which cannot be repaired by approved methods, will be considered defective Work performed by this Section.
- .2 Replace defective Work, as directed by Consultant.
- .3 Pay for additional inspection and testing, redesign, corrective measures, and related expenses if Work has proven to be deficient.

3.8 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 04 05 19 Masonry Anchorage and Reinforcing
- .3 Section 04 22 00 Concrete Unit Masonry
- .4 Section 04 27 00 Multiple Wythe Unit Masonry
- .5 Section 05 12 23 Structural Steel
- .6 Section 06 10 00 Rough Carpentry
- .7 Section 09 21 23 Interior Painting

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A53/A53M-22 Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
 - .2 ASTM A153/A153M-23 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - .3 ASTM A307-21 Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - .4 ASTM A385/A385M-22 Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
 - .5 ASTM A1008/A1008M-23e1 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
 - .6 ASTM A1011/A1011M-23 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
 - .7 ASTM C1107/C1107M-20 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
 - .8 ASTM D1187/D1187M-97(2018) Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal
 - .9 ASTM F3125/F3125M-23 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 CSA Group (CSA)
 - .1 CSA G40.21-13 General Requirements for Rolled or Welded Structural Quality Steel.
 - .2 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA-S16.1-M Limit States Design of Steel Structures.
 - .4 CSA S136-12 Cold Formed Steel Structural Members.
 - .5 CSA W47.1-09 (R2014) Certification of Companies for Fusion Welding of Steel Structures.
 - .6 CSA W59-18 Welded Steel Construction
 - .7 CSA W178.1-18 Certification of Welding Inspection Organizations
 - .8 CSA W178.2-18 Certification of Welding Inspectors
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1.40-97 Anticorrosive Structural Steel Alkyd Primer
 - .2 CAN/CGSB 1.181-99 Ready Mixed, Organic Zinc Rich Coating.
- .4 Canadian Sheet Steel Building Institute (CSSBI)
- .5 Steel Structures Painting Council, Systems and Specifications Manual.

- .1 CISC/CPMA 1-73a-1975 A Quick drying One-coat Paint for Use on Structural Steel.
- .2 CISC/CPMA 2-75-1975 A Quick Drying Primer for Use on Structural Steel.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit Shop and Erection Drawings for review.
 - .2 Verify site dimensions before proceeding with shop fabrication and to suit field conditions and field openings.
 - .3 Show and describe in detail all the work of this Section including large scale detail of members and materials, of connection and jointing details, and of anchorage devices, dimensions, thicknesses, description of materials, metal finishing, as well as all other pertinent data and information, including type, size and description of all fasteners and anchors.
 - .4 Indicate connections to building structure.
 - .5 Shop drawings for all metal fabrications shall be stamped and signed by a Professional Engineer registered in the Province of Ontario. Each submission of the shop drawings shall bear the seal of the Engineer.

1.5 Qualifications

- .1 Work of this Section shall be executed by a firm thoroughly conversant with laws and regulations which govern and capable of workmanship of best grade of modern shop and field practice known to recognized manufacturers specializing in this work and having a minimum ten (10) years proven experience in the fabrication of high quality metal fabrications. Use workmen skilled in work of this Section.
- .2 Welding shall be performed by trades persons certified by The Canadian Welding Bureau under CSA Standard W47.1.

1.6 Design Requirements

- .1 Design metal, handrail, guardrail construction and connections to OBC vertical and horizontal live load requirements.

1.7 Examination

- .1 All dimensions shall be taken from the drawings and checked against the building. Be responsible for the correctness of such measurements and report to the Consultant in writing all discrepancies between measurements at building and those shown on drawings prior to commencing work. Verify location of anchor bolts and embedded steel and ensure that work prepared by other trades is at a proper elevation, on line, level and true.

1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Label, tag or otherwise mark work supplied for installation by other Sections to indicate its function, location and shop drawing description.
- .3 Protect work from damage and deliver to a location at the site in order to meet the scheduling requirements.

- .4 Protect architecturally exposed materials during fabrication, delivery, handling, storage and erection to prevent marring of surfaces exposed to view, by marking, bending, denting or coarse grinding.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Structural Steel Sections and Steel Plate: CSA G40.20-13/G40.21-13, Grade 350W.
- .2 Architectural and Miscellaneous Mild Steel: CSA G40.20-13/G40.21-13, Grade 300W.
- .3 High Strength Bolts and Nuts: ASTM F3125. Dimensions, sizes, thread, strength, quality and type of items shall be designed for the work intended. Exposed fasteners and anchors shall be same material, colour and finish as the metal to which they are applied.
- .4 Sheet Steel: (Commercial Quality) ASTM A1008 stretcher leveled or temper rolled.
- .5 Steel Pipe: ASTM A53 Schedule 40, Grade B.
- .6 Welding Materials: CSA W59.
- .7 Welding Electrodes: CSA W48 Series.
- .8 Grout: non-shrink, non-metallic, non-stain, flowable, to ASTM C1107, 15 MPa at 24 hours.
- .9 Isolation Coating: Alkali resistant bituminous paint to ASTM D1187.
- .10 Adhesive Anchors: HILTI or Rawl Epoxy Adhesive Anchors sized to suit loading conditions, suitable for substrate. Adhesive to be low VOC type (maximum 250 g/l) to SCAQMD Rule 1168-03, Adhesives and Sealants Applications.

2.2 Finishes

- .1 Primers: All primers for metal fabrications are to be factory applied under the requirements of this Section. Refer to Finish Schedules in Section 09 91 23 for types of primers required for each application. Colour to be grey.
- .2 Zinc Rich Primer: zinc rich, organic, ready mix to CAN/CGSB 1.181. Low VOC type.

PART 3 EXECUTION

3.1 Fabrication

- .1 Fabricate to reviewed shop drawings and in general to details, sizes and materials indicated on drawings and specified herein.
- .2 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

- .3 Fabricate work complete with all components required for anchoring; bolting or welding to structural frame; standing free or resting in frames or sockets; in a safe and sure manner.
- .4 Where possible fit and shop assemble various sections of the work and deliver to site in largest practicable sections. Where shop fabricating is not possible, make trial assembly in shop.
- .5 Ensure exposed welds are continuous for length of each joint.
- .6 Grind and fill all welds after inspection and acceptance and leave ready for prime painting.
- .7 Fill all open joints, depressions, seams with metallic paste filler or by continuous brazing or welding and grind smooth to true sharp arises and profiles.
- .8 Fit joints and intersecting members accurately. Make work in true planes with adequate fastenings.
- .9 Supply all fastenings, anchors, accessories required for fabrication and erection of work of this Section. Make thread dimensions such that nuts and bolts will fit without re-threading or chasing threads.
- .10 Welding shall be done by the shielded metal-arc method in accordance with the requirements CSA W59. The welding operators shall be currently certified under CSA W47.1 for the work they are performing.
- .11 Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise shown or specified. Keep exposed fastenings to an absolute minimum evenly spaced and neatly laid out. Make fastenings of permanent type unless otherwise indicated.
- .12 Surfaces to be welded shall be free from loose scale, rust, paint, or other foreign matter. Where weld material is deposited in two or more layers, each layer shall be cleaned before the next layer is deposited. Care shall be taken to minimize stresses due to heat expansion, contraction and distortion by using proper sequence in welding and by approved methods.
- .13 Appearance, quality of welds made, methods of correcting defective work shall be in accordance with CSA W59.

3.2 Shop Painting

- .1 Cleaning Steel:
 - .1 Clean steel, whether it is to be painted or not, to the degree required by CISC/CPMA 1-73a, except as specified below.
 - .2 Steel to receive a shop or field paint finish shall be cleaned in accordance with Sections 09 91 23 or SSPC SP6, whichever produces a surface which has less rust and mill scale.
 - .3 Clean steel which is specified to be painted to CISC/CPMA 2-75 in accordance with that Standard.
 - .4 Clean steel which is specified to receive an organic zinc-filled epoxy primer, or zinc-rich paint, or inorganic zinc primer, in accordance with SSPC-SP 6, Commercial Blast Cleaning.
 - .5 Clean welds by wire brushing and wash down with clean water, to remove the chemical residues left by the electrodes, prior to painting.
- .2 The following surfaces shall not be painted:
 - .1 Surfaces and edges to be field welded. If painted, remove paint for field welding for a distance of at least 50 mm on all sides of the joint, to ensure proper fusion of the metal.
 - .2 The contact surfaces of friction type connections assembled by high strength bolts.

- .3 Portions of steel members which are to be encased in or in contact with concrete or masonry.
- .3 Preparation and priming of all metal work which will be exposed to view and which is scheduled to be finish painted, shall be in accordance with the requirements of Section 09 91 23.
- .4 All other concealed or unpainted ferrous metal work shall be given one prime paint coat type CGSB 1.40 and in accordance with CISC/CPMA 2-75. Work paint into all corners and all joints. Metal parts in contact shall be primed before shop assembly. Priming damaged during erection or through lack of protection shall be cleaned and touched up.
- .5 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 ° C.
- .6 Metals in contact with other dissimilar metals, concrete or masonry materials shall be insulated or separated from one another to prevent corrosion, staining or electrolysis by use of bituminous paint.

3.3 Miscellaneous Framing and Supports

- .1 General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- .2 Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - .1 Furnish inserts for units installed after concrete is placed.
- .3 Prime miscellaneous framing and supports with primer specified in Section 09 91 23 - Interior Painting.

3.4 Angle Lintels

- .1 Provide all loose steel angle lintels required to support openings and recesses in masonry walls, whether indicated on the drawings or not. Refer to Architectural, Structural and Mechanical drawings for locations of openings. Lintels shall be as scheduled on the Structural drawings.
- .2 Steel angles: CSA G40.21, Grade 300W, sizes indicated for openings. Provide 150 mm minimum bearing at ends unless otherwise indicated.
- .3 Weld or bolt back-to-back angles to profiles as indicated.
- .4 Supply for installation by Sections 04 22 00 and 04 27 00.
- .5 Lintels shall be prime painted unless otherwise indicated.

3.5 Railings

- .1 Definition: the term railing shall be taken to mean balustrades, guards, rails and handrails.
- .2 Design and fabricate railings to conform to all applicable Ontario Building Code requirements.
- .3 Unless otherwise indicated, fabricate railings as follows:
 - .1 Fabricate handrails and guardrails as detailed.
 - .2 Pipe rails shall have an outside diameter of not more than 38 mm. Close open ends of tubular

- members with welded steel plugs.
- .3 Extend handrails horizontally at top and bottom of each flight of stairs as shown on the drawings but not less than 305 mm beyond stair nosing at top of stair and 610 mm at bottom of stair.
- .4 Turn handrails down at exposed ends or turn into wall as detailed.
- .5 Support railings at each end, and at maximum 1070 mm centres unless indicated otherwise or required to meet loading requirements of the Ontario Building Code.
- .6 Minimum wall thicknesses of tubular railings: 2.5 mm.
- .7 At corners, angles and intersections, cope or mitre railings, weld and grind smooth.
- .8 Pickets shall be minimum 13 mm diameter solid steel bars at 100 mm centres.

3.6 Miscellaneous Steel Trim

- .1 Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- .2 Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - .1 Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

3.7 Steel Weld Plates and Angles

- .1 Provide steel weld plates and angles not specified in other Sections, for items supported from concrete or masonry construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete or masonry.

3.8 Installation

- .1 Supervise the setting of bases, anchor bolts, and other steel to concrete connections. Cutting of base plates to accommodate anchor bolts is cause for rejection of base plates.
- .2 Provide all bracing and shoring required to support the work of this Section during installation.
- .3 Work shall be fabricated and erected square, plumb and true, straight, level and accurately fitted to size detailed on reviewed Shop Drawings. All joints shall be welded unless otherwise indicated. Exposed welds shall be ground smooth and/or flush. Exposed work shall be finished smooth and even, close joints and neat connections. Exposed welds continuous for full length of joints.
- .4 Where anchors or fastenings, sleeves, have to be built in by other trades, supply all necessary templates, instructions and supervision to ensure satisfactory installation.
- .5 Do all drilling, cutting and fitting necessary to attach this work to adjoining work and make it complete.
- .6 Provide all components required for anchoring. Make anchoring in concealed manner where possible. Exposed anchors shall be approved by the Consultant, shall be neat, and of the same material, colour, texture and finish of base metal on which they occur. Exposed fastenings shall be evenly spaced.
- .7 Grind all field welds smooth.
- .8 Touch up shop coat of prime paint where damaged by field erection.

3.9 Fasteners and Anchors

- .1 Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
- .2 Securely anchor components in place. Unless otherwise indicated, anchor components as follows:
 - .1 To concrete and solid masonry with expansion or epoxy adhesive type anchors.
 - .2 To hollow construction with toggle bolts.
 - .3 To thin metal with screws or bolts.
 - .4 To thick metal with bolts or by welding.
 - .5 Fill space between railing members and sleeves with non-shrink grout.
- .3 Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.
- .4 Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
- .5 Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.
- .6 Fasteners for securing metal fabrication to existing construction or new construction may be expansion bolts, toggle bolts, power actuated drive pins, welding, self-drilling and tapping screws or bolts.

3.10 Schedule

- .1 General:
 - .1 Supply and install all metal fabrications indicated on Drawings, and not included in the work of other Sections.
 - .2 Coordinate and sequence the work to ensure timely delivery to the site, of all items to be built in.
 - .3 Where items are required to be built into masonry, concrete or other work supply such items to respective Sections with all anchors and accessories for building in.
 - .4 All items shall be of sizes and as detailed on drawings.
 - .5 Coordinate with Section 09 91 23 for preparation of exposed metal items required to have finish coatings applied in the field.
 - .6 Review all coordination drawings prior to installation of materials, to ensure that no interferences with the work of other Sections will occur.

3.11 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 10 00 Concrete Forming and Accessories
- .2 Section 03 30 00 Cast-In-Place Concrete
- .3 Section 04 22 00 Concrete Unit Masonry
- .4 Section 05 50 00 Metal Fabrications
- .5 Section 06 20 00 Finish Carpentry
- .6 Section 07 21 13 Building Insulation
- .7 Section 07 26 00 Vapour Retarders
- .8 Section 08 11 00 Metal Doors and Frames

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A123/A123M-17 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - .2 ASTM A653/A653M-23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
 - .3 ASTM D2559 - 12a(2018) Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions
 - .4 ASTM F1667-21a Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
- .2 CSA Group (CSA)
 - .1 CSA A247- M86 (R1996) Insulating Fiberboard.
 - .2 CSA B111-1974(R2003) Wire Nails, Spikes and Staples.
 - .3 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .4 CSA O80 SERIES-15 Wood Preservation
 - .5 CSA O86-14 Engineering Design in Wood
 - .6 CSA O121-17 Douglas Fir Plywood.
 - .7 CSA O141:23 Canadian Standard Lumber.
 - .8 CSA O151-17 Canadian Softwood Plywood
 - .9 CSA O437 Series-93 (R2011) Standards on OSB and Waferboard
 - .10 CSA Z809-08 Sustainable Forest Management
- .3 Underwriters Laboratories Canada (ULC)
 - .1 ULC 102-2018 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .4 National Lumber Grading Authority (NGLA)
 - .1 Standard Grading Rules for Canadian Lumber, Latest Edition.
- .5 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004 FSC Principle and Criteria for Forest Stewardship.
 - .2 FSC-STD-20-002-2004 Structure and Content of Forest Stewardship Standards V2-1
 - .3 FSC Accredited Certified Bodies.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Certified Wood: Submit listing of wood products and materials used, produced from wood obtained from forests certified by FSC Accredited Certification Body in accordance with FSC-STD-01-001.

1.5 Quality Assurance

- .1 Sawn lumber shall be identified by the grade stamp of an association or independent grading agency certified by the Canadian Lumber Standards Accreditation Board.

1.6 Shipping, Handling and Storage

- .1 Protect materials, under cover, both in transit and on the site.
- .2 Store materials to prevent deterioration or the loss or impairment of their structural and other essential properties. Do not store materials in areas subject to high humidity and areas where masonry and concrete work are not completely dried out.
- .3 Store sheathing materials level and flat, in a dry location. Protect panel edges from moisture at all times.

1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Timber Material shall be 'Grade Stamped'.
- .2 CSA Z809 or FSC Certified.
- .3 Construction Lumber: To CSA O141 Softwood Lumber graded to NLGA Standard Grading Rules for Canadian Lumber, published by the National Lumber Grades Authority. All lumber shall bear grade stamps. Moisture content of softwood lumber not to exceed 19% at time of installation.
 - .1 Framing lumber, plates, furring, blocking, No. 1 SPF.
 - .2 Nailing strips, furring and strapping: No. 4 S-P-F.
 - .3 Fitment framing: No. 1 S-P-F.
- .4 Canadian Softwood Plywood: to CSA O151-M, standard construction, good one or both sides as required, thickness as shown or specified.
 - .1 Douglas Fir Plywood: To CSA O121-M, standard construction, good one side, thickness as shown on the drawings.
 - .2 Plywood used for exposed interior work shall have select grade veneer, one or both faces where exposed, with fire retardant finish. Fire retardant shall be in accordance with CAN/CSA-080.1, and all treated materials shall bear a ULC approval stamp.
- .5 Nails, Spikes and Staples: To ASTM F1667.
- .6 Bolts: 12.5 mm diameter, galvanized, complete with nuts and washers.
- .7 Proprietary Fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.
- .8 Wood Preservative to CSA O80 SERIES.

- .9 Adhesive: Contractors gun grade cartridge loaded wood adhesive, general purpose, to ASTM D2559.
- .10 Building Paper: to CAN2-51.32-M, 15# asphalt impregnated paper.
- .11 Vapour Retardant: 0.152 mm polyethylene film to CGSB 51.34 Type 1.
- .12 Fibreglass Insulation: to CSA A101, loose batt type, minimum density of 24 kg/m³.
- .13 Galvanizing: to CSA-G164. Use galvanized fasteners, and hardware for exterior work, preservative treated lumber, and materials in contact with concrete or masonry.

PART 3 EXECUTION

3.1 Installation

- .1 Workmanship
 - .1 Execute work using skilled mechanics according to best practice, as specified here.
 - .2 Lay out work carefully and to accommodate work of other trades. Accurately cut and fit; erect in proper position true to dimensions; align, level, square, plumb, adequately brace, and secure permanently in place. Join work only over solid backing.
- .2 Rough Hardware: Include rough hardware such as nails, bolts, nuts, washers, screws, clips, hangers, connectors, strap iron, and operating hardware for temporary enclosures.
- .3 Erection of Framing Members
 - .1 Install members true to line, levels and elevations. Space framing members and frame all openings as detailed on the drawings.
 - .2 Construct continuous members from pieces of longest practical length.
 - .3 Install spanning members with crown edge up.
 - .4 Anchor wood framing to supporting walls with galvanized metal strap ties.
- .4 Provide treated wood nailers, blocking, cants, grounds, furring and similar members where shown and where required for screeding or attachment of other work and surface applied items. Attach to substrate as required to support applied loading.
- .5 Blocking: Provide solid wood backing to support millwork, cabinetwork, equipment, fixtures, railings and accessories and the like, as required. Coordinate with work of other Sections and install all required backing. Any such equipment mounted on gypsum wallboard assemblies or similar assemblies shall be adequately supported.
 - .1 Provide solid wood blocking in all partitions where wall stops are specified in the hardware schedule.

3.1 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 05 50 00 Metal Fabrications
- .2 Section 06 10 00 Rough Carpentry
- .3 Section 07 92 00 Joint Sealants
- .4 Section 08 11 00 Metal Doors and Frames
- .5 Section 08 71 10 Door Hardware
- .6 Section 09 21 16 Gypsum Board
- .7 Section 09 91 23 Interior Painting
- .8 Section 10 28 10 Toilet and Bath Accessories

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM E1333-22 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emissions Rates from Wood Products Using a Large Chamber.
 - .2 ASTM F1667-21a Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
- .2 CSA Group (CSA)
 - .1 CSA B111-1974 (R2003) Wire Nails, Spikes and Staples.
 - .2 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA O112 SERIES-M1977 (R2006) Standards for Wood Adhesives
 - .4 CSA O121-17 Douglas Fir Plywood.
 - .5 CSA O141:23 Canadian Standard Lumber.
 - .6 CSA O151-17 (R2022) Canadian Softwood Plywood
 - .7 CSA O153-13 (R2017) Poplar Plywood.
 - .8 CSA Z760-94 (R2001) Life Cycle Assessment
- .3 American National Standards Institute (ANSI)
 - .1 ANSI A208.1-2009 Particleboard.
 - .2 ANSI A208.2-2016 Medium Density Fibreboard (MDF) for Interior Applications.
 - .3 ANSI/HPVA HP-1-2016 Standard for Hardwood and Decorative Plywood.
 - .4 ANSI/NEMA LD 3-2005 High Pressure Decorative Laminates
- .4 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
 - .1 Architectural Woodwork Quality Standards Illustrated.
- .5 Canadian Plywood Association (CanPly)
 - .1 The Plywood Handbook 2005.
- .6 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-V4-0 FSC Principle and Criteria for Forest Stewardship.
 - .2 FSC-STD-20-002-2004, Structure and Content of Forest Stewardship Standards V2-1
 - .3 FSC Accredited Certified Bodies.
- .7 National Hardwood Lumber Association (NHLA)
 - .1 Rules for the Measurement and Inspection of Hardwood and Cypress 1998.
- .8 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2005.
- .9 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)
 - .1 SCAQMD Rule 1168-03 Adhesives and Sealants Applications

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit shop drawings.
 - .1 Indicate details of construction, profiles, jointing, fastening and other related details.
 - .2 Indicate materials, thicknesses, finishes and hardware.
- .3 Submit duplicate 300 mm long samples of each type of solid wood or 300 x 300 mm square type of plywood to receive stain or natural finish.
- .4 Submit samples of plastic laminate materials.

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 Wood materials certified by Forestry Stewardship Council.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Protect materials against dampness during and after delivery.
- .3 Store materials in ventilated areas, protected from extreme changes of temperature or humidity.

1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Lumber Materials

- .1 Softwood lumber: unless specified otherwise, S4S, moisture content 19% or less in accordance with following standards:
 - .1 CSA O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
 - .3 AWMAC custom premium grade, moisture content as specified.
 - .4 Machine stress-rated lumber is acceptable.
- .2 Hardwood Lumber: To NHLA requirements, moisture content of 6% maximum, maple species, AWMA Custom Grade.
 - Stage Flooring: Select grade, tongue & groove birch flooring to match existing size & profile.
 - Salvage and reuse existing decking where possible.

2.2 Panel Materials

- .1 Douglas Fir Plywood (DFP): to CSA O121, standard construction.
 - .1 Forestry Stewardship Council (FSC) certified.

- .2 Urea-formaldehyde free.
- .2 Canadian Softwood Plywood (CSP): to CSA O151, standard construction.
 - .1 Forestry Stewardship Council (FSC) certified.
 - .2 Urea-formaldehyde free.
- .3 Hardwood Veneered Plywood: To CSA O115, of thickness indicated, Type II Select Grade Maple, where transparent finish is required and Solid Grade where paint finish is required. Good two sides for work with two sides exposed to view; good one side for work with one side exposed to view. Use particle board core with Type I bond.
- .4 Particleboard: to ANSI A208.1.
 - .1 Forestry Stewardship Council (FSC) certified.
 - .2 Urea-formaldehyde free.
- .5 Medium density fibreboard (MDF): to ANSI A208.2, density 640-800 kg/m³.
 - .1 Forestry Stewardship Council (FSC) certified.
 - .2 Urea-formaldehyde free.

2.3 Plastic Laminate

- .1 Plastic Laminate Facing Sheet: ANSI/NEMA LD 3-2005 High-Pressure Decorative Laminates (HPDL) PF-S and GP-S;
 - .1 Backing sheet: BK Grade by manufacturer of facing sheet.
 - .2 Core: CSA O151
 - .3 Laminating adhesive: CSA O112.
 - .4 Core sealer: clear water resistant synthetic resin sealer.
 - .5 Colours, pattern, gloss and texture will be selected by Consultant from full range of products by one of the following:
 - .1 Formica,
 - .2 Arborite,
 - .3 Wilsonart.
 - .6 Up to three colours and patterns will be selected by the Consultant.

2.4 Accessories

- .1 Rough Hardware: Bolts, lag screws, anchors, nails and expansion shields required to secure this portion of work. Rough hardware hot dip galvanized conforming to latest edition of CSA G164. All fasteners used in damp or wet areas to be suitable for use in corrosive environment. Use hot dipped galvanized or other material approved by the Consultant.
- .2 Nails and staples: to ASTM F1667 galvanized.
- .3 Wood screws: to CSA B35.4 plain type and size to suit application.
- .4 Stainless Steel hardware: Type 316 Stainless steel for exposed or wet locations, tamper proof.
- .5 Splines: wood or metal to suit application.
- .6 Adhesive: recommended by manufacturer, waterproof type, maximum VOC limit 30 g/L SCAQMD Rule 1168 - Adhesives and Sealants Applications.

PART 3 EXECUTION

3.1 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 Interior and exterior frames: Set frames with plumb sides, level heads and sills, and secure.

3.2 Fabrication

- .1 General:
 - .1 Field measure all dimensions.
 - .2 Fabricate all finish carpentry items to AWMAC premium grade, and in accordance with the reviewed shop drawings.
 - .3 Set nails and screws, apply stained plain wood filler to indentations, sand smooth and leave ready to receive finish.
 - .4 Provide 10 mm thick solid matching wood strip on plywood and particle board edges 13 mm or thicker, exposed in final assembly.
 - .5 Ease edges of solid lumber components to 1.6 mm radius.
- .2 Plastic Laminate Components
 - .1 Unless otherwise specified herein, comply with requirements of ANSI/NEMA LD 3 Annex 'A'.
 - .2 Assembly: Bond plastic laminate to core with adhesive, under pressure.
 - .3 Core: unless otherwise indicated: 19 mm thick.
 - .4 Balanced construction: plastic laminate covered components shall be of balanced construction, with plastic laminate on both faces of core. Seal core edges not covered with plastic laminate.
 - .5 Use largest practicable plastic laminate sheet size.
 - .6 Provide joints symmetrically; provide joints as corners and at changes in superficial areas; provide concealed draw bolt anchors and joints. All butt joints shall have a blind spine.
 - .7 Openings and cutouts:
 - .1 Radius internal corners at least 3 mm and chamfer edges.
 - .2 Where core edge is to remain exposed, cover with plastic laminate edging.
 - .3 Where core edge is to be concealed, seal with sealer.

3.3 Installation

- .1 Do finish carpentry to Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), except where specified otherwise.
- .2 All fastenings shall be concealed.
- .3 Provide heavy duty grounds as necessary for secure installation of finish carpentry work.
- .4 All wood surfaces shall be sanded smooth, ready to receive finish.
- .5 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.

- .6 Form joints to conceal shrinkage.
- .7 Set and secure materials and components in place, rigid plumb and square.
- .8 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
- .9 Set finishing nails to receive filler. Where screws are used to secure members, countersink screws in round, cleanly cut hole and plug with wood plug to match material being secured.
- .10 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

3.4 Door Installation

- .1 Install doors in accordance with instructions in Section 08 11 00 and Section 08 14 16 and manufacturer's printed instructions.

3.5 Finish Hardware Installation

- .1 Finish hardware will be supplied for installation under this Section.
- .2 Prepare doors and frames in accordance with manufacturer's instructions and templates. Install finish hardware complete in all respects, hang doors and make adjustments necessary.
- .3 Doors shall swing freely. Where thresholds are to be used, door bottom shall be finished to suit thresholds as required.
- .4 Where indicated on door schedules or drawings, under-cut doors.

3.6 Miscellaneous

- .1 Install Toilet and Bath Accessories as specified in Section 10 28 10, including accessories supplied by Owner.

3.7 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 04 22 00 Concrete Unit Masonry
- .3 Section 04 27 00 Multiple Wythe Unit Masonry
- .4 Section 06 10 00 Rough Carpentry
- .5 Section 07 26 00 Vapour Retarders
- .6 Section 07 27 13 Modified Bituminous Sheet Air Barriers
- .7 Section 07 92 00 Joint Sealants
- .8 Section 08 11 00 Metal Doors and Frames
- .9 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C423-23 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - .2 ASTM C518-21 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - .3 ASTM C578-22 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
 - .4 ASTM C612-14(2019) Standard Specification for Mineral Fiber Block and Board Thermal Insulation
 - .5 ASTM C665-23 Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
 - .6 ASTM C1620-16(2023) Standard Specification for Aerosol Polyurethane and Aerosol Latex Foam Sealants
 - .7 ASTM D1621-16(2023) Standard Test Method for Compressive Properties of Rigid Cellular Plastics
 - .8 ASTM D1623-17(2023) Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
 - .9 ASTM E1677-19 Standard Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls
 - .10 ASTM E84-23d Standard Test Method for Surface Burning Characteristics of Building Materials
- .2 CSA Group (CSA)
 - .1 CSA B111-1974 (R2003) Wire Nails, Spikes and Staples
- .3 Underwriters Laboratories Canada (ULC)
 - .1 ULC 701.1 Standard for Thermal Insulation, Polystyrene Boards
 - .2 ULC 702.1 Standard for Thermal Insulation Mineral Fibre for Buildings
 - .3 ULC 704 Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.
- .4 Underwriters Laboratories (UL)
 - .1 UL 1715 - Fire Test of Interior Finish Material
- .5 Canadian General Services Board (CGSB)
 - .1 CGSB 71-GP-24M Adhesive, Flexible, for Bonding to Cellular Polystyrene Insulation.
 - .2 CAN 2-51.32 Sheathing, Membrane, Breather Type.
- .6 Uniform Building Code (UBC)

.1 UBC 26-3 Room Fire Test Standard for Interior of Foam Plastic Systems

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit insulation manufacturer's product literature including specified physical properties for each type of insulation specified.
- .3 Submit installation instructions.
- .4 Submit certification that product complies with specification requirements and is suitable for the use indicated.

1.5 Environmental Requirements

- .1 Insulation shall not be produced with, or contain, any of the regulated CFC compounds listed in the Montreal Protocol of the United Nations Environmental Program.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Deliver material to the site in the original unbroken packages bearing the name of manufacturer.
- .4 Store materials in an approved manner at the site preceding application and protect from damage at all times.
- .5 Remove damaged or deteriorated materials from site.

1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Board Insulation

- .1 Rigid insulation at perimeter of ground floor slab and below grade: extruded expanded polystyrene to ULC S701.1 TYPE 4. HFO blowing agents. Thickness as detailed, 400 x 2440 mm boards with butt edges. Material shall have the following characteristics when tested to the reference standards:
 - .1 Compressive Strength: ASTM D1621: 210 kPa.
 - .2 Water Absorption: ASTM D2842: maximum 0.7% by volume.
 - .3 Water Absorption: ASTM C272: maximum 0.1% by volume.
 - .4 Water Vapour Permeance, ASTM E96: 52 ng/Pa•s•m²
 - .5 Thermal resistance RSI: ASTM C518: 0.88/25 mm
 - .6 Basis of Design: Soprema XPS-30
- .2 Polyisocyanurate Rigid Foam Board Insulation;

- .1 Closed cell, polyisocyanurate insulation board laminated with a non-reflective glass-mat facer on both sides. 1219mm x 2438mm or factory cut to 406mm x 2438mm. Sopra-Iso, V Plus as manufactured by Soprema.
- .2 Provide foil faced polyisocyanurate board insulation with the following thickness, RSI Value, and R-values:

Thickness (mm)	RSI Value	R value
13	0.53	3.0
19	0.79	4.5
25	1.04	6.0
51	2.13	12.1

- .2 Facer Materials: non-reflective glass-mat on each face of insulation.
 - .3 Flame Spread and Smoke Developed: Less than 500 when tested in accordance CAN/ULC S102.
 - .4 Water Vapour Permeance: Less than 58 ng/ (Pa s m2) at 25.4 mm when tested in accordance with ASTM E96, Desiccant Method.
 - .5 Compressive Strength: Greater than 140 kPa when tested in accordance with ASTM D1621.
 - .6 Water Absorption: Less than 1.1% by volume when tested in accordance with ASTM D2842.
 - .7 Dimensional Stability: Less than 0.5% linear change when tested in accordance with ASTM D2126.
 - .8 Produced without using HCFC, CFC and HFC blowing agents
- .3 Accessories:
- .1 Clips and Fasteners: corrosion-resistant type, sized to suit application; as supplied by insulation manufacturer.
- .4 Adhesives: As recommended by material manufacturer, compatible with insulation and substrate membrane, waterproof, conforming to CGSB 71-GP-24M.
- .1 Air-Bloc 21 by Monsey Bakor
 - .2 Shur Stik 99 by The GH Company
 - .3 PL Premium by LePage
- .5 Primer for concrete and masonry surfaces recommended by the adhesive manufacturer for the materials to be adhered.

2.2 Spray Foam Insulation

- .1 Spray Foam Insulation: to ASTM C1620, one component expanding polyurethane or polyisocyanurate foam, ULC approved and compatible with rigid insulating materials, with Class 1 fire rating to ASTM E84 for window and door frame application:
 - .1 Ultra Seal PF-100 Gun Foam by Nuco Inc.
 - .2 Handi-Foam by Fomo Products Inc.
 - .3 Pinkseal by Owens Corning.
 - .4 Hilti CF 812 Window and Door Pro.

2.3 Accessories

- .1 Sealing Tape: minimum 65 mm width, polypropylene sheathing tape with acrylic adhesive.
- .2 Rough Hardware: Nails and staples as required for installation of insulation and membrane materials, galvanized to CSA B111 and B34.

- .3 Mechanical Fastening: galvanized screw type fasteners with 25 mm galvanized plate washers. Screws shall be 13 mm longer than the combined thickness of the insulation and sheathing.
- .4 Joint Tape: Joint tape suitable for use with foil facers. Ensure compatibility prior to use by field testing.
- .5 Vapour Retarder: As specified in Section 07 26 00.

PART 3 EXECUTION

3.1 Installation – General

- .1 Install insulation of types indicated, or, where not indicated, as appropriate, to provide a continuously un-interrupted building envelope in accordance with the requirements of the reference standards.
- .2 Install insulation after building substrate materials are dry.
- .3 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .4 Fit insulation tightly around all structural angles, penetrations and other protrusions.
- .5 Cut and trim insulation neatly to fit spaces. Butt joints tightly; offset vertical joints.
- .6 Insulation board materials shall be free from chipped or broken edges.
- .7 Sizes of materials shall be consistent with the module of the system.
- .8 Do not enclose or conceal insulation until it has been inspected by the Consultant.

3.2 Perimeter Insulation

- .1 Do not proceed with installation until concrete surfaces are dry and cured, and water proofing membranes have been inspected and approved.
- .2 Install perimeter insulation vertically just prior to backfilling.
- .3 Prime porous concrete surfaces.
- .4 Apply adhesive in gobs or pads to the back of the insulation board in accordance with manufacturer's instructions. Joints shall be left dry with joints brought into tight contact. Apply insulation to the wall with a slight sliding motion to ensure good contact.
- .5 Protect insulation from damage until time for backfilling.
- .6 Following backfilling and prior to placement of underslab vapour barriers, install horizontal insulation. Install rigid insulation at perimeter of all exterior walls and for extent as indicated. Tightly butt joints.

3.3 Rigid Board Installation

- .1 General:

- .1 Comply with manufacturer's instructions for installation of polyisocyanurate rigid foam board insulation.
- .2 Do not install polyisocyanurate rigid foam board insulation that has become soiled, wet, or has not been properly protected from sunlight.
- .3 Dry fit polyisocyanurate rigid foam board insulation prior to final installation. Neatly trim board around conduits, pipes, and other items that will penetrate insulation.
- .2 Adhesive Attachment:
 - .1 Apply adhesive in accordance with the manufacturers written instructions. Ensure insulation is well bonded to the substrate at all joints between boards and at all penetrations.
- .3 Mechanical Attachment:
 - .1 Select a mechanical fastener appropriate for the intended substrate. Fasten insulation board to substrate with mechanical anchors spaced no greater than 9.5 mm from edge of board or opening, 305 mm on center at perimeter edges and openings and no greater than 406 mm on center in both directions within the field of the perimeter. The washer of a single 44.5 mm washer style fastener may be used to bridge adjoining boards.
- .4 Joint Treatment: For joints, gaps, and openings less than 13 mm wide, install continuous bead of joint treatment to form a seal at all board joints and openings.
- .5 Expanding Foam Sealant: For joints, gaps, and openings greater than 13 mm wide, install sealant in a continuous ribbon between adjacent board edges, working sealant in to joint for a full depth bead of sealant.
- .6 Tape: Install tape to form a continuous seal between adjacent boards. Ensure compatibility and maintain adequate overlaps.
- 3.4 Spray Foam Insulation
 - .1 Completely fill all joints and penetrations in exterior walls, at door and window frames and where indicated, with expanding spray foam insulation, in accordance with manufacturer's instructions.
- 3.5 Cleaning
 - .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 06 10 00 Rough Carpentry
- .3 Section 07 21 13 Building Insulation
- .4 Section 07 27 13 Modified Bituminous Sheet Air Barriers
- .5 Section 07 92 00 Joint Sealants
- .6 Section 09 21 16 Gypsum Board
- .7 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM E96/E96M-22ae1 Standard Test Methods for Water Vapor Transmission of Materials
 - .2 ASTM E154/E154M-08a(2019) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
 - .3 ASTM E1643-18a Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
 - .4 ASTM E1745-17(2023) Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
 - .5 ASTM F1249-20 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34 Vapour Barrier, Polyethylene Sheet, for Use in Building Construction
- .3 American Concrete Institute (ACI)
 - .1 ACI 302.1R Guide for Concrete Floor and Slab Construction

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's product data including certification that materials meet the requirements of the reference standards, and application instructions.

1.5 Project Conditions

- .1 Products specified are not intended for uses subject to abuse or permanent exposure to the elements.
- .2 Do not apply membranes on frozen ground.

1.6 Quality Assurance

- .1 Use an experienced installer and adequate number of skilled personnel who are thoroughly trained and experienced in the application of the vapor retarder.
- .2 Obtain vapour retarder materials from a single manufacturer regularly engaged in manufacturing the product.

- .3 Provide products which comply with all federal, provincial and local regulations controlling use of volatile organic compounds (VOCs).

1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- .4 Store materials in a clean dry area in accordance with manufacturer's instructions. Stack membrane on smooth ground or wood platform to eliminate warping.
- .5 Protect materials during handling and application to prevent damage or contamination.
- .6 Ensure membrane is stamped with manufacturer's name, product name, and membrane thickness at intervals of no more than 220 cm.

1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Sheet Vapour Barrier for Below Concrete Slabs on Grade

- .1 Vapour retarder membrane below slabs on grade shall be manufactured from virgin polyolefin resins and shall meet or exceed all requirements of ASTM E1745, Class A.
 - .1 Maximum Water Vapour Permeance (ASTM E154 Sections 7, 8, 11, 12, 13, by ASTM E96, Method B or ASTM F1249)
 - .1 As received: 0.0063 perms.
 - .2 After Wetting and Drying: 0.0052 perms.
 - .3 Resistance to Plastic Flow and Temperature: 0.0057 perms.
 - .4 Effect Low Temperature and Flexibility: 0.0052 perms
 - .5 Resistance to Deterioration from Organisms and Substances in Contacting Soil: 0.0052 perms.
 - .6 Puncture Resistance (ASTM D1709): >3,200 grams.
 - .7 Tensile Strength ASTM E154, Section 9: 72 Lb. Force/Inch
 - .2 Thickness of Retarder (plastic), ACI 302.1R-96, not less than 15 mils.
 - .3 Acceptable product: Sealtight Perminator HP, as manufactured by W.R. Meadows or Stego Wrap Vapor Barrier by Stego Industries LLC.
- .2 Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 100 mm. Perminator Tape by W.R. Meadows or Stego Tape by Stego Industries LLC.
- .3 Pipe Collars: Construct pipe collars from vapor barrier material and pressure sensitive tape per manufacturer's instructions.

PART 3 EXECUTION

3.1 Vapour Retarders Below Slabs

- .1 Install sheet vapour retarder below all concrete slabs on grade.
- .2 Prepare surfaces in accordance with manufacturers recommendations.
- .3 Level, tamp, or roll earth or granular material beneath the slab base.
- .4 Install vapour retarder below floor slab immediately prior to concrete reinforcement placement and in accordance with ASTM E1643
- .5 Unroll vapour retarder with the longest dimension parallel with the direction of the pour.
- .6 Lap vapour retarder over footings and seal to foundation walls.
- .7 Overlap joints 150 mm and seal with manufacturer's tape.
- .8 Seal all penetrations (including pipes and conduits) with manufacturer's pipe boot.
- .9 No penetration of the vapour retarder is allowed except for reinforcing steel and permanent utilities.
- .10 Repair damaged areas by cutting patches of vapour retarder, overlapping damaged area 150 mm and taping all four sides with tape.
- .11 Restrict traffic over vapour retarder.
- .12 Prior to placing concrete inspect vapour retarder and repair all tears and punctures.

3.2 Inspection

- .1 Arrange for inspection of vapour retarders immediately prior to covering, by local building department and Consultant.
- .2 Make all required repairs identified during inspection.

3.3 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 21 13 Building Insulation
- .3 Section 07 62 00 Sheet Metal Flashing and Trim
- .4 Section 07 92 00 Joint Sealants
- .5 Section 09 21 16 Gypsum Board

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM D412-16 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
 - .2 ASTM D624-00 (2020) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
 - .3 ASTM D4541-17 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
 - .4 ASTM E96/E96M-16 Standard Test Methods for Water Vapor Transmission of Materials
 - .5 ASTM E330/E330M-14 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
 - .6 ASTM E783-02 (2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
 - .7 ASTM E1186-17 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
 - .8 ASTM E2178-13 Standard Test Method for Air Permeance of Building Materials
 - .9 ASTM E2357-18 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 37-GP-56M, Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing
- .3 National Air Barrier Association (NABA)
 - .1 National Air Barrier Association's (NABA) Quality Assurance Program (QAP)

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Submit manufacturer's complete set of standard details for air barriers.
- .4 Quality Assurance Submittals: submit following :
 - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.5 Performance Requirements

- .1 Select and install wall components and assemblies to resist air leakage caused by static air pressure across exterior wall assemblies, including windows, glass, doors, and other interruptions to integrity of wall systems; to maximum air leakage rate of 0.01 L/s.m² when subjected to pressure differential of 75 Pa as measured in accordance with ASTM E783, and ASTM E330.
- .2 Select and install wall components and assemblies to resist air leakage caused by dynamic air pressure across exterior wall assemblies, including windows, glass, doors and other interruptions to integrity of wall systems; to maximum air leakage rate of 0.013 L/s.m² when subjected to hourly wind design loads in accordance with NBC, using 1 in 10 year probability, as measured in accordance with ASTM E783 and ASTM E330.
- .3 If ongoing testing is required throughout air barrier system installation, perform qualitative testing methods in accordance with ASTM E1186 and ASTM D4541.
- .4 Provide continuity of air barrier materials and assemblies in conjunction with materials described in other Sections.

1.6 Quality Assurance

- .1 Quality Assurance Program: Submit evidence of current Contractor accreditation and Installer certification under the National Air Barrier Association's (NABA) Quality Assurance Program (QAP).
- .2 Preconstruction Meeting: Convene a minimum of two weeks prior to commencing work of this Section. Agenda shall include, at a minimum, construction and testing of mock-up, sequence of construction, coordination with substrate preparation, air barrier materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction and chemical/fire safety plans. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.
- .3 Mock-Ups: Build mock-up representative of primary air barrier assemblies and glazing assemblies including backup wall and typical penetrations as acceptable to the Consultant. Mock-up shall be dimensions no less than 2.5 metres long by 2.5 metres high and include the materials and accessories proposed for use in the exterior wall assembly. Mock-ups shall be suitable for testing as specified in the following paragraph.
- .4 Mock-Up Tests for Air and Water Infiltration: The third party testing agency shall test the mock-up for air and water infiltration in accordance with ASTM E1186 (air leakage location), ASTM E783 (air leakage quantification) at a pressure difference of 75 Pa, and ASTM E1105 (water penetration). Use smoke tracer to locate sources of air leakage. If deficiencies are found, the air barrier Contractor shall reconstruct mock-up for retesting until satisfactory results are obtained. Deficiencies include air leakage beyond values specified, uncontrolled water leakage, unsatisfactory workmanship.
 - .1 Perform the air leakage test and water penetration test of mock-up prior to installation of cladding and trim but after installation of all fasteners for cladding and trim and after installation of other penetrating elements.
- .5 Mock-Up Tests for Membrane Adhesion: Test mock-up for transition membrane adhesion in accordance with ASTM D4541 (modified), using a type II pull tester except that the membrane shall be cut through to separate the material attached to the disc from the surrounding material. Perform test after curing period recommended by the material manufacturer. Record mode of

failure and area where the material failed in accordance with ASTM D4541. When the material manufacturer has established a minimum adhesion level for the product on the substrate, the inspection report shall indicate whether this requirement has been met. Where the material manufacturer has not declared a minimum adhesion value for their product/substrate combination, the value shall simply be recorded.

1.7 Sequencing

- .1 Sequence work to permit installation of materials in conjunction with related materials and seals.

1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.10 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of three years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Materials

- .1 Materials: as required to achieve specified performance criteria; meeting specified reference standards and functionally compatible with adjacent materials and components.
- .2 Air barrier membrane components and accessories must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

2.2 Membranes

- .1 Self-adhered air barrier membrane shall SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film, and having the following physical properties:
 - .1 Thickness: 1.0 mm minimum.
 - .2 Air leakage: <0.01 L/s.m² @ 75 Pa to ASTM E283
 - .3 Vapour permeance: 1.6 ng/Pa.m².s to ASTM E96
 - .4 Low temperature flexibility: -30° C to CGSB 37-GP-56M
 - .5 Elongation: 200% to ASTM D412.
- .2 Acceptable Products:
 - .1 Blueskin SA by Henry Company.
 - .2 Perm-A-Barrier by W.R. Grace & Co.
 - .3 Air Shield by W.R. Meadows
 - .4 ExoAir 110 by Tremco
 - .5 Sopraseal Stick 1100T by Soprema

2.3 Adhesive and Primers

- .1 As recommended by manufacturer.

2.4 Mastics & Termination Sealants

- .1 As recommended by manufacturer.

PART 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 General

- .1 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.

3.3 Examination

- .1 Examine all surfaces to ensure conformance to the manufacturer's recommended surface conditions.

3.4 Preparation

- .1 Prepare substrate surfaces in accordance with air barrier material manufacturer's instructions.
- .2 All surfaces which are to receive flexible air barrier must be smooth, clean, dry, frost-free and in sound condition. All moisture, frost, grease, oils, loose mortar, dust, or other foreign materials which may impede the adhesion of the air barrier must be removed.
- .3 New mortar must be cured 14 days and must be dry before air barrier membrane is applied.
- .4 Concrete must be cured 28 days and dry before air barrier membrane is applied.
- .5 Remove any and all sharp protrusions and repair any defects such as spalled or loose aggregate areas.
- .6 Do not proceed with air barrier application until all substrate defects are repaired.

3.5 Installation

- .1 Install air barrier materials at transitions and/or where indicated on the drawings in accordance with manufacturer's instructions.
- .2 Prime surfaces and apply membrane in strict accordance with manufacturer's printed directions.
- .3 Primed surfaces not covered by air barrier membrane during the same working day must be reprimed.

- .4 Apply membrane by heating the surface in contact with the substrate with a trigger-activated propane torch, type as recommended by the manufacturer.
- .5 Cut sheet membrane into manageable sizes, position membrane for alignment prior to removing protective film.
- .6 Install membrane horizontally, in a shingle fashion starting at lowest point. Position membrane and remove protective film and press firmly into place. Ensure minimum 50 mm overlap at all end and side laps. Promptly roll the membrane surface and all laps with a countertop roller to ensure proper surface bond and effect the seal.
- .7 Tie-in to window frames, door frames, roofing systems, cladding, concrete walls, and at the interface of dissimilar materials as indicated or as necessary to achieve a continuous air seal throughout the building envelope. Seal with air barrier tape. Refer to manufacturer's standard details.
- .8 All joints, interconnections, and penetrations of the air barrier components including lighting fixtures shall be indicated on manufacturer's standard details.
- .9 Ensure all projections are properly sealed with a trowel or caulk application of specified sealant.

3.6 Inspection and Repair

- .1 Inspect membrane thoroughly before covering and make any corrections to punctures, tears, voids and other obvious defects which would impede the membrane from performing as intended.
- .2 Notify Consultant when sections of work are complete so as to allow for review prior to installation of insulation. Remove, replace or repair materials not satisfactory to the Consultant and wait for re-inspection before covering work.

3.7 Cleaning and Protection

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Protect air barrier materials from damage during installation and the remainder of the construction period, according to material manufacturer's written instructions.
- .3 Coordinate with installation of materials which cover the air barrier assemblies, to ensure exposure period does not exceed that recommended by the material manufacturer.
- .4 Clean adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and acceptable to the primary material manufacturer.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 04 22 00 Concrete Unit Masonry
- .2 Section 05 31 00 Steel Deck
- .3 Section 07 92 00 Joint Sealants
- .4 Section 09 21 16 Gypsum Board

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM E84-23d Standard Test Method for Surface Burning Characteristics of Building Materials
 - .2 ASTM E119-20 Standard Test Methods for Fire Tests of Building Construction and Materials
 - .3 ASTM E136-19a Standard Test Method for Behavior of Material in a Vertical Tube Furnace at 750° C
 - .4 ASTM E814-13a (2017) Standard Test Method for Fire Tests of Penetration Firestop Systems
 - .5 ASTM E1966-15(2019) Standard Test Method for Fire-Resistive Joint Systems
 - .6 ASTM E2307-20 Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus
- .2 Underwriter's Laboratories of Canada (ULC)
 - .1 ULC 101-2014 Standard Methods of Fire Endurance Tests of Building Construction and Materials
 - .2 ULC 102.2-2018 Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies
 - .3 ULC 115-2018 Standard Method of Fire Tests of Firestop Systems
- .3 National Fire Protection Association (NFPA)
 - .1 NFPA 252 Standard Methods of Fire Test and Door Assemblies
- .4 South Coast Air Quality Management District (SCAQMD) California State
 - .1 SCAQMD Rule 1168-03: Adhesives and Sealants.
- .5 Ontario Building Code

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings: Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.
- .4 Samples: Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.
- .5 Quality Assurance Submittals: submit THE following:
 - .1 Test reports: in accordance with ULC 101 for fire endurance and ULC 102 for surface burning

characteristics.

- .2 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties
- .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, cleaning procedures.

1.5 Definitions

- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- .2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

1.6 Quality Assurance

- .1 One installer shall install all firestopping on the project. Each trade shall not firestop their own service penetrations. Installer shall be certified by fire stopping manufacturer.
- .2 Qualifications:
 - .1 Qualified Installer: specializing in fire stopping installations with 5 years documented experience approved and trained by manufacturer.
- .3 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Consultant to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
- .4 Site Meetings:
 - .1 As part of Manufacturer's Services described in 3.5- Field Quality Control, schedule site visits, to review Work, at stages listed.
 - .2 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
 - .3 Twice during progress of Work at 25% and 60% complete.
 - .4 Upon completion of Work, after cleaning is carried out.
 - .5 Single Source Responsibility: Obtain through-penetration fire-stop systems for each kind of penetration and construction condition indicated from a single manufacturer.
- .5 Field-Constructed Mockup: Prior to installing fire-stopping, erect mockups for each different through-penetration fire-stop system indicated to verify selections made and to demonstrate qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final installations.
 - .1 Locate mockups on site in locations indicated or, if not indicated, as directed by Consultant.

- .2 Notify Consultant one week in advance of the dates and times when mockups will be erected.
- .3 Obtain Consultant's acceptance of mockups before start of final unit of Work.
- .4 Retain and maintain mockups during construction in an undisturbed condition as a standard for judging completed unit of Work.
- .5 Accepted mockups in an undisturbed condition at time of Substantial Performance may become part of completed unit of Work.

1.7 Sustainable Requirements

- .1 Materials shall be Low VOC type conforming to SCAQMD Rule 1168-03. Maximum VOC level of firestopping materials shall be 250 g/l.

1.8 Project Conditions

- .1 Environmental Conditions: Do not install fire-stopping when ambient or substrate temperatures are outside limits permitted by fire-stopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- .2 Ventilation: Ventilate fire-stopping per fire-stopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

1.9 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.
- .4 Storage and Protection:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 All fire stopping shall consist of ULC listed firestop system.
- .2 Applications: Provide fire-stopping systems composed of materials specified in this Section that comply with system performance and other requirements.
- .3 General: Provide fire-stopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.
- .4 All firestopping material shall be:
 - .1 From one manufacturer;
 - .2 Intumescent where an appropriate system exists.

- .5 Fire stopping and smoke seal systems: ULC listed in accordance with ULC 115.
 - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of ULC 115 and not to exceed opening sizes for which they are intended.
- .6 Service penetration assemblies: ULC listed systems tested to ULC 115.
- .7 Service penetration fire stop components: ULC listed and certified by test laboratory to ULC 115.
- .8 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .9 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .10 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .11 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .12 Water: potable, clean and free from injurious amounts of deleterious substances.
- .13 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .14 F-Rated Through-Penetration Fire-stop Systems: Provide through-penetration fire-stop systems with F ratings indicated, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.
- .15 T-Rated Through-Penetration Fire-stop Systems: Provide through-penetration fire-stop systems with T ratings, in addition to F ratings, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupy-able floor areas. T-rated assemblies are required where the following conditions exist:
 - .1 Where fire-stop systems protect penetrations located outside of wall cavities.
 - .2 Where fire-stop systems protect penetrations located outside fire-resistive shaft enclosures.
 - .3 Where fire-stop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.
 - .4 Where fire-stop systems protect penetrating items larger than a 100 mm diameter nominal pipe or 10,000 mm² in overall cross-sectional area.
- .16 Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs. Sealants for vertical joints: non-sagging.
- .17 For fire-stopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
 - .1 For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration fire-stop systems.
 - .2 For floor penetrations with annular spaces exceeding 100 mm or more in width and exposed to possible loading and traffic, provide fire-stop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
 - .3 For penetrations involving insulated piping, provide through-penetration fire-stop systems not requiring removal of insulation.

- .18 For firestopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450.
- .19 Compatibility: Provide fire-stopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by fire-stopping manufacturer based on testing and field experience.
- .20 Accessories: Provide components for each fire-stopping system that are needed to install fill materials and to comply with "System Performance Requirements". Use only components specified by the fire-stopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance-rated systems. Accessories include but are not limited to the following items:
 - .1 Permanent forming/damming/backing materials including the following:
 - .1 Semi-refractory fibre (mineral wool) insulation.
 - .2 Ceramic fibre.
 - .3 Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
 - .4 Fire-rated formboard.
 - .5 Joint fillers for joint sealants.
 - .2 Temporary forming materials.
 - .3 Substrate primers.
 - .4 Collars.
 - .5 Steel sleeves.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

- .1 Compliance: comply with manufacturer's written recommendations or specifications.

3.2 Preparation

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
- .2 Ensure that substrates and surfaces are clean, dry and frost free.
- .3 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .4 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour retarder.
- .5 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 Installation

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing and as necessary to maintain fire resistance ratings of floor and wall assemblies.
- .2 Provide fire stopping for all disciplines.

- .3 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .4 Fill spaces between openings, ducts, pipes and unused sleeves passing through fire separations with firestop material and install firestopping systems in accordance with the appropriate ULC system number for the products and type of penetration.
- .5 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .6 Tool or trowel exposed surfaces to neat finish.
- .7 Remove excess compound promptly as work progresses and upon completion.

3.4 Sequences of Operation

- .1 Proceed only when submittals have been reviewed by Consultant.
- .2 Mechanical pipe insulation: certified fire stop system component.
 - .1 Ensure pipe insulation installation precedes fire stopping.

3.5 Field Quality Control

- .1 Inspections: notify Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
- .2 Employ a ULC accredited Designated Responsible Individual (DRI) to inspect and label all fire stop applications on site.
- .3 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Article 1.4 - Submittals.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in Article 1.6 - Quality Assurance.

3.6 Commissioning

- .1 Employ a ULC accredited Designated Responsible Individual (DRI) to inspect and label all fire stop applications on site. Submit DRI's written reports within 3 days of review, verifying compliance of Work.
- .2 Perform a thorough examination of the fire stopping system to determine if the assembly is installed as per its ULC listing.
- .3 Allow for destructive testing of installed firestopping. Repair all tested assemblies.
- .4 The examination shall take place prior to close-up to confirm assembly components and installation configuration.
- .5 Any and all deviations from the ULC listed system shall be considered grounds for rejection and

replacement.

3.7 Schedule

- .1 Fire stop and smoke seal at:
 - .1 Penetrations through fire-resistance rated partitions and walls.
 - .2 Perimeter of fire-resistance rated partitions.
 - .3 Intersection of fire-resistance rated partitions.
 - .4 Control and sway joints in fire-resistance rated partitions and walls.
 - .5 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
 - .6 Around mechanical and electrical assemblies penetrating fire separations.
 - .7 Rigid ducts: greater than 129 cm²: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
 - .8 All electrical boxes installed in fire rated gypsum board assemblies.
 - .9 All locations required by the Ontario Building Code.
 - .10 Any other locations indicated.

3.8 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 04 22 00 Concrete Unit Masonry
- .3 Section 04 27 00 Multiple Wythe Unit Masonry
- .4 Section 06 10 00 Rough Carpentry
- .5 Section 06 20 00 Finish Carpentry
- .6 Section 06 40 00 Architectural Woodwork
- .7 Section 07 21 13 Building Insulation
- .8 Section 07 27 13 Modified Bituminous Sheet Air Barriers
- .9 Section 07 62 00 Sheet Metal Flashing and Trim
- .10 Section 07 84 00 Firestopping
- .11 Section 08 11 00 Metal Doors and Frames
- .12 Section 32 16 23 Sidewalks

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C510-16(2022) Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants
 - .2 ASTM C661-15(2022) Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
 - .3 ASTM C679-15(2022) Standard Test Method for Tack-Free Time of Elastomeric Sealants
 - .4 ASTM C719-22 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
 - .5 ASTM C793-05(2017) Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants
 - .6 ASTM C794-18(2022) Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
 - .7 ASTM C834-17 Standard Specification for Latex Sealants
 - .8 ASTM C919-22 Standard Practice for Use of Sealants in Acoustical Applications
 - .9 ASTM C920-18 Standard Specification for Elastomeric Joint Sealants
 - .10 ASTM C1087-23 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems
 - .11 ASTM C1183/C1183M-13(2018) Standard Test Method for Extrusion Rate of Elastomeric Sealants
 - .12 ASTM C1193-16 Standard Guide for Use of Joint Sealants
 - .13 ASTM C1246-17(2022) Standard Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants After Cure
 - .14 ASTM C1247-20 Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids
 - .15 ASTM C1248-22 Standard Test Method for Staining of Porous Substrate by Joint Sealants
 - .16 ASTM C1311-22 Standard Specification for Solvent Release Sealants
 - .17 ASTM C1330-23 Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
 - .18 ASTM D412-16(2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
 - .19 ASTM D2203-01(2023) Standard Test Method for Staining from Sealants

- .20 ASTM E84-23d Standard Test Method for Surface Burning Characteristics of Building Materials
- .21 ASTM E90-09(2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- .2 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .3 U. S. Environmental Protection Agency (EPA)
 - .1 EPA 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings.
- .4 South Coast Air Quality Management District (SCAQMD) California State
 - .1 SCAQMD Rule 1168-03: Adhesives and Sealants.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit product data for all sealant materials and accessories including:
 - .1 Preparation instructions and recommendations.
 - .2 Standard drawings illustrating manufacturer's recommended sealant joint profiles and dimensions applicable to Project.
- .3 Joint Sealant Schedule: Indicate joint sealant location, joint sealant type, manufacturer and product name, and colour, for each application. Utilize joint sealant designations included in this Section.
- .4 Samples:
 - .1 Samples for Colour Selection: For each joint sealant type.
 - .2 Samples for Verification: For each joint sealant product, for each colour selected.
- .5 Greenguard Certificates: For each sealant and accessory product specified to meet volatile organic emissions standards of the Greenguard Children and Schools Certification.

1.5 Quality Assurance

- .1 Installer Qualifications: Company with minimum of three years of experience specializing in work of this section, employing applicators trained for application of joint sealants required for this project, with record of successful completion of projects of similar scope, and approved by manufacturer.
- .2 Single Source Responsibility: Provide joint sealants by a single manufacturer responsible for testing of Project substrates to verify compatibility and adhesion of joint sealants.
- .3 Caulking work shall be carried out in strict accordance with manufacturer's printed directions.
- .4 Preconstruction Manufacturer Laboratory Compatibility, Staining, and Adhesion Testing: Submit samples of each substrate or adjacent material that will be in contact with or affect joint sealants. Current manufacturer test data of products on matching substrates will be acceptable.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Project Conditions

- .1 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 Ventilate area of work by use of approved portable supply and exhaust fans.

1.8 Scheduling

- .1 Ensure sealants are cured before covering with other materials.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Manufacturer

- .1 Basis-of-Design Products: Provide joint sealant products manufactured by Tremco, Inc., Commercial Sealants and Waterproofing, 220 Wicksteed Avenue, Toronto, www.tremcosealants.com, or comparable products of other manufacturer approved by Consultant.

2.2 Materials, General

- .1 VOC Content for Interior Applications: Provide sealants and sealant primers complying with the following VOC content limits per 40 CFR 59, Subpart D (EPA Method 24):
 - .1 Architectural Sealants: 250 g/L.
 - .2 Sealant Primers for Nonporous Substrates: 250 g/L.
 - .3 Sealant Primers for Porous Substrates: 775 g/L.
- .2 Low-Emitting Sealants for Interior Applications: Provide sealants and sealant primers complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- .3 Compatibility: Provide joint sealants and accessory materials that are compatible with one another, and with adjacent materials, as demonstrated by sealant manufacturer using ASTM C1087 testing and related experience.
- .4 Joint Sealant Standard: Comply with ASTM C920 and other specified requirements for each joint sealant.
- .5 Stain Test Characteristics: Where sealants are required to be non-staining, provide sealants tested per ASTM C1248 as non-staining on porous joint substrates specified.

2.3 Silicone Joint Sealants

- .1 SJS#1: Single-Component, Nonsag, Non-Staining, Moisture-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, Use NT; SWRI validated.
 - .1 Basis of Design Product: Tremco Spectrem 1.
 - .2 Volatile Organic Compound (VOC) Content: 1 g/L maximum.
 - .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools

- Certification emissions levels.
 - .4 Staining, ASTM C1248: None on concrete, marble, granite, limestone, and brick.
 - .5 Colour: As selected by Consultant from manufacturer's standard line.
- .2 SJS#5: Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT.
- .1 Basis of Design Product: Tremco Tremsil 200 Sanitary.
 - .2 Volatile Organic Compound (VOC) Content: 1 g/L maximum.
 - .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
 - .4 Colour: White and Clear.

2.4 Urethane Joint Sealants

- .1 UJS#1: Single-Component, Nonsag, Moisture-Cure, Polyurethane Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, Use NT; Greenguard certified.
- .1 Basis of Design Product: Tremco Dymonic 100.
 - .2 Volatile Organic Compound (VOC) Content: 40 g/L maximum.
 - .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
 - .4 Tensile Strength ASTM D412: 350 to 450 psi
 - .5 Percent Elongation ASTM D412: 800 to 900%
 - .6 Modulus at 100% ASTM D412: 75 to 85 psi
 - .7 Tear Strength ASTM D412: 65 to 75 psi
 - .8 Smoke Development ASTM E84: 5
 - .9 Colour: As selected by Consultant from manufacturer's standard line.
- .2 UJS#4: Immersible, Single-Component, Pourable, Traffic Grade Polyurethane Joint Sealant: ASTM C920, Type S, Grade P, Class 50, Use T and I.
- .1 Basis of Design Product: Tremco Vulkem 45 SSL.
 - .2 Volatile Organic Compound (VOC) Content: 110 g/L maximum.
 - .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
 - .4 Colour: As selected by Consultant from manufacturer's standard line.

2.5 Latex Joint Sealants

- .1 LJS#1: Latex Joint Sealant: Siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
- .1 Basis of Design Product: Tremco Tremflex 834.
 - .2 Volatile Organic Compound (VOC) Content: 35 g/L maximum.
 - .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
 - .4 Colour: White, paintable.

2.6 Acoustical Sealants

- .1 AJS#1: Acoustical/Curtainwall Sealant: Single-component, non-hardening, non-sag, paintable synthetic rubber-tested to reduce airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing of similar assemblies according to ASTM E90.
- .1 Basis of Design Product: Tremco Acoustical/Curtainwall Sealant.
 - .2 Volatile Organic Compound (VOC) Content: 160 g/L maximum.
 - .3 Colour: White, paintable.

2.7 Joint Sealant Accessories

- .1 Cylindrical Sealant Backing: ASTM C1330, Type B non-absorbent, bi-cellular material with surface skin, or Type O open-cell polyurethane, as recommended by sealant manufacturer for application.
- .2 Bond Breaker Tape: Polymer tape compatible with joint sealant and adjacent materials and recommended by sealant manufacturer.
- .3 Joint Substrate Primers: Substrate primer recommended by sealant manufacturer for application.
- .4 Cleaners: Chemical cleaners acceptable to joint sealant manufacturer.
- .5 Masking tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3 EXECUTION

3.1 Examination

- .1 Examine joint profiles and surfaces to determine if work is ready to receive joint sealants. Verify joint dimensions are adequate for development of sealant movement capability. Verify joint surfaces are clean, dry, and adequately cured. Proceed with joint sealant work once conditions meet sealant manufacturer's written recommendations.

3.2 Preparation

- .1 Joint Surface Cleaning: Clean joints prior to installing joint sealants using materials and methods recommended by sealant manufacturer. Comply with ASTM C1193.
 - .1 Remove curing compounds, laitance, form-release agents, dust, and other contaminants.
 - .2 Clean nonporous and porous surfaces utilizing chemical cleaners acceptable to sealant manufacturer.
 - .3 Protect elements surrounding the Work of this section from damage or disfiguration. Apply masking tape to adjacent surfaces when required to prevent damage to finishes from sealant installation.

3.3 Application

- .1 Sealant and Primer Installation Standard: Comply with ASTM C1193 and manufacturer's written instructions.
- .2 Joint Backing: Select joint backing materials recommended by sealant manufacturer as compatible with sealant and adjacent materials. Install backing material at depth required to produce profile of joint sealant allowing optimal sealant movement.
 - .1 Install joint backing to maintain the following joint ratios:
 - .1 Joints up to 13 mm wide: 1:1 width to depth ratio.
 - .2 Joints greater than 13 mm wide: 2:1 width to depth ratio; maximum 13 mm joint depth.
 - .2 Install bond breaker tape over substrates when sealant backings are not used.
- .3 Masking: Mask adjacent surfaces to prevent staining or damage by contact with sealant or primer.
- .4 Joint Priming: Prime joint substrates when recommended by sealant manufacturer or when indicated by preconstruction testing or experience. Apply recommended primer using sealant manufacturer's recommended application techniques.

- .5 Liquid Sealant Application: Install sealants using methods recommended by sealant manufacturer, in depths recommended for application. Apply in continuous operation from bottom to top of joint vertically and horizontally in a single direction. Apply using adequate pressure to fill and seal joint width.
 - .1 Tool sealants immediately with appropriately shaped tool to force sealants against joint backing and joint substrates, eliminating voids and ensuring full contact.
 - .2 Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
 - .3 Tool exposed joint surface concave using tooling agents approved by sealant manufacturer for application.
- .6 Cleaning: Remove excess sealant using materials and methods approved by sealant manufacturer that will not damage joint substrate materials.
 - .1 Remove masking tape immediately after tooling joint without disturbing seal.
 - .2 Remove excess sealant from surfaces while still uncured.
- .7 Installation of Acoustical Sealant: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations on both sides of assemblies with a continuous bead of acoustical sealant. Comply with ASTM C919 and with manufacturer's written recommendations.

3.4 Field Quality Control

- .1 Field-Adhesion Testing: Perform adhesion tests in accordance with manufacturer's instructions and with ASTM C1193, Method A.
 - .1 Perform 5 tests for the first 300 m of joint length for each kind of sealant and joint substrate, and one test for each 300 m of joint length thereafter or 1 test per each floor per building elevation, minimum.
 - .2 For sealant applied between dissimilar materials, test both sides of joint.
- .2 Remove sealants failing adhesion test, clean substrates, reapply sealants, and re-test. Test adjacent sealants to failed sealants.
- .3 Submit report of field adhesion testing to Consultant indicating tests, locations, dates, results, and remedial actions taken.

3.5 Exterior Joint Sealant Schedule

- .1 Exterior concealed transition joints in air barrier.
 - .1 SJS#1: Single-component neutral-curing low-modulus silicone sealant.
 - .2 Compatibility: Compatible with air barrier components specified in Section 07 27 13.
- .2 Exterior movement joints in brick masonry.
 - .1 UJS#1: Single-component non-sag urethane sealant.
- .3 All other exterior non-traffic joints.
 - .1 SJS#1: Single-component neutral-curing non-staining silicone sealant.
 - .2 UJS#1: Single-component non-sag urethane sealant.
- .4 Exterior horizontal traffic and traffic isolation joints:
 - .1 UJS# 4: Single-component pourable urethane sealant.

3.6 Interior Joint Sealant Schedule

- .1 Interior vertical movement joints in interior concrete and unit masonry.
 - .1 UJS#1: Single-component non-sag urethane sealant.
- .2 Interior movement joints in interior unit masonry.
 - .1 UJS#1: Single-component non-sag urethane sealant.
- .3 Interior perimeter joints of exterior aluminum frames.
 - .1 UJS#1: Single-component non-sag urethane sealant.
- .4 Interior perimeter joints of interior frames.
 - .1 LJS#1: Siliconized acrylic latex
- .5 Interior sanitary joints between plumbing fixtures, food preparation fixtures, and casework and adjacent walls, floors, and counters.
 - .1 SJS#5: Mildew-Resistant, Single-Component, nonsag, acid-curing silicone joint sealant.
- .6 Interior traffic joints in floor and between floor and wall construction.
 - .1 UJS# 4: Single-component pourable urethane sealant.
- .7 Interior non-moving joints between interior painted surfaces and adjacent materials.
 - .1 LJS#1: Siliconized acrylic latex
 - .2 Joint-Sealant Colour: Paintable.
- .8 Interior exposed and non-exposed acoustical applications.
 - .1 AJS#1: Acoustical joint sealant.

3.7 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 04 22 00 Concrete Unit Masonry
- .2 Section 06 10 00 Rough Carpentry
- .3 Section 07 92 00 Joint Sealants
- .4 Section 08 71 10 Door Hardware
- .5 Section 09 21 16 Gypsum Board
- .6 Section 09 91 23 Interior Painting

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A653/A653M-23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .2 ASTM C177-19e1 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
 - .3 ASTM C518-21 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - .4 ASTM C553-13(2019) Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
 - .5 ASTM C591-22 Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
 - .6 ASTM C1289-22a Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
 - .7 ASTM D6386-22 Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
 - .8 ASTM D7396-14(2020) Standard Guide for Preparation of New, Continuous Zinc-Coated (Galvanized) Steel Surfaces for Painting
 - .9 ASTM E90-09(2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99 Ready-Mixed Organic Zinc-Rich Coating.
 - .2 CGSB 41-GP-19M-84 Rigid Vinyl Extrusions for Windows and Doors.
- .3 CSA Group (CSA)
 - .1 CSA-G40.20-13/G40.21-13 General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W59-18 Welded Steel Construction (Metal Arc Welding).
- .4 Canadian Steel Door Manufacturers' Association (CSDMA)
 - .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames, 2000
 - .2 CSDMA Recommended Specifications for Commercial Steel Doors and Frames, 2006.
 - .3 CSDMA Selection and Usage Guide for Commercial Steel Door and Frame Products, 2009.
- .5 Underwriters Laboratories Canada (ULC)
 - .1 ULC 104-2015 Standard Method for Fire Tests of Door Assemblies.
 - .2 ULC 105- 2016 Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104.

- .3 ULC 106-2015 Standard Method for Fire Tests of Window and Glass Block Assemblies
- .4 ULC 701-2011 Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .5 ULC 702.1- 2014 Standard for Thermal Insulation, Mineral Fibre, for Buildings.
- .6 ULC 704-11 Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
- .6 Underwriters Laboratories (UL)
 - .1 UL10B Fire Tests of Door Assemblies.
 - .2 UL10C Standard for Positive Pressure Fire Tests of Door Assemblies.
- .7 National Fire Protection Association (NFPA)
 - .1 NFPA 80-22 Standard for Fire Doors and Other Opening Protectives.
 - .2 NFPA 252-2017 Fire Tests of Door Assemblies.
- .8 American National Standards Institute (ANSI)
 - .1 ANSI 250.4-2018 Test Procedure and Acceptance Criteria for — Physical Endurance for Steel Doors, Frames and Frame Anchors
 - .2 ANSI 250.10-2011 Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Provide shop drawings
 - .1 Indicate each type of door, frame, steel, construction and core.
 - .2 Indicate fire ratings.
 - .3 Indicate material thicknesses, mortises, reinforcements, anchorages, location of exposed fasteners, openings, arrangement of hardware, and finishes.
 - .4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

1.5 Defining Opening Sizes

- .1 Width - Widths of openings shall be measured from inside to inside of frame jamb rabbets. (Referred to as "frame rabbet width" or "nominal door width")
- .2 Height - Heights of openings shall be measured from the finished floor (exclusive of floor coverings) to the head rabbet of the frame. (Referred to as "frame rabbet height" or "nominal door height")
- .3 Door Sizes - Doors shall be sized so as to fit the above openings and allow a 3 mm nominal clearance at jambs and head of frame. A clearance of 13 mm maximum shall be allowed between the bottom of the door and the finished floor (exclusive of floor coverings).
- .4 Tolerances - Doors and frame product shall be manufactured and installed in accordance with the CSDMA's, "Recommended Dimensional Standards for Commercial Steel Doors and Frames".

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Requirements of Regulatory Agencies

- .1 Steel fire rated doors and frames: labeled and installed by an organization accredited by Standards

Council of Canada in conformance with ULC 104 or NFPA 252 for ratings specified or indicated.

- .2 Provide fire labeled frame products for those openings requiring fire protection ratings, as scheduled. Test products in strict conformance with ULC 104 or NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

1.8 Testing and Performance

- .1 Fire labeled products shall be provided for those openings requiring fire protection ratings as scheduled on the drawings. Products shall be tested in strict conformance with ULC 104 and listed by Underwriters Laboratory of Canada Ltd. or Warnock Hersey under an active Factory Inspection Program.
- .2 Product quality shall meet the standards established by the Canadian Steel Door Manufacturer's Association.
- .3 Door construction shall meet acceptance criteria of ANSI A250.10 and shall be certified as meeting Level A (1,000,000 cycles) and Twist Test Acceptance Criteria deflection not to exceed 6.4 mm/13.6 kg force, total deflection at 136.1 kg force not to exceed 64 mm and permanent deflection not to exceed 3.0 mm when tested in strict conformance with ANSI A250.4. Test shall be conducted by an independent nationally recognized accredited laboratory.
- .4 Core materials for insulated doors shall attain a thermal resistance rating of RSI 2.17 when tested in accordance with ASTM C177 or ASTM C518.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Acceptable Materials
 - .1 Steel doors and frame product manufactured in accordance with this Specification by CSDMA members, are eligible for use on this project.
- .2 Steel: Commercial grade steel to ASTM A653, CS, Type B, Coating Designation ZF75 (A25) minimum. Minimum steel thicknesses shall be in accordance with Appendix 1 of the CSDMA, Recommended Specifications for Commercial Steel Door and Frame Products unless noted otherwise.
- .3 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653, ZF75.
- .4 Door Core Materials
 - .1 Interior Doors: Structural small cell, 24.5mm maximum kraft paper 'honeycomb'. Weight 36.3 kg per ream minimum, density: 16.5 kg/m³ minimum sanded to required thickness. ULC approved.
- .5 Primers:
 - .1 Touch-up prime CAN/CGSB-1.181, organic zinc rich, rust inhibitive.

- .1 Maximum VOC limit 50 g/L to GC-03.

2.2 Adhesives

- .1 Adhesive: maximum VOC content 50 g/L to SCAQMD Rule 1168.
- .2 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
- .3 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, low VOC sealant/adhesive or U.L.C. approved equivalent.

2.3 Accessories

- .1 Glazing Stops: Minimum 0.9 mm base thickness sheet steel with wipe zinc finish to ASTM A525. Fasteners to be #6 x 32 mm cadmium plated oval head scrulox self-drilling type screws. Tamper proof screws.
- .2 Door silencers: single stud rubber/neoprene type.
- .3 Fiberglass: to ULC 702, loose batt type, minimum density of 24 kg/m³.
- .4 Metallic paste filler: to manufacturer's standard.
- .5 Sealant: As specified in Section 07 92 00.

2.4 Fabrication - Frame Products

.1 General

- .1 Fabricate frames in accordance with CSDMA specifications.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Interior frame product shall be 1.60 mm. Interior frames shall be welded type construction.
- .4 Blank, reinforce, drill and tap frames for templated hardware and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
- .5 Prepare frames to receive electrical conduit for door operators where indicated and required.
- .6 Protect mortised cutouts with steel guard boxes.
- .7 Provide anchorage appropriate to floor, wall and frame construction. Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite on the strike jamb. For rebate opening heights up to and including 1520 mm provide two (2) anchors, and an additional anchor for each additional 760 mm of height or fraction thereof, except as indicated below. Frames in previously placed concrete, masonry or structural steel shall be provided with anchors located not more than 150 mm from the top and bottom of each jamb, and intermediate anchors at 660 mm on centre maximum. Fasteners for such anchors shall be provided by others.
- .8 Minimum reinforcing, anchor and other component thickness shall be in accordance with Table 1 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products".
- .9 Each interior door opening shall be prepared for single stud rubber door silencers, three (3) for single door openings, two for double door openings, except on gasketed frame product.
- .10 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

- .11 Fire-rated frame products shall be provided for those openings requiring fire protection as determined and scheduled by the Consultant. Frames shall be listed for conformance with ULC 104. Window assemblies shall be listed for conformance with ULC 106. All fire-rated frame products shall bear the label of and be listed by a nationally recognized testing agency having a factory inspection service. Labeling shall be in accordance with NFPA 80, the listing authority's policies and label materials, and shall identify the manufacturer. Fire-rated frame products shall be constructed as listed for labeling in the Follow-Up Service Procedures/Factory Inspection Manuals issued by the listing agency to individual manufacturers.

.2 Welded Type

- .1 Welding in accordance with 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.
- .4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
- .5 Where frame product is to be installed prior to the adjacent partition, a floor anchor shall be securely attached to the inside of each jamb profile. Each floor anchor shall be provided with two holes for securing to the floor. For conditions that do not permit the use of a floor anchor, an additional wall anchor, located within 150 mm of the base of the jamb, shall be substituted.
- .6 Weld in two temporary jamb spreaders per door opening to maintain proper alignment during shipment and handling, which shall not be used for installation.
- .7 Glazing stops shall be formed steel channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
- .8 When required due to site access, when advised by the contractor responsible for coordination or installation, as specified on the drawings or due to shipping limitations, frame product for large openings shall be fabricated in sections as designated on the approved submittal drawings, with splice joints for field assembly and welding by others.
- .9 Prior to shipment, mark each frame product with an identification number as shown on the approved submittal drawings.
- .10 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
- .11 Manufacturer's nameplates on frames and screens are not permitted

2.5 Fabrication - Doors

.1 General

- .1 Interior doors: insulated steel construction with honeycomb core laminated to minimum 1.19 mm nominal thickness steel face sheets under pressure.
- .2 Voids between vertical stiffeners shall be filled with fiberglass batt type insulation.
- .3 Doors: swing type, flush.
- .4 Doors: manufacturers' proprietary construction, tested and/or engineered as part of a fully operable assembly, including door, frame, gasketing and hardware in accordance with ASTM E330.

- .2 Longitudinal edges shall be mechanically inter-locked, adhesive assisted. Seams: visible grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.

- .3 Doors shall be mortised, blanked, reinforced, drilled and tapped at the factory for templated hardware and electronic hardware, in accordance with the approved hardware schedule and templates provided by the hardware supplier.

- .4 Holes 12.7 mm diameter and larger shall be factory prepared, except mounting and through-bolt holes, which are by others, on site, at time of hardware installation. Holes less than 12.7 mm diameter shall be factory prepared only when required for the function of the device (for knob, lever, cylinder, thumb or turn pieces) or when these holes over-lap function holes.
- .5 Doors shall be reinforced where required, for surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges, or non-templated hardware.
- .6 Provide top and bottom of doors with inverted, recessed, welded steel channels.
- .7 Minimum reinforcing and component thickness shall be in accordance with Table 1 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products".
- .8 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
- .9 Fire-rated doors shall be provided for those openings requiring fire protection as indicated. Such products shall be listed for conformance with ULC 104. All fire-rated doors shall bear the label of and be listed by a nationally recognized testing agency having a factory inspection service. Labeling shall be in accordance with NFPA 80, the listing authority's policies and label materials, and shall identify the manufacturer. Fire-rated doors shall be constructed as listed for labeling in the Follow-Up Service Procedures/Factory Inspection Manuals issued by the listing agency to individual manufacturers.
- .10 Prior to shipment, mark each door with an identification number as shown on the approved submittal drawings.
- .11 Manufacturer's nameplates on doors are not permitted.

2.6 Finishes

- .1 Doors and frames shall wipe coat zinc, ready for painting.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

- .1 Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheets.

3.2 Installation

- .1 Install doors and frames to CSDMA Installation Guide, NAAMM-HMMA 840, Installation Guide for Commercial Steel Doors and Frames.
- .2 Fire-rated door and frame product shall be installed in accordance with NFPA-80.
- .3 Make allowance for deflection to ensure structural loads are not transmitted to frame product.
- .4 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 10 - Door Hardware. Coordinate with Section 08 71 10 for preparation and installation of automatic door operators.

- .5 Adjust operable parts for correct clearances and function.
- .6 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 and thresholds: 13 mm.
- .7 Caulk perimeter of frames. Refer to Section 07 92 00 – Joint Sealants.

3.3 Finish Repairs

- .1 Touch up with primer finishes damaged during installation.
- .2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.4 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 06 20 00 Finish Carpentry
- .2 Section 08 11 00 Metal Doors and Frames

1.3 References

- .1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
 - .1 ANSI/DHI A115.1G-1994 Installation Guide for Doors and Hardware
 - .2 ANSI/ICC A117.1-2017 Accessible and Usable Buildings and Facilities
 - .3 ANSI/BHMA A156.1-2013 American National Standard for Butts and Hinges.
 - .4 ANSI/BHMA A156.2-2011 Bored and Preassembled Locks and Latches.
 - .5 ANSI/BHMA A156.3-2014 Exit Devices.
 - .6 ANSI/BHMA A156.4-2013 Door Controls - Closers.
 - .7 ANSI/BHMA A156.5-2014 Auxiliary Locks and Associated Products.
 - .8 ANSI/BHMA A156.6-2010 Architectural Door Trim.
 - .9 ANSI/BHMA A156.8-2010 Door Controls - Overhead Stops and Holders.
 - .10 ANSI/BHMA A156.10-2011 Power Operated Pedestrian Doors.
 - .11 ANSI/BHMA A156.12-2013 Interconnected Locks and Latches.
 - .12 ANSI/BHMA A156.13-2012 Mortise Locks and Latches Series 1000.
 - .13 ANSI/BHMA A156.15-2011 Release Devices - Closer Holder, Electromagnetic and Electromechanical.
 - .14 ANSI/BHMA A156.16-2013 Auxiliary Hardware.
 - .15 ANSI/BHMA A156.18-2012 Materials and Finishes.
 - .16 ANSI/BHMA A156.19-2013 Power Assist and Low Energy Power - Operated Doors.
 - .17 ANSI/BHMA A156.21-2014 Thresholds.
 - .18 ANSI/BHMA A156.22-2012 Door Gasketing and Edge Seal Systems
- .2 Canadian Steel Door Manufacturers' Association (CSDMA)
 - .1 CSDMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): Standard Hardware Location Dimensions.
- .3 National Wood Window and Door Association (NWWDA)
- .4 Door Hardware Institute (DHI)
- .5 Accessibility for Ontarians with Disabilities Act (AODA)

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit manufacturer's printed product literature, specifications and data sheets.
- .3 Samples:
 - .1 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
 - .2 After approval samples will be returned for incorporation in the Work.
- .4 Hardware List:
 - .1 Submit contract hardware list.

.2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

.5 Manufacturer's Instructions: Submit manufacturer's installation instructions.

.6 Provide operation and maintenance data for door closers, locksets, door holders, electrified hardware and fire exit hardware for incorporation into Operations and Maintenance Manuals specified in Section 01 78 00 - Closeout Submittals.

1.5 Quality Assurance

.1 Regulatory Requirements:

.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 Pre-installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

.3 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 Receive the delivery of the Finishing Hardware and identify all items against the Finishing Hardware Schedule. Ensure each hardware item is accompanied by the correct template, installation instructions, special tools, fastening devices and other loose items. Advise the finish hardware supplier and Consultant in writing of errors or omissions.

.5 Storage and Protection: Store finishing hardware in locked, clean and dry area.

.6 Remove all hardware from doors and frames prior to painting. After painting is complete and dry, reinstall all hardware to manufacturer's recommendations.

1.7 Waste Management and Disposal

.1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.8 Warranty

.1 Warrant all hardware against defects of workmanship and material, for a period of one year, except for door closers which shall be warranted for ten years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Materials

- .1 All hardware shall be supplied as specified in the Finishing Hardware Schedule.
- .2 All finishes shall be as indicated in the Finishing Hardware Schedule by international codes.
- .3 All door handles shall be lever type meeting requirements of the referenced accessibility standards and the Ontario Building Code.
- .4 Power Door Operators and controls shall be CSA approved and shall meet the requirements of the Ontario Building Code and the Accessibility for Ontarians with Disabilities Act (AODA).

2.2 Fastenings

- .1 Use only fasteners provided by 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 Exposed fastening devices to match finish of hardware.
- .4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.
- .5 Use fasteners compatible with material through which they pass.

2.3 Electrified Devices

- .1 Electrified exit devices shall conform to all traditional exit device standards as specified above. All power requirements for exit devices used must utilize a continuous circuit electric hinge for clean design and no visible means of interrupting power to device.
- .2 All exit devices with electric latch retraction shall provide for a remote means of unlocking for momentary or maintained periods of time.
- .3 Exit devices with electrified trim shall be fail-secure unless otherwise specified.

2.4 Keying

- .1 Keying: All permanent cylinders to be grandmaster-keyed as directed by the Owner. The factory shall key all locks and cylinders and maintain keying records. The factory shall establish a System Information Document (SID) to designate primary system administrators and require a separate letter of authorization for all future shipments of keyed products.
- .2 Remove all construction cores and install all permanent cores. Unless otherwise directed by the Owner.
- .3 Construction master/change keys are to be delivered by the contractor directly to The Owner.

- .4 Ship all permanent cylinders and keys separately. Identify door number and keyset symbol on each envelope for direct factory delivery to the owner.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .3 Furnish manufacturers' instructions for proper installation of each hardware component.

3.2 Examination

- .1 Before installing any hardware, carefully check all architectural drawings of the work requiring hardware, verify door swings, door and frame materials and operating conditions, and assure that all hardware will fit the work to which it is to be attached.
- .2 Check all shop drawings and frame and door lists affecting hardware type and installation, and certify to the correctness thereof, or advise the hardware supplier and Consultant in writing of required revisions.

3.3 Templates

- .1 Check the hardware schedule, drawings and specifications, and furnish promptly to the applicable trades any patterns, templates, template information and manufacturer's literature required for the proper preparation for and application of hardware, in ample time to facilitate the progress of the work.

3.4 Installation

- .1 Installation of hardware shall be in accordance with ANSI A115.1G, manufacturer's templates and instructions.
- .2 Install each item of mechanical and electromechanical hardware and access control equipment to comply with the manufacturer's written instructions and according to specifications. All items to be installed with fasteners identified by manufacturer's installation instructions unless otherwise noted.
- .3 Mounting Heights: Install door hardware at heights indicated in the following applicable publications unless; specifically indicated or required by local governing regulations, requirements to match for special templates, necessary coordination with door elevations, and or to ensure consistency with pairs of doors.
 - .1 DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames"
 - .2 DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors"
 - .3 ANSI/ICC A117.1 Accessibility Guidelines for Buildings and Facilities
 - .4 NWWDA
 - .5 AODA

- .4 Power door operator products and accessories are required to be installed by an AAADM certified technician as approved by the manufacturer. Adjust for proper opening and closing operation after final balancing of HVAC system.
- .5 Coordinate installation of electric door strikes, keypad locks, card readers, washroom duress systems, and other electronic door control and security devices with Electrical contractor including supply and installation of wiring and all terminations.
- .6 All hardware shall be installed by carpenters, skilled in the application of architectural hardware and satisfactory to the hardware supplier. Refer to Section 06 20 00 - Finish Carpentry. Instruction sheets, details and templates shall be read and understood before installation.
- .7 Install all materials as listed in the Finishing Hardware Schedule on the doors and frames listed. Interchanging of hardware will not be allowed.
- .8 Use only manufacturer's supplied fasteners. Failure to comply may void manufacturer's warranties and applicable licensed labels. Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
- .9 Where door stop contacts door pulls, mount stop to strike bottom of pull.
- .10 Remove construction cores when directed by Owner's Representative.
- .11 After installation, templates, installation instructions and details shall be put in a file and turned over to the Owner, when building is Substantially Performed.

3.5 Field Quality Control

- .1 Conduct periodic inspections to ensure that door frames are installed plumb, level and square with verification by installer prior to installation of doors and door hardware.
- .2 Hardware supplier to attend site meetings as required to ensure proper execution of the guidelines set forth herein.
- .3 Hardware supplier will perform final field inspection of installed door hardware after final adjustment of all products and will document and report any deficiencies or omissions for correction and written acceptance by the Contractor.

3.6 Adjusting

- .1 Adjust door hardware, operators, closers 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 provide tight fit at contact points with frames.

3.7 Demonstration

- .1 Instruct Owner's maintenance personnel in the proper adjustment, operation and maintenance of mechanical and electromechanical door hardware, electronic devices and maintenance of finishes.

3.8 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .3 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
- .4 Remove protective material from hardware items where present.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 04 20 00 Concrete Unit Masonry
- .2 Section 07 92 00 Joint Sealants
- .3 Section 09 21 16 Gypsum Board

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C144-18 Standard Specification for Aggregate for Masonry Mortar
 - .2 ASTM C207-18 Standard Specification for Hydrated Lime for Masonry Purposes
- .2 American National Standards Institute (ANSI)
 - .1 ANSI A108/A118/A136.1:2017 American National Specifications for the Installation of Ceramic Tile.
 - .2 ANSI A137.1: 2017 American National Standard Specifications for Ceramic Tile
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 71-GP 22M 1978 Adhesive, Organic, for Installation of Ceramic Wall Tile
- .4 International Standards Organization (ISO)
 - .1 ISO 10545 Series Ceramic Tiles, Standards for Testing
 - .2 ISO 13006-2012 Ceramic Tiles, Definitions, Classifications, Characteristics and Marking.
 - .3 ISO 13007-2010 Ceramic Tiles, Grouts and Adhesives.
- .5 Terrazzo, Tile and Marble Association of Canada (TTMAC)
 - .1 TTMAC 2019-2021 Specifications Guide 09 30 00, Tile Installation Manual.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Provide product data. Include manufacturer's information on:
 - .1 Ceramic tile, marked to show each type, size, and shape required.
 - .2 Mortar and grout.
 - .3 Divider strip.
 - .4 Levelling compound.
 - .5 Waterproofing isolation membrane.
- .3 Submit duplicate samples of tile. Samples to be submitted on 300 x 600 mm sample board for each colour, texture, size and pattern of tile. Grout sample joints for representative sample of final installation.
- .4 Trim and Accessories: submit duplicate samples of each trim.
- .5 Maintenance Data: Provide maintenance data for tile work, for incorporation into Maintenance Manuals specified under Section 01 78 00.

1.5 Quality Assurance

- .1 Do tile work in accordance with Installation Manual 200, Ceramic Tile, by Terrazzo, Tile and Marble Association of Canada (TTMAC), except where this specification is more stringent.

- .2 For the installation of ceramic tile, use only skilled tradesmen who are familiar with the referenced standards and with the requirements for this Work.
- .3 The setting material manufacturer's representative shall review the details with the Contractor prior to the start of work. Instruct the Contractor on the proper installation procedures to ensure compliance with the guarantee requirements.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver packaged materials in original unopened containers.
- .3 Keep delivered material dry and free from stains. Store cementitious material off damp surfaces.
- .4 Use all means necessary to protect materials, before, during and after installation and to protect the installed work and materials of all other trades.
- .5 In the event of damage, immediately make all repairs and replacements necessary to the approval of the Consultant and at no additional cost to the Owner.
- .6 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Project Conditions

- .1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12 °C for 48 hours before, during and after installation.
- .2 Do not install tiles at temperatures less than 12 °C or above 38 °C.
- .3 Do not apply epoxy mortar and grouts at temperatures below 15 °C or above 25 °C.
- .4 Provide and maintain temporary lighting. Lighting levels shall be sufficient to complete work including inspections. Provide minimum lighting levels of 400 lux at work areas.

1.8 Qualifications

- .1 Installer of ceramic tiles shall have a minimum of 10 years of experience including at least five projects of similar scope and scale. Submit documented proof of experience prior to commencing work of this Section.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.10 Maintenance

- .1 Upon completion of the installation and as a condition of acceptance, deliver to the Owner 2% of tile and accessory tiles in each colour and pattern of ceramic tiles installed under this Section for the Owners maintenance program. Identify each carton for location and installation date. Submission must be made all at one time and prior to Substantial Performance.

1.11 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of five years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Materials

- .1 Materials shall be graded and containers grade sealed, delivered to the job site in their original packages or containers with the manufacturer's labels and seals intact.
- .2 Tile and grout colours shall be selected by the Consultant from the manufacturer's standard range of colours.
- .3 Tile shall conform to ANSI A137.1.
- .4 Provide coves, corners, reveals, surf caps, inners and outers as required to complete the work.

2.2 Ceramic Tile

- .1 CT1: Ceramic Wall Tile: Olympia Colour & Dimension Collection, bright glazed, 102 x 408 mm. Up to four (4) colours will be selected (80% field colour, 20% Accent colours).

2.3 Mortar, Adhesives and Grout Material

- .1 Primer: Low VOC, low viscosity primer as recommended by manufacturer to suit substrate and site conditions; provide proof of bonding ability of setting systems where manufacturer recommends that a primer is not necessary to installation.
- .2 Surface Preparation Materials:
 - .1 Portland Cement Mortar: Scratch and bond coat, levelling bed containing the following:
 - .1 Portland Cement: Meeting or exceeding requirements of CSA A3000, Type GU.
 - .2 Hydrated Lime: Meeting or exceeding requirements of ASTM C207, Type N.
 - .3 Sand: Meeting or exceeding requirements of ASTM C144, passing 16 mesh.
 - .4 Water: Potable.
 - .2 Self Levelling and Smoothing Underlayment: Cementitious and self levelling smoothing underlayment meeting or exceeding requirements of ANSI A108.1, Type 2.
- .3 Wall Tile Systems:
 - .1 Thin Set Interior Installation: Dry set mortar meeting or exceeding requirements of ANSI A118.1 formulated for thin set applications, factory sanded mortar consisting of Portland cement, sand and additives requiring only addition of potable water for installation complete with bond enhancing latex additive.
- .4 Adhesive Systems:
 - .1 Epoxy Adhesive: Thin set adhesive system using 100% solids epoxy resin and epoxy hardener meeting or exceeding requirements of ANSI A108.1; stain proof, chemical resistant and having high temperature resistance and water cleanable.
- .5 Tile Grout Systems:

- .1 Unsanded Portland Cement Grout: factory blended dry-set stain resistant, latex modified Portland cement meeting or exceeding requirements of ANSI A118.6, specifically formulated for joints less than or equal to 3 mm in width.

2.4 Accessories

- .1 CT Edge Protection: Schluter RONDEC, size to suit tile thickness. Satin anodized aluminum. Trim to come with all connectors or end caps required for a complete and finished installation. As a minimum, provide edge protection at the following locations:
 - .1 Top of PC Base;
 - .2 Top of CT wall tile;
 - .3 All outside corners of wall tile or porcelain ceramic tile base.
- .2 Sealant: as specified in Section 07 92 00.

2.5 Mixes

- .1 Mix premanufactured mortars and grouts in accordance with referenced standards, and mortar and grout manufacturer's written instructions; mix site mixed materials as follows:
 - .1 Scratch Coat (by volume): Mix 1 part Portland cement, 4 parts sand, and latex additive where required by TTMAC detail.

PART 3 EXECUTION

3.1 Surface Conditions

- .1 Surfaces on which tile is to be applied, shall be thoroughly cleaned down.
- .2 Verify that concrete substrates have been allowed to cure for a minimum of 28 days in accordance with TTMAC requirements.
- .3 Verify that substrates for bonding tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and are within starting flatness tolerances as specified in Section 03 30 00 and are ready for application of levelling materials specified in this Section.
- .4 Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of Work, and similar items located in or behind tile have been completed before installing tile.
- .5 Drywall surfaces on which wall tile is to be applied, shall be free from dust, excess plaster and shall be plain and true without any irregularities. Prepare existing gypsum board surfaces as recommended by TTMAC and product manufacturer to support tile installation.
- .6 Existing painted masonry or concrete wall surfaces to receive ceramic tile shall be thoroughly cleaned of all paint down to concrete or concrete block surfaces using paint stripper. Prepare painted surfaces in accordance with manufacturer's instructions and TTMAC recommendations.
- .7 In the event of discrepancies, immediately notify the Consultant and do not proceed with installation in such areas until all such discrepancies have been fully resolved.
- .8 Check that conditions of temperature, humidity, traffic and usage are suitable as required by Installation Manual specifications. Minimum temperature to be not less than 10°C.

- .9 Check that surfaces ready to receive tiling are cured, level and/or graded, plumb, smooth, firm, free from loose particles, droppings, projection, grease, solvent, paint and other foreign matter and from other unsuitable conditions.
- .10 Install transition strips and edge trim at exposed edges of all tiled walls in accordance with manufacturer's instructions.

3.2 Installation

- .1 Install tiling in accordance with requirements of TTMAC Tile Installation Manual and parts of ANSI A108 Series of tile installation standards that apply to types of bonding and grouting materials, and to methods required for complete tile installation.
- .2 Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions:
 - .1 Terminate Work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
 - .2 Make cut edges smooth, even and free from chipping.
 - .3 Do not split tile.
- .3 Accurately form intersections and returns; perform cutting and drilling of tile without marring visible surfaces:
 - .1 Cut, drill, and fit tile to accommodate work of other subcontractors penetrating or abutting work of this Section.
 - .2 Carefully grind cut edges of tile abutting trim, finish, or built in items for straight aligned joints.
 - .3 Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile and to provide a uniform joint appearance.
- .4 Lay tile in pattern indicated on Drawings and as follows:
 - .1 Align joints when adjoining tiles on walls and trim are the same size.
 - .2 Centre tile patterns between control and movement joints; notify Consultant for further instructions where tile patterns do not align with control or movement joints.
 - .3 Cut tile accurately and without damage.
 - .4 Smooth exposed cut edges with abrasive stone, where exposed.
 - .5 Chipped or split edges are not acceptable.
- .5 Bonding Bed: Set tile in place while bond coat is wet and tacky and as follows:
 - .1 Adjust amount of bonding materials placed on substrates based on temperature and humidity to prevent skinning over of bonding materials.
 - .2 Use sufficient bond coat to provide a minimum 80% contact for tiles smaller than 300 mm x 300 mm with bonding material evenly dispersed and pressed into back of tile; refer to back buttering requirements for larger materials and installations having Moderate or higher Load Bearing Performance requirements.
 - .3 Notch bond coat in horizontal straight lines and set on freshly placed bonding material while moving (sliding) tile back and forth at 90° to notches.
 - .4 Verify that corner and edges are fully supported by bonding material.
 - .5 Set tiles to prevent lippage greater than 1 mm over a 3 mm grout joint.
 - .6 Keep two-thirds of grout joint depth free of bonding materials.
 - .7 Clean excess bonding materials from tile surface prior to final set.
 - .8 Sound tiles after bonding materials have cured and replace hollow sounding tile before grouting.
- .6 Back Buttering: Obtain 100% mortar coverage in accordance with applicable requirements for back buttering of tile in referenced TTMAC and ANSI A108 series of tile installation standards for

the following applications:

- .1 Glass tile
- .2 Exterior tile
- .3 Tile installed with chemical resistant mortars and grouts
- .4 Tile 300 mm or larger in any direction
- .5 Tile with raised or textured backs
- .6 Tile installation rated for Heavy or Extra Heavy Duty.
- .7 All porcelain tiles with more than 20% of the tile backs covered with firing release dust back buttered so that 100% of the back is covered with adhesive mortar rated for C627, Extra Heavy Duty rating.

- .7 Control and Movement Joints: Install control joints and expansion joints in tile work in accordance with TTMAC Detail 301MJ; keep control and expansion joints free of bonding materials and as follows:

- .1 Cut tiles to establish line of joints; sawn joints after installation of tiles will not be acceptable.
- .2 Locate joints in tile surfaces directly above joints in concrete substrates.
- .3 Install prefabricated joint profiles in accordance with manufacturer's written instructions, set with top surface of joint profile slightly below top surface of tile.
- .4 Prepare joints and apply sealants in accordance with requirements of Section 07 92 00.
- .5 Keep control and movement joints free from setting materials.
- .6 Form an open joint for sealant in tile wherever a change in backing material occurs, at all vertical interior corners, around penetrating pipes and fixtures, and where tile abuts other materials or fixtures.
- .7 Install control joints where indicated or at not less than the following spacings:

Environment	Minimum	Maximum	Joint Width (minimum)
Interior/Shaded	4800 mm	6100 mm	6 mm

3.3 Grouting

- .1 Grouting: Install grout in accordance with manufacturer's written instructions, the requirements of TTMAC, and as follows:
 - .1 Allow proper setting time before application of grout.
 - .2 Pre-seal or wax tiles requiring protection from grout staining.
 - .3 Force grout into joints to a smooth, dense finish.
 - .4 Remove excess grout in accordance with manufacturer's written instructions and polish tile with clean cloths.
- .2 Grout all tile using specified grout in strict accordance with manufacturers written instructions all to give a flush, hard joint.
- .3 Joints in tile shall be filled solid and flush with grout.
- .4 Prepare joints and mix grout in accordance with manufacturer's printed instructions. Force maximum amount of grout into joints, avoiding air traps or voids.
- .5 Remove all excess grout by washing diagonally across the joints. Check for voids, air pockets and gaps and fill same. Remove all discoloured grout and replace with new.
- .6 Cure all joints.

3.4 Cleaning and Protection

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

- .2 Cleaning: Clean tile surfaces so they are free of foreign matter using manufacturer recommended cleaning products and methods after completion of placement and grouting and as follows:
 - .1 Remove grout residue from tile as soon as possible.
 - .2 Flush surface with clean water before and after cleaning.
- .3 Protection: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or other tile deficiencies as follows:
 - .1 Protect finished areas from traffic until setting materials have sufficiently cured in accordance with TTMAC requirements.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 09 21 16 Gypsum Board
- .2 Section 09 53 00 Acoustical Suspension

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C423-23 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - .2 ASTM E84-23d Standard Test Method for Surface Burning Characteristics of Building Materials
 - .3 ASTM E1264-22 Standard Classification for Acoustical Ceiling Products
 - .4 ASTM E1414/E1414M-21a Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
 - .5 ASTM E1477-98a(2022) Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers
- .2 Underwriters Laboratories of Canada (ULC)
 - .1 ULC 102-2018 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
 - .1 Acoustical Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.
- .3 Submit duplicate 300 x 300 mm samples of each type of acoustical units.
- .4 Provide maintenance data for acoustic panel ceilings for incorporation into Operation and Maintenance Manual specified in Section 01 78 00 – Closeout Submittals.

1.5 Quality Assurance

- .1 Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
- .2 Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.
- .3 Mock-up:
 - .1 Construct mock-up 10 m² minimum of acoustical panel tile ceiling including one inside corner

- and one outside corner.
- .2 Construct mock-up where directed.
- .3 Allow 48 hours for inspection of mock-up by Consultant before proceeding with ceiling work.
- .4 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

1.6 Project Conditions

- .1 Permit wet work to dry before beginning to install.
- .2 Maintain uniform minimum temperature of 15° C and humidity of 20-40% before and during installation.
- .3 Store materials in work area 48 hours prior to installation.
- .4 Building areas to receive ceilings shall be free of construction dust and debris.

1.7 Performance Requirements

- .1 Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
 - .1 Surface Burning Characteristics: As follows, tested per ASTM E84 and complying with ASTM E1264 Classification.
 - .2 Fire Resistance: As follows tested per ASTM E119 and listed in the appropriate floor or roof design in the Underwriters Laboratories Fire Resistance Directory
- .2 Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to applicable code.

1.8

Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Protect on site stored or installed absorptive material from moisture damage.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.10 Extra Materials

- .1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide acoustical units amounting to 5% of gross ceiling area for each pattern and type required for project.
- .3 Ensure extra materials are from same production run as installed materials.

PART 2 PRODUCTS

2.1 Materials

- .1 Acoustic units for suspended ceiling system: to ASTM E1264
- .2 Panel Type 1: CGC Fissured.
 - .1 Class A.
 - .2 Composition: Water Felted Mineral Fiber
 - .3 Pattern regular fissured.
 - .4 Texture: medium.
 - .5 Flame spread: ASTM E1264, Class A (U.L.C.), 25 or less.
 - .6 Smoke developed 50 or less in accordance with ULC 102.
 - .7 Noise Reduction Coefficient (NRC): ASTM C423; Classified with UL label, 0.55
 - .8 Ceiling Attenuation Class (CAC): ASTM C1414; Classified with UL label, 35
 - .9 Light Reflectance (LR) range of 0.81 to ASTM E1477.
 - .10 Dimensional Stability: Standard
 - .11 Edge Profile: Square Lay-In
 - .12 Colour: White.
 - .13 Size 610 x 1219 x 16 mm thick.
 - .14 Shape flat.
 - .15 Surface coverings: Ecolabel certified paint.
- .3 Alternate manufacturer: Products as manufactured by the following are acceptable, subject to Consultants approval of style, finish, performance characteristics and texture:
 - .1 Armstrong Industries
 - .2 Certainteed
- .4 Ceiling Suspension System: as specified in Section 09 53 00.

PART 3 EXECUTION

3.1 Examination

- .1 Do not install acoustical panels until work above ceiling has been inspected by Consultant.

3.2 Installation

- .1 Co-ordinate with Section 09 53 00 - Acoustical Suspension.
- .2 Coordinate layout and installation of ceilings with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, and fire-suppression system.
- .3 Install acoustical panels and tiles in ceiling suspension system.
- .4 Install acoustical units parallel to building lines with edge unit not less than 50% of unit width, with directional pattern running in same direction. Refer to reflected ceiling plan.
- .5 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.

3.3 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 05 12 23 Structural Steel
- .2 Section 09 21 16 Gypsum Board
- .3 Section 09 51 13 Acoustic Panel Ceilings
- .4 Division 23 Mechanical
- .5 Division 26 Electrical

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A307-21 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
 - .2 ASTM A641/A641M-19 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - .3 ASTM A653 / A653M – 23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .4 ASTM A1011/A1011M-23 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
 - .5 ASTM C635/C635M-22 Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay in Panel Ceilings.
 - .6 ASTM C636/C636M-19 Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - .7 ASTM E84-23d Standard Test Method for Surface Burning Characteristics of Building Materials
 - .8 ASTM E119-22 Standard Test Methods for Fire Tests of Building Construction and Materials
 - .9 ASTM E1264-22 Standard Classification for Acoustical Ceiling Products

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
- .3 Acoustical Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.
- .4 Submit one representative model of each type of ceiling suspension system.
 - .1 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

1.5 Design Requirements

- .1 Determine the superimposed loads that will be applied to suspension systems by components of the building other than the ceiling and ensure that adequate hangers are installed to support the

additional loads in conjunction with the normal loads of the system.

- .2 Design supplemental suspension members and hangers where width of ducts and other construction within ceiling plenum produces hanger spacing that interferes with location of hangers at required spacing to support standard suspension system members:
 - .1 Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- .3 Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of L/360 to ASTM C635 deflection test.

1.6 Performance Requirements

- .1 Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
 - .1 Surface Burning Characteristics: Tested per ASTM E84 and complying with ASTM E1264 Classification.
- .2 Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to applicable code.

1.7 Quality Assurance

- .1 Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
- .2 Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.
- .3 Where required, provide fire-resistance rated suspension system: certified by a Canadian Certification Organization accredited by Standards Council of Canada.
- .4 Construct mock-ups as described in Section 09 51 13.

1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Components: All main beams and cross tees, base metal and end detail shall be commercial quality hot-dipped galvanized steel as per ASTM C635. Main beams and cross tees shall be double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.

- .2 Face width: 22 mm
- .3 Edge Moldings and Trim: Hemmed angle moulding to match main beams and cross tees.
- .4 Structural Classification: Intermediate Duty System, ASTM C635.
- .5 Colour: White and match the actual colour of the specified ceiling tile.
- .6 Standard of Acceptance:
 - .1 Armstrong Prelude XL
 - .2 Donn DXT
 - .3 Certaineed Classic Environmental Stab.
- .7 Attachment Devices: Size for five times design load indicated in ASTM C635, Table 1, Direct Hung unless otherwise indicated or required.
- .8 Threaded Rod: to ASTM A397. Galvanized or zinc plated.
- .9 Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft annealed, with a yield stress load of at least three times design load, but not less than 2.06 mm thick.
- .10 Channel Framing and Fittings: Strut type metal framing and components to ASTM A1011 or ASTM A653. Unistrut P1000SL or equivalent. Galvanized.

PART 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 Examination

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

3.3 Preparation

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

3.4 Installation

- .1 Install suspension system and panels in compliance with ASTM C636; CISCA Seismic Guidelines and in accordance with the manufacturer's installation instructions.
- .2 Install wall moldings at intersection of suspended ceiling and vertical surfaces.

- .3 Do not erect ceiling suspension system until work above ceiling has been inspected by Consultant.
- .4 Secure hangers to overhead structure using attachment methods as indicated by manufacturer. Do not suspend ceiling systems from building services including plumbing lines, conduit, cable trays or duct work.
- .5 Hanger and bracing wires shall not attach to or bend around obstructions including but not limited to: piping, ductwork, conduit and equipment. Provide trapeze or other supplementary support members at obstructions to allow typical hanger spacing. Brace assemblies must be configured and/or located in order to avoid obstructions in addition to maintaining the required brace assembly spacing.
- .6 Install hangers spaced at maximum 1219 mm centres and within 152 mm from ends of main tees. Install hanger wires plumb and straight.
- .7 Lay out centre line of ceiling both ways, to provide balanced borders at room perimeter with border units not less than 50% of standard unit width.
- .8 Ensure suspension system is coordinated with location of related components.
- .9 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles, and speakers.
- .10 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 610 mm around perimeter of fixture.
- .11 Interlock cross member to main runner to provide rigid assembly.
- .12 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.
- .13 Install access splines to provide ceiling access.
- .14 Finished ceiling system to be square with adjoining walls and level within 1:1000

3.5 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Touch up scratches, abrasions, voids and other defects in painted surfaces.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM F1667/F1667M-21a Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
- .2 CSA Group (CSA)
 - .1 CSA A123.3-05 Asphalt Saturated Organic Roofing Felt
 - .2 CSA O151-09 Canadian Softwood Plywood
 - .3 CAN/CSA-Z809-16 Sustainable Forest Management
- .3 Maple Flooring Manufacturers Association (MFMA)
 - .1 MFMA PUR Standards
 - .2 MFMA Specifications for Gymnasium Finishes and Sealers for Maple, Beech, and Birch Floors, 2020
- .4 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards:
 - .1 SCAQMD Rule 1113-2016 Architectural Coatings
 - .2 SCAQMD Rule 1168-2017 Adhesives and Sealants Applications
- .6 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2015-2019 Standard

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's product literature and data sheets for wood flooring, including wood species, product characteristics, performance criteria, dimensions, and limitations.
- .3 Shop Drawings: Indicate construction details at transitions to other floor finishes, locations and details of movement joints.
- .4 Samples for Initial Selection: Submit samples of wood flooring illustrating the complete range of clear finishes.
- .5 Samples for Verification:
 - .1 Submit three samples, approximately 300 mm long x specified profile for each type of wood unit to illustrate the normal range of wood colour and texture variations expected.
 - .2 Samples will not be returned for inclusion into work.
- .6 Certifications: Submit product manufacturer's certificates certifying materials comply with specified performance characteristics and criteria, and physical requirements.

- .7 Test and Evaluation Reports: Submit results of concrete substrate moisture tests and temperature measurements.
- .8 Manufacturer's Instructions: Submit manufacturer's installation instructions.
- .9 Submit leaning, refinishing, and maintenance information for wood flooring for inclusion in the Operation and Maintenance Manuals specified in Section 01 78 00-Closeout Submittals.

1.5 Administrative Requirements

- .1 Sequencing: Allow concrete, masonry, gypsum board, plaster, and paint to thoroughly dry before delivering wood flooring.

1.6 Maintenance Materials

- .1 Extra Stock Materials: Submit one liter of clear wood floor finish.

1.7 Quality Assurance

- .1 Qualifications:
 - .1 Installer: Five years of experience completing installations similar in scope to this Project, and whose previous work has had successful in-service performance.

1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Delivery and Acceptance Requirements: Deliver materials to site in original factory packaging with manufacturer's labels.
 - .1 Do not deliver or unload flooring in rain, snow, or high relative humidity.
 - .2 Cover flooring with tarpaulin or vinyl if atmosphere is foggy or damp.
 - .3 Control the wood moisture content to within the manufacturer's recommended percentage range.
- .3 Storage and Handling Requirements:
 - .1 Store hardwood flooring, adhesive and related materials in fully enclosed, humidity-controlled, well-ventilated, clean, and dry storage space.
 - .2 Remove packaging and divide hardwood flooring into small groups. Store in spaces where it will be installed.
 - .3 Allow adequate room around horizontal stacks of flooring for good air circulation.
 - .4 Allow a minimum four days for wood to acclimatize, and in accordance with manufacturer's recommendations.
 - .5 Protect wood flooring from nicks, scratches, and distortion.
 - .6 Replace defective or damaged materials with new.

1.9 Project Conditions

- .1 Ambient Conditions:
 - .1 Ventilation: Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
 - .1 Continuously ventilate during and after installation. Run system 24 hours per day during installation. Continuously ventilate for seven days after completion of installation.
 - .2 Temperature and Relative Humidity:

- .1 Maintain ambient temperature between 16 - 27 degrees C from seven days before installation until Substantial Performance of the Work. If possible, maintain temperature near occupancy levels.
- .2 Maintain ambient relative humidity levels between 30 - 50%, for five days before delivery and until Substantial Performance of the Work. If possible maintain relative humidity near occupancy levels.

1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.11 Warranty

- .1 Manufacturer's Warranty: warrant flooring installation from the flooring manufacturer for one year.

PART 2 PRODUCTS

2.1 Material

- .1 Yellow Birch Strip Flooring: Unfinished, kiln dried, matched ends, and as follows:
 - .1 Grade: First grade to MFMA Random Length. Include grade stamp on each bundle of flooring.
 - .2 Thickness: to match existing.
 - .3 Face Width: 88.9 mm
 - .4 Edges: Tongue and Groove.
 - .5 Lengths: MFMA-RL random length
- .2 Nails: To ASTM F1667, purpose designed barbed nails for power nailing, length to suit application.
- .3 Subfloor:
 - .1 Sheathing:
 - .1 Plywood to CSA O151.
 - .2 No. 2 group 1 softwood suitable for subfloors over wood joists
 - .3 16 mm performance rated plywood.
- .4 Levelling and Patching Compound: Latex-modified, hydraulic cement-based, and as recommended by wood flooring manufacturer.
- .5 Mastic: Type recommended by wood flooring manufacturer.

2.2 Finishes

- .1 Birch finishes to MFMA Specifications for Gymnasium Finishes and Sealers for Maple, Beech, and Birch Floors:
 - .1 Flooring Sealer: Group 1, Water-based sealer.
 - .2 Flooring Finish: Group 4, NFT Low Gloss Water Based Finish

2.3 Accessories

- .1 Thresholds: Refer to Section 08 71 10 - Door Hardware.
- .2 Adhesives: As recommended by wood flooring manufacturer.

PART 3 EXECUTION

3.1 Examination

- .1 Verification of Conditions: Verify conditions of substrates previously installed are acceptable for wood strip and plank flooring installation in accordance with manufacturer's instructions and NFCA's recommendations.
 - .1 Visually inspect substrates.
 - .2 Verify concrete slab has cured a minimum of 30 days.
 - .3 Test and record measurements of substrate temperature and moisture content for each applicable room.
 - .4 Test and record measurements of ambient room temperature and relative humidity for each applicable room.
 - .5 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .6 Proceed with installation only after unacceptable conditions have been remedied.

3.2 Preparation

- .1 Test and record moisture content and temperature of wood flooring materials and subflooring in accordance with ASTM F 710, and as follows:
 - .1 Verify moisture content and temperature are within acceptable limits in accordance with manufacturer's and NFCA's recommendations.
- .2 Preparation - Wood Subfloor:
 - .1 Installation - Sheet Underlayment:
 - .1 Install with wood grain of panel facing 90 degrees to joists.
 - .2 Nail every 150 mm along each joist.
 - .3 Subfloor: Flat, clean, dry, structurally sound and free of squeaks and protruding nails and staples.
 - .4 Nailing Schedule: Adequate to secure subfloor, typically 150 mm on centre along panel ends, and 300 mm on centre along intermediate supports.
 - .5 Do not blind nail on panel edges.
 - .6 Flatten panel edge swelling where occurring.
 - .7 Sweep subfloor clean.

3.3 Installation

- .1 Install No.15 felt directly below finish flooring.
- .2 Install finish flooring parallel to long dimension of room and at right angle to floor joists.
- .3 Machine nail fastening. Maintain tight joints and board ends. Install to manufacturer's instructions.
- .4 Maintain 50-mm expansion space at perimeter of flooring surface
- .5 Machine sand floor surface with coarse, medium, then fine sandpaper until smooth, even, and uniform. Vacuum clean to remove all dust.
- .6 Apply sealer and two coats of floor finish. Allow to dry thoroughly before allowing foot traffic.
- .7 Install thresholds or transition strips at door openings. Attach threshold or transition strip to adjacent finished floor surface to cover expansion space.

3.4 Protection

- .1 Protect wood flooring from after applying initial wood flooring finish until final site review by Consultant.
- .2 Prohibit traffic on floor for a minimum of 48 hours after applying wood flooring finish.
- .3 Protect wood flooring finish from potential damage from heavy rolling loads of plywood or hardboard sheets.

3.5 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 14 42 16 Vertical Wheelchair Lift

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM E648-19ae1 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
 - .2 ASTM E662-21ae1 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
 - .3 ASTM F970-22 Standard Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading
 - .4 ASTM F1303-04(2021) Standard Specification for Sheet Vinyl Floor Covering with Backing
- .2 Underwriters Laboratories of Canada (ULC)
 - .1 ULC 102.2-2018 Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.
- .3 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1113 Architectural Coatings.
 - .2 SCAQMD Rule 1168 Adhesives and Sealants Applications.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit manufacturer's current printed product literature, specifications, installation instructions, and field reports.
- .3 Samples: Submit duplicate 300 mm x 300 mm sample pieces of sheet material.
- .4 Provide maintenance data for resilient sheet flooring for incorporation into Operation and Maintenance Manual specified in Section 01 78 00 – Closeout Submittals.

1.5 Quality Assurance

- .1 Single-Source Responsibility: provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.
- .2 Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
 - .1 Training: Installer who has attended a manufacturer's flooring installation training clinic.
- .3 Regulatory Requirements: Provide slip resistant sheet vinyl safety flooring in compliance with the following:
 - .1 Accessibility for Ontarians with Disabilities Act (AODA).

.4 Fire Performance:

- .1 Fire Performance Characteristics: Provide resilient vinyl sheet flooring with the following fire performance characteristics as determined by testing material in accordance with ASTM test methods indicated below by a certified testing laboratory or other testing agency acceptable to authorities having jurisdiction:
 - .1 ASTM E648 Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I
 - .2 ASTM E662 (Smoke Generation) Maximum Specific Optical Density of 450 or less

1.6 Extra Materials

- .1 Provide extra stock materials of resilient flooring, base and adhesives in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Provide 2m² of each colour, pattern and type flooring material required for this project for maintenance use.
- .3 Extra materials to be from same production run as installed materials.
- .4 Clearly identify each roll of sheet flooring and each container of adhesive

1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.9 Project Conditions

- .1 Temperature Requirements: If storage temperature is below 18° C or the floor temperature is below 18° C, the sheet flooring product must be moved to a warmer place and allowed to reach this temperature before unrolling or installation.
- .2 Maintain air temperature and structural base temperature at flooring installation area between 20° C and 26° C for 48 hours before, during and 48 hours after installation.

1.10 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of five years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Materials

- .1 Homogeneous sheet vinyl with backing: to ASTM F1303.
 - .1 Type: I - PVC binder content 90%
 - .2 Grade: 1
 - .3 Backing: B-non-foam plastic.
 - .4 Thickness: 2.0 mm.

- .5 Product: Forbo Contrast Eternal Vinyl Sheet Flooring.
- .6 Colour: selected by Consultant.

.2 Vinyl Weld Rod

- .1 Provide solid colour vinyl weld rod as produced by flooring manufacturer, and intended for heat welding of seams. Colour shall be compatible with field colour of flooring or as selected by Consultant to contrast with field colour of flooring.

.3 Sheet vinyl flooring by the following alternate acceptable manufacturers will be accepted subject to approval by the Consultant of material specifications and colour availability:

- .1 Armstrong World Industries
- .2 Johnsonite
- .3 Tarkett

.4 Base Accessories:

- .1 Fillet Strip: 19 mm radius fillet strip compatible with resilient sheet material.
- .2 Cap Strip: Extruded flanged zero edge vinyl reducer strip approximately 25 mm exposed height with 13 mm flange.

2.1 Adhesives

- .1 Primers and adhesives: type recommended by resilient flooring manufacturer for specific material on applicable substrate.
- .2 Provide seam adhesive at seams as recommended by the resilient flooring manufacturer.

2.2 Accessories

- .1 Subfloor Filler and Leveler: Use only gray Portland cement-based "moisture tolerant" underlayments, and patching compounds as recommended by manufacturer. Use for filling cracks, holes or leveling. Gypsum based materials are not acceptable.
- .2 Sealing
 - .1 For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.
- .3 Transition: Provide transition/reducing strips tapered to meet abutting materials.
- .4 Threshold: Provide threshold of thickness and width to suit application.
- .5 Resilient Edge Strips: Provide resilient edge strips of width shown on the drawings, of equal gauge to the flooring, homogeneous vinyl or rubber composition, tapered or bullnose edge, with colour to match or contrast with the flooring, or as selected by the Consultant from manufacturer's standard colours.
- .6 Metal edge strips: Aluminum extruded, smooth, mill finish with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.
- .7 Sealer and wax: type recommended by resilient flooring material manufacturer for material type and location. Maximum VOC limit 100 g/L to SCAQMD Rule 1113

PART 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 Examination

- .1 Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog, installation instructions.
- .2 Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
- .3 Ensure concrete floors are clean and dry by using test methods recommended by flooring manufacturer.

3.3 Preparation

- .1 Flooring shall be installed over subfloors conforming to ASTM F1482 for wood subfloors.
- .2 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.
- .3 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

3.4 Application: Flooring

- .1 Provide high ventilation rate, with maximum outside air, during installation, and for 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through building air distribution system. Maintain extra ventilation for at least one month following building occupation.
- .2 Apply adhesive uniformly using recommended trowel. Do not spread more adhesive than can be covered by flooring before initial set takes place.
- .3 Lay flooring with seams parallel to building lines to produce a minimum number of seams. Border widths minimum 1/3 width of full material.
- .4 Run sheets in direction of traffic. Double cut sheet joints heat weld according to manufacturer's printed instructions.
- .5 As installation progresses, and after installation roll flooring with 45 kg minimum roller to ensure full adhesion.
- .6 Cut flooring around fixed objects.
- .7 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.
- .8 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.5 Application: Integral Cove Base

- .1 Set preformed fillet strip to receive base.
- .2 Install the base with adhesive, terminate expose edge with the cap strip.
- .3 Form internal and external corners to the geometric shape generated by the cove at either straight or radius corners.
- .4 Weld joints as specified for the flooring. Seal cap strip to wall with an adhesive type sealant.
- .5 Unless otherwise specified or shown where sheet flooring is scheduled, provide integral base at intersection of floor and vertical surfaces.

3.6 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Remove temporary coverings and protection of adjacent work areas.
- .3 Remove excess adhesive from floor, base and wall surfaces without damage.
 - .1 Repair or replace damaged installed products.
- .4 Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance.
- .5 Sweep or vacuum all construction debris and dust, then clean the flooring with manufacturer's recommended products using an auto scrubber.

3.7 Protection

- .1 Protect new floors from time of final set of adhesive until date of Substantial Performance inspection.
- .2 Protect finished installation from damage from other trades using a non-staining, temporary floor protection system, such as a reusable textured plastic sheeting without taping to the surface of the flooring.
- .3 Prohibit traffic on floor for 48 hours after installation.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 07 92 00 Joint Sealants

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C307-23 Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing
 - .2 ASTM C579-23 Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
 - .3 ASTM C580-18(2023) Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
 - .4 ASTM D4541-22 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
 - .5 ASTM F1869-22 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
- .2 International Concrete Repair Institute (ICRI)
 - .1 ICRI Technical Guidelines 310 - Surface Preparation

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.
- .3 Samples for Verification: For each resinous flooring system required, 150 mm square, applied to a rigid backing. Colour, texture, and thickness shall be representative of appearance of finished system.
- .4 Manufacturer's Safety Data Sheet (SDS) for each product being used.
- .5 Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- .6 Provide maintenance data for resinous flooring for incorporation into Operating and Maintenance Manuals specified in Section 01 78 00- Closeout Submittals.

1.5 System Description

- .1 The work shall consist of preparation of the substrate, the furnishing and application of an epoxy based multi roller applies flooring system with macro coloured decorative chips broadcast and a crystal clear urethane topcoat.

- .2 The system shall have the color and texture as specified by the Owner with a nominal thickness of 60 mils. It shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.
- .3 Cove base to be applied where noted on plans and per manufacturers standard details unless otherwise noted

1.6 Quality Assurance

- .1 Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, through one source from a single manufacturer, with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.
- .2 The Manufacturer shall have a minimum of 7 years experience in the production, sales, and technical support of epoxy and urethane industrial flooring and related materials.
- .3 Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.
 - .1 Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
 - .2 Installer shall have completed at least 10 projects of similar size and complexity.
- .4 Manufacturer Field Technical Service Representatives: Resinous flooring manufacture shall retain the services of Field Technical Service Representatives who are trained specifically on installing the system to be used on the project.
 - .1 Field Technical Services Representatives shall be employed by the system manufacture to assist in the quality assurance and quality control process of the installation and shall be available to perform field problem solving issues with the installer.
- .5 No requests for substitutions shall be considered that would change the generic type of the specified system.
- .6 A pre-installation conference shall be held between Applicator, General Contractor and the Consultant to review this specification, application procedure, quality control, inspection and acceptance criteria and application schedule.
- .7 Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - .1 Apply full-thickness mockups on 1200 mm square floor area selected by Consultant.
 - .1 Include 1200 mm length of integral cove base.
 - .2 Approved mockups may become part of the completed Work if undisturbed at time of Substantial Performance.

1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.

- .2 Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
- .3 Store materials to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects. Store material in accordance with the Manufacturer's recommendations and relevant health and safety regulations.
- .4 Copies of Safety Data Sheets (SDS) for all components shall be kept on site for review by the consultant or other personnel.

1.8 Project Conditions

- .1 Site Requirements:
 - .1 Application may proceed while air, material and substrate temperatures are between 10 ° C and 32 ° C providing the substrate temperature is above the dew point. Outside of this range, the Manufacturer shall be consulted.
 - .2 The relative humidity in the specific location of the application shall be less than 90 % and the surface temperature shall be at least 32 ° C above the dew point.
 - .3 The Applicator shall ensure that adequate ventilation is available for the work area.
 - .4 The Applicator shall be supplied with adequate lighting equal to the final lighting level during the preparation and installation of the system.
- .2 Conditions of new concrete to be coated with cementitious urethane material:
 - .1 Concrete shall be cured for a minimum of 7 days and have fully cured a minimum of twenty-eight days in accordance with ACI-308 prior to the application of the coating system pending moisture tests.
 - .2 Concrete shall have a flat rubbed finish, float or light steel trowel finish (a hard steel trowel finish is neither necessary nor desirable).
 - .3 Sealers, release agents and curing membranes should not be used.
 - .4 Concrete surfaces on grade shall have been constructed with a vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.
- .3 Safety Requirements:
 - .1 All open flames and spark-producing equipment shall be removed from the work area prior to commencement of application.
 - .2 "No Smoking" signs shall be posted at the entrances to the work area.
 - .3 Non-related personnel in the work area shall be kept to a minimum.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.10 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of two years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Manufacturer

Dur-a-Flex Inc., 95 Goodwin St., East Hartford, CT, 06108. Phone (860) 528-9838, Fax: (860) 528-2802.

2.2 Resinous Flooring

- .1 Dur-A-Chip, Epoxy based seamless flooring system or approved equivalent system.
 - .1 System Materials:
 - .1 Primer: Dur-A-Flex Inc., Dur-A-Glaze #4 WB resin and hardener.
 - .2 First Broadcast Coat: Dur-A Flex Inc., Dur-A-Gard OPF resin and hardener.
 - .1 Chips: Dur-A-Flex Inc., Macro Decorative Coloured Chips.
 - .3 Second Broadcast and Grout Coat: Dur-A-Flex Inc., Dur-A-Glaze #4 resin and water clear hardener.
 - .1 Chips: Dur-A-Flex Inc., Macro Decorative Coloured Chips.
 - .4 Grout Coat: Dur-A-Flex Inc., Dur-A-Glaze #4 resin and water clear hardener.
 - .5 Top Coat: Dur-A-Flex Inc., Armor Top resin, hardener & grit.
 - .2 Patch Materials
 - .1 Shallow Fill and Patching: Dur-A-Flex Inc., Dur-A-Glaze # 4 Cove Rez.
 - .2 Deep Fill and Sloping Material (over 6 mm): Dur-A-Flex Inc., Dur-A Crete.

2.3 Product Requirements

- .1 Primer: Dur-A-Glaze #4 WB
 - .1 Percent Solids: 56%
 - .2 VOC: 2 g/L
 - .3 Bond Strength to Concrete ASTM D4541: 3790 kpa (550 psi) failure in substrate
 - .4 Hardness, ASTM D3363: 3H
 - .5 Elongation, ASTM D2370: 9%
 - .6 Flexibility (1/4: Cyl. Mandrel), ASTM D1737: Pass
 - .7 Impact Resistance, MIL D-2794: >160
 - .8 Abrasion Resistance, ASTM D4060: 30 mg loss
CS 17 wheel, 1000 g Load
- .2 Broadcast Coat#1: Dur-A-Gard OPF
 - .1 Percent Solids: 100%
 - .2 VOC: 59 g/L
 - .3 Compressive Strength, ASTM D695: 110,316 kpa (16,000 psi)
 - .4 Tensile Strength, ASTM D638: 26,200 kpa (3,800 psi)
 - .5 Flexural Strength, ASTM D790: 27,579 kpa (4,000 psi)
 - .6 Flame Spread/NFPA-101, ASTM E84: Class A
 - .7 Impact Resistance, MIL D-3134: 0.635mm(0.025 inch) Max.
 - .8 Water Absorption, MIL D3134 : Pass
 - .9 Potlife at 70 degrees F: 20-25 minutes
 - .10 Abrasion Resistance, ASTM D4060: 35 mg loss
CS 10 wheel, 1000 g Load, 1000 cycles
- .3 Broadcast and Grout Coat: Dur-A-Glaze #4 Water Clear
 - .1 Percent Solids: 100%
 - .2 VOC: 3.8 g/L
 - .3 Compressive Strength, ASTM D695: 77,220 kpa (11,200 psi)
 - .4 Tensile Strength, ASTM D638: 14,478 kpa (2,100 psi)
 - .5 Flexural Strength, ASTM D790: 35,163 kpa (5,100 psi)
 - .6 Flame Spread/NFPA-101, ASTM E84: Class A
 - .7 Impact Resistance, MIL D-24613: 0.01778mm(0.0007 inch), no cracking
 - .8 Water Absorption, MIL D-24613: Nil

- .9 Potlife at 70 degrees F: 20 minutes
- .10 Abrasion Resistance, ASTM D4060: 29 mg loss
CS 10 wheel, 1000 g Load, 1000 cycles
- .4 Top Coat: Armor Top
 - .1 Percent Solids: 95%
 - .2 VOC: 0 g/L
 - .3 Tensile Strength, ASTM D2370 48,263 kpa (7,000 psi)
 - .4 Adhesion, ASTM 4541: Substrate Failure
 - .5 Hardness, ASTM D3363: 3H
 - .6 60° Gloss, ASTM D523: 70
 - .7 Potlife at 70 degrees F, 50% RH: 2 hours
 - .8 Full Chemical resistance: 7 days
 - .9 Abrasion Resistance, ASTM D4060: Gloss, 4 mg loss with grit
CS 17 wheel, 1000 g Load, 1000 cycles Gloss, 10 mg loss without grit

2.4 Accessories

- .1 Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.

PART 3 EXECUTION

3.1 Examination

- .1 Examine substrates, areas and conditions, with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.
 - .1 Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

3.2 Preparation

- .1 Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean and dry substrate for resinous flooring application.
- .2 General
 - .1 All concrete surfaces shall be free of laitance, oil, grease, curing compounds, loose particles, friable matter, dirt, bituminous products and all other contaminants.
 - .2 Moisture Testing: Perform tests as recommended by manufacturer and as follows:
 - .1 Perform relative humidity test using in situ probes, ASTM 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level.
 - .2 If the relative humidity exceeds 75% then Dur-A-Flex, Dur-A-Glaze MVP Primer moisture mitigation system must be installed prior to resinous flooring installation. Slab on grade substrates without a vapour barrier may also require the moisture mitigation system.
 - .3 There shall be no visible moisture present on the surface at the time of application of the system. Compressed oil-free air and/or a light passing of a propane torch may be used to dry the substrate.
 - .4 Mechanical surface preparation
 - .1 Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface

characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 3-4 as described by the International Concrete Repair Institute.

- .2 Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
- .3 Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum 6.4 mm key cut shall be made to properly seat the system, providing a smooth transition between areas. The detail cut shall also apply to drain perimeters and expansion joint edges.
- .4 Cracks and joints (non-moving) greater than 3.0 mm wide are to be chiseled or chipped-out and repaired per manufacturer's recommendations.
- .5 At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufactures recommendations.

3.3 Application

.1 General:

- .1 The system shall be applied in six distinct steps as listed below:
 - .1 Substrate preparation
 - .2 Priming
 - .3 First broadcast coat
 - .4 Second broadcast coat
 - .5 Grout coat
 - .6 Topcoat application
- .2 Immediately prior to the application of any component of the system, the surface shall be dry and any remaining dust or loose particles shall be removed using a vacuum or clean, dry, oil-free compressed air.
- .3 The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the Manufacturer's recommendations.
- .4 The system shall follow the contour of the substrate unless pitching or other leveling work has been specified by the Consultant.
- .5 A neat finish with well-defined boundaries and straight edges shall be provided by the applicator.

.2 Primer:

- .1 The primer shall be Dur-A-Glaze #4 WB Primer that is mixed at the ratio of 1 part resin to 4 parts hardener per the manufacturer's instructions.
- .2 The primer shall be applied by 3mm(1/8") notched squeegee and back rolled at the rate of 200 sf/gal to yield a dry film thickness of 4 mils.

.3 Broadcast Coats:

- .1 The broadcast coat shall be applied as a double broadcast system as specified by the consultant.
- .2 The broadcast coat shall be comprised of 2 components, a resin and hardener as supplied by the manufacturer and mixed in the ratio of 2 parts resin to 1 part hardener.
- .3 The resin shall be added to the hardener and thoroughly mixed by suitably approved mechanical means.
- .4 The first broadcast coat shall be applied over horizontal surfaces using the dip and roll and back roll method at the rate of 300 sf/gal using the Dur-A-Gard OPF material.
- .5 Chips shall be broadcast to excess into the wet material, Macro chips at the rate of 0.1 lbs/sf.
- .6 Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.
- .7 Scape the floor with a trowel or floor scraper. Sweep and vacuum the floor again.
- .8 Apply material to fully cure. Vacuum, sweep and/or blow to remove all loose chips.

.9 Scrape the floor with a trowel or floor scraper. Sweep and vacuum the floor again.

.4 Grout Coats:

.1 The grout shall be comprised of a Dur-A-Glaze #4 water clear epoxy that is mixed in the ratio of 1 part hardener to 2 parts resin and installed per the manufacturer's recommendations.

.5 Topcoat

.1 The topcoat shall be roller applied at the rate of 500 sf/gal to yield a dry film thickness of 3 mills.

.2 The topcoat shall be comprised of 2 components, Base A and Hardener B as supplied by the manufacturer.

.3 The finished floor will have a nominal thickness of 60 mils.

3.4 Terminations

.1 Chase edges to "lock" the flooring system into the concrete substrate along lines of termination.

.2 Penetration Treatment: Lap and seal resinous system onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.

.3 Treat floor drains by chasing the flooring system to lock in place at point of termination.

3.5 Field Quality Control

.1 The following tests shall be conducted by the Applicator:

.1 Temperature: Air, substrate temperatures and, if applicable, dew point.

.2 Coverage Rates: Rates for all layers shall be monitored by checking quantity of material used against the area covered.

3.6 Cleaning and Protection

.1 Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.

.2 Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 05 12 23 Structural Steel
- .2 Section 05 31 00 Steel Deck
- .3 Section 05 50 00 Metal Fabrications
- .4 Section 06 20 00 Finish Carpentry
- .5 Section 08 11 00 Metal Doors and Frames
- .6 Section 09 21 16 Gypsum Board
- .1 Section 09 64 29 Wood Strip and Plank Flooring

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A780/A780M-20 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- .2 Environmental Protection Agency (EPA)
 - .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
- .3 Master Painters Institute (MPI)
 - .1 MPI Architectural Painting Specifications Manual, 2018
 - .2 MPI Standard GPS-1-12 and GPS-2-12 MPI Green Performance Standard for Painting and Coatings.
- .4 Society for Protective Coatings (SSPC)
 - .1 Systems and Specifications, SSPC Painting Manual 2009
- .5 Underwriters Laboratories of Canada (ULC)
 - .1 ULC 102-18 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
- .6 South Coast Air Quality Management District, California State (SCAQMD)
 - .1 SCAQMD Rule 1113-96, Architectural Coatings.
- .7 Green Seal GS-11 Green Seal Environmental Standard for Paints and Coatings, January 1997.
- .8 National Fire Code of Canada

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit full range colour sample chips.
 - .2 Submit duplicate 200 x 300 mm sample panels of each paint, stain, clear coating and special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards.
 - .3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with

specified performance characteristics and physical properties and SCAQMD Rule 1113-96.

- .5 Provide maintenance data for paint products for incorporation into Operating and Maintenance Manuals specified in Section 01 78 00- Closeout Submittals. Include following:
 - .1 Product name, number, type and use.
 - .2 Colour numbers.
 - .3 MPI Environmentally Friendly classification system rating.

1.5 Quality Assurance

- .1 Qualifications:
 - .1 Contractor: to have a minimum of five years proven satisfactory experience.
 - .2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work.
 - .3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.
- .2 Conform to latest MPI requirements for 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 Paint materials to be highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and to be compatible with other coating materials as required.
- .5 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Consultant.
- .6 Provide mock-up:
 - .1 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 and textures. Locate where directed.
 - .2 Mock-up will be used to judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Architectural Painting Specification Manual standards.
 - .3 Allow 24 hours for inspection of mock-up before proceeding with work.
 - .4 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver and store materials in original containers, sealed, with labels intact. Labels to indicate:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
- .3 Provide and maintain dry, temperature controlled, secure storage. Store materials and equipment in well-ventilated area with temperature range 7 ° C to 30 ° C. Store materials and supplies away from heat generating devices.
- .4 Observe manufacturer's recommendations for storage and handling.

- .5 Keep areas used for storage, cleaning and preparation, clean and orderly. After completion of operations, return areas to clean condition.
- .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 Remove damaged, opened and rejected materials from site.

1.7 Fire Safety Requirements

- .1 Provide one 9 kg Type ABC dry chemical 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 National Fire Code of Canada requirements.

1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic in designated containers. Handle and dispose of hazardous materials in accordance with Municipal regulations.
- .3 Unused materials must be disposed of at official hazardous material collections site.
- .4 Paint and related materials are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from the Ministry of the Environment.
- .5 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
- .6 Place materials defined as hazardous or toxic waste in containers or areas designated for hazardous waste.

1.9 Maintenance

- .1 Extra Materials:
 - .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Quantity: provide one four litre can of each type and colour of finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
 - .3 Deliver to Owner and store where directed.

1.10 Ambient Conditions

- .1 Heating, Ventilation and Lighting:
 - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 – Temporary Utilities.
 - .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 ° C for 24 hours before, during and after paint application until paint has cured sufficiently.
 - .3 Provide continuous ventilation for seven days after completion of application of paint.
 - .4 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.
- .5 Provide minimum lighting level of 323 Lux on surfaces to be painted.
 - .2 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Unless pre-approved in writing by Consultant and product manufacturer, perform no painting when:
 - .1 Ambient air and substrate temperatures are below 10 ° C.
 - .2 Substrate temperature is above 32 ° 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 ° C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 ° C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
 - .2 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.
 - .3 Perform painting work when maximum moisture content of the substrate is below:
 - .1 Allow new concrete to cure minimum of 28 days.
 - .2 15% for wood.
 - .3 12% for plaster and gypsum board.
 - .4 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".
 - .5 Test concrete and plaster surfaces for alkalinity as required.
 - .3 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.

PART 2 PRODUCTS

2.2 Materials

- .1 Provide paint materials for paint systems from single manufacturer.
- .2 Products to meet requirements of GS-11 or SCAQMD Rule 1113-96
- .3 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
- .4 Only qualified products with E2 or E3 "Environmentally Friendly" rating are acceptable for use.
- .5 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.
- .6 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:
 - .1 Non-flammable, biodegradable.
 - .2 Manufactured without compounds which contribute to ozone depletion in the upper atmosphere.

- .3 Manufactured without compounds which contribute to smog in the lower atmosphere.
- .4 Do not contain methylene chloride, chlorinated hydrocarbons or toxic metal pigments.
- .5 Recycled content of 15% post-consumer and ½ post-industrial waste.
- .7 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
- .8 Flash point: 61 °C or greater for water-borne surface coatings and recycled water-borne surface coatings.

2.3 Colours

- .1 Consultant will provide Colour Schedule.
- .2 Colour schedule will be based upon selection of eight base colours and six deep tint accent colours.
- .3 Selection of colours will be from manufacturer's full range of colours.
- .4 Where specific products are available in restricted range of colours, selection will be based on limited range.
- .5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.4 Mixing and Tinting

- .1 Perform colour tinting operations prior to delivery of paint to site.
- .2 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.
- .3 Thin paint for spraying in accordance with paint manufacturer's instructions.
- .4 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.

2.5 Gloss/Sheen Ratings

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

Gloss Level Category/	Units @ 60 Degrees	Units @ 85 Degrees
G1 – matte finish	0 to 5	Max. 10
G2 – velvet finish	0 to 10	10 to 35
G3 – eggshell finish	10 to 25	10 to 35
G4 – satin finish	20 to 35	Min. 35
G5 – semi-gloss finish	35 to 70	
G6 – gloss finish	70 to 85	
G7 – high gloss finish	> 85	

- .2 Gloss level ratings of painted surfaces as specified and as noted on Finish Schedule.

2.6 Interior Painting Systems

- .1 Wood Strip and Plank Flooring:
 - .1 As specified in Section 09 64 29.
- .2 Structural Steel:
 - .1 INT 5.1X Latex G5 semi-gloss finish (over quick dry shop primer).
- .3 Metal Fabrications:
 - .1 INT 5.3A Latex G5 semi-gloss finish
- .4 Zinc Coated Metal Deck:
 - .1 INT 5.3H. Interior Latex semi-gloss, dry fog/fall type.
- .5 Galvanized Metal: interior doors, frames, railings, misc. steel, pipes, and ducts.
 - .1 INT 5.3A Latex G5 semi-gloss finish
- .6 Concrete Masonry:
 - .1 INT 4.2D High performance architectural latex G5 semi-gloss finish.
- .7 Gypsum Board: Walls and Bulkheads.
 - .1 INT 9.2A Latex G3 eggshell finish over latex sealer.
- .8 Gypsum Board: Ceilings and Bulkheads:
 - .1 INT 9.2A Latex G2 velvet finish over latex sealer.
- .9 Glazed Concrete Block:
 - .1 Sand glazed surfaces smooth and clean with a multi-purpose cleaner.
 - .2 Repair any chips or cracks with epoxy.
 - .3 Apply latex bonding primer
 - .4 INT 5.3A Latex G5 semi-gloss finish
- .10 Electrical Equipment Backboards:
 - .1 INT 6.4P Fire retardant, pigmented coating. Low odour/low VOC. Semi-gloss (UL/ULC rated).
- .11 All other surfaces not noted above: high performance finish suitable for commercial and institutional environment and in accordance with MPI painting manual.

PART 3 EXECUTION

3.1 General

- .1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.
- .2 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and application instructions, and data sheets.

3.2 Examination

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report damages, defects, unsatisfactory or unfavourable conditions to Consultant before proceeding with work.

3.3 Preparation

- .1 Protection:
 - .1 Protect existing building surfaces and adjacent structures from paint splatters, markings and other damage by suitable non-staining covers or masking and in accordance with paint manufacturers and MPI recommendations. If damaged, clean and restore surfaces as directed by Consultant.
 - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
 - .3 Protect factory finished products and equipment.
- .2 Surface Preparation:
 - .1 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
 - .2 Place "WET PAINT" signs in occupied areas as painting operations progress.
- .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 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.
- .5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply vinyl 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.
- .6 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 and SSPC-SP 6. 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.
- .12 Clean, sand and repair existing glazed concrete block. Repair any chips or cracks with epoxy and apply latex bonding primer
- .7 Touch up of shop primers with primer as specified.
- .8 Do not apply paint until prepared surfaces have been accepted by Consultant.

3.4 Application

- .1 Apply paint materials in accordance with paint manufacturer's written application instructions.
- .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 Spray application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 - .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
 - .3 Apply paint in uniform layer, overlapping at edges of spray pattern. Back roll first coat application.
 - .4 Brush out immediately all runs and sags.
 - .5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.
- .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.
- .8 Finish alcoves as specified for adjoining rooms.
- .9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.5 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.
- .2 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 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- .5 Do not paint over nameplates.

- .6 Keep sprinkler heads free of paint.
- .7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.
- .8 Paint fire protection piping red.
- .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.

3.6 Field Quality Control

- .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .2 Standard of Acceptance:
 - .1 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.7 Cleaning and Restoration

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .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 Consultant. Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 10 28 10 Toilet and Bath Accessories.

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A653/A653M-23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- .2 CSA Group (CSA)
 - .1 CSA /ASC B651:23 Accessible Design for the Built Environment
- .3 Accessibility for Ontarians with Disabilities Act (AODA)

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for toilet compartments or components, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit duplicate copies of manufacturer's standard colour charts for selection by the Consultant.
- .3 Shop Drawings:
 - .1 Indicate partition layout.
 - .2 Show and describe in detail materials, finishes, dimensions, details of connections and fastenings, elevations, plans, sections, thicknesses, metal thickness, hardware and any other pertinent information.
- .4 Samples:
 - .1 Submit duplicate 300 x 300 mm samples of panel showing finish on both sides, two finished edges and core construction.
 - .2 Submit duplicate representative samples of each hardware item, including brackets, fastenings and trim.
 - .3 All samples must be properly identified including name of supplier, and name of manufacturer.
- .5 Quality Control Submittals:
 - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.
- .6 Closeout Submittals:
 - .1 Provide maintenance data for toilet compartments for incorporation into operations and maintenance manual specified in Section 01 78 00 - Closeout Submittals.

1.5 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.

- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Toilet compartments must be delivered to the job site in the manufacturers' original packages and marked to correspond with the approved shop drawings.
- .4 Protect finished surfaces during shipment and installation. Do not remove until immediately prior to final inspection.

1.6 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.7 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of three years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Approved Manufacturers

- .1 Only those manufacturers names and product numbers listed herein, are approved for use on this project. Absolutely no variations from listed and preapproved items will be permitted.
- .2 Approved manufacturer(s):
 - .1 Hadrian Manufacturing Inc.
 - .2 ASI Global Partitions

2.2 Materials

- .1 Construction: Doors, Panels and Pilasters shall be constructed of two sheets of panel flatness zinc-coated steel, Galvanneal ASTM A653 GR33, laminated under pressure to a honeycomb core for sound deadening and rigidity. Formed edges to be welded together and inter-locked under tension with a roll-formed oval crown locking bar, mitred, welded and ground smooth at the corners. Honeycomb shall have a maximum 25mm cell size.
- .2 Doors: Shall be 25mm thick with cover sheets not less than 0.8mm. All doors 1461 mm high.
- .3 Panels: Shall be 25mm thick with cover sheets not less than 0.8mm. All panels 1461 mm high.
- .4 Pilasters: Shall be 32mm thick with cover sheets not less than 0.8mm. Pilaster tops shall be reinforced with a 20-gauge channel to create extra strength and twist-free rigidity along with minimizing damage by handling and/or shipping.
- .5 Headrail: Shall be 25mm by 41mm extruded anodized aluminum with double-ridge anti-grip design. Wall thickness to be 1.5mm and shall be securely attached to wall and pilasters with manufacturer's fittings in such a way as to make a strong and rigid installation. All joints in headrails shall be made at pilaster.

2.3 Hardware

- .1 Hardware and Fittings: All panel-to-pilaster, panel-to-wall and pilaster-to-wall connections shall be made with full height continuous channels. All door hardware shall be chrome plated zinc die castings. Fasteners are zinc plated 12 x 45 mm and 12 x 16 mm TR-27 6-lobe security screws. Doors shall be equipped with a gravity type hinge mounted on the lower pilaster hinge bracket. Door hinges shall be wrap-around style and adjustable to permit the door to rest at any position when not latched.
- .2 Each door to be fitted with a combined coat hook and bumper and a concealed latch, with face mortised flush with edge strip of door.
- .3 Barrier-free doors shall include thumbturn lever to activate latch without fingertip grip application.
- .4 Both standard and barrier-free latches shall have a turn slot designed to allow emergency access from exterior. The combined full length extruded aluminum door stop and keeper shall have a 6 mm wide continuous rubber bumper locked in place the length of the stop. To cover the sightline gap at door hinge side, full length extruded aluminum filler channel shall be provided. The "no sightline" continuous stop and hinge filler shall be powder coated to match door and pilaster finish. Threaded upper hinge pin shall have a metal core and self-lubricating nylon sleeve to ensure smooth, quiet operation. Pilaster shoes shall be a welded one-piece design made from polished stainless steel. Two-piece shoes that can disassemble when kicked are unacceptable.

2.4 Finish

All sheet metal to be thoroughly cleaned, phosphated and finished with a high performance powder coating, electrostatically applied and oven cured to provide a uniform, smooth protective finish.

- .1 Colours will be selected by the Consultant from the manufacturer's standard range of colours. Up to four colours will be selected.

2.5 Fabrication

- .1 Shop fabricate partitions and screens. Take site measurements for areas where partitions are to be located and fabricate partitions to suit site dimensions.
- .2 Fabricate to reviewed shop drawings and manufacturer's standards.
- .3 Toilet Compartment Doors: 1461 mm high; 610 and 810 mm wide.
- .4 Urinal Screens: 1070 mm high x 456 mm wide.

PART 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 Examination

- .1 Check areas scheduled to receive compartments for correct dimensions, plumbness of walls, and soundness of surfaces that would affect installation of mounting brackets.

- .2 Verify spacing of plumbing fixtures to assure compatibility with installation of compartments.
- .3 Do not begin installation of compartments until conditions are satisfactory.

3.3 Preparation

- .1 Examine all site conditions that would prevent the proper application and installation of toilet compartments. Any defect must be immediately identified and corrected, prior to the installation of the toilet compartments.

3.4 Installation

- .1 All toilet compartments must be mounted according to manufacturers standard locations and those specified on the drawings.
- .2 Toilet compartments shall include the furnishing of all necessary screws, special screws, bolts, special bolts, expansion shields and all other devices necessary for the proper installation and application of the toilet compartments.
- .3 Install products in strict compliance with manufacturer's written instructions and recommendations, including the following:
 - .1 Verify blocking and supports in walls and ceilings have been installed properly at points of attachment.
 - .2 .Verify location does not interfere with door swings or use of fixtures.
 - .3 Use fasteners and anchors suitable for substrate and project conditions
 - .4 Install units rigid, straight, plumb, and level.
 - .5 Conceal evidence of drilling, cutting, and fitting to room finish.
 - .6 Test for proper operation.
- .4 Adjust hardware for proper operation after installation. Set hinge cam on in-swinging doors to hold doors open when unlatched. Set hinge cam on out-swinging doors to hold unlatched doors in closed position.
- .5 At final completion, toilet compartments shall be left clean and free from disfigurement. Make all final adjustments. Where toilet compartments are found defective, repair or replace or otherwise correct as directed.
- .6 Upon request, at completion of the project, the toilet compartment supplier shall be required to brief Owner's maintenance staff regarding proper care of toilet compartments, including required lubrications, adjustments, cleaning, etc.

3.5 Field Quality Control

- .1 After installation has been completed, provide for a site inspection of all toilet compartments to determine that all items have been supplied and installed as per the enclosed details. Check the operation and adjustment of all toilet compartments. Any discrepancies, or malfunctioning product, must be reported to the Owner immediately.

3.6 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Touch-up, repair or replace damaged products.

- .3 Clean exposed surfaces of compartments, hardware, and fittings.
- .4 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .5 Provide for the proper protection of all toilet compartments until the time of Substantial Performance.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 10 21 13 Metal Toilet Compartments

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A653/A653M-23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .2 ASTM A924/A924M-22a Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
 - .3 ASTM B456-17(2022) Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
 - .4 ASTM C1036-21 Standard Specification for Flat Glass
 - .5 ASTM C1503-18 Standard Specification for Silvered Flat Glass Mirror
 - .6 ASTM D1187/D1187M-97(2018) Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.81-M90 Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
 - .2 CAN/CGSB-1.88-92 Gloss Alkyd Enamel, Air Drying and Baking.
- .3 CSA Group (CSA)
 - .1 CSA/ASC B651:23 Accessible Design for the Built Environment.
 - .2 CSA G164-18(R2023) Hot Dip Galvanizing of Irregularly Shaped Articles.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
 - .1 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.
- .3 Samples:
 - .1 Submit samples when requested.
 - .2 Samples to be returned for inclusion into work.
- .4 Closeout Submittals:
 - .1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.6 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.7 Extra Materials

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

PART 2 PRODUCTS

2.1 Materials

- .1 Sheet steel: to ASTM A653 with ZF001 designation zinc coating.
- .2 Stainless steel sheet metal: Type 304, with Brushed finish.
- .3 Stainless steel tubing: Type 304, commercial grade, seamless welded, minimum 1.2 mm wall thickness.
- .4 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 Manufacturers

- .1 Products and components listed are minimum standard of acceptance. Alternative products by recognized manufacturers of toilet and bath accessories may be accepted subject to review by the Consultant of manufacturer's product information and specifications.
- .2 Acceptable manufacturers include:
 - .1 Bobrick
 - .2 Bradley
 - .3 Frost
 - .4 Hafele
 - .5 Richelieu
 - .6 Watrous

2.3 Components

- .1 TPD: Toilet Tissue Dispenser:
 - .1 Supplied by Owner, installed by Contractor.
- .2 SD: Soap Dispenser: Liquid wall mounted soap dispenser.
 - .1 Supplied by Owner, installed by Contractor.
- .3 PTD: Paper Towel Dispenser:
 - .1 Supplied by Owner, installed by Contractor.
- .4 GB1: Grab Bar, 38 mm diameter x 1.6 mm wall tubing of stainless steel, 76 mm diameter wall flanges, concealed screw attachment, flanges welded to tubular bar, provided with steel back plates and all accessories. Knurl bar at area of hand grips. Grab bar material and anchorage to

withstand downward pull of 2.2 kN. 600 mm long.

.1 Frost # 1001-NP24"

.5 GB2: Barrier Free Toilet Grab Bars (L-shaped) 760 x 760 38 mm dia. Peened finish c/w mounting kits.

.1 Frost # 1003-NP30"X30", 90° Angle Grab Bar.

.6 Framed Mirror: Bobrick B-290-1830, satin finish.

.7 SND: Sanitary Napkin Disposal

.1 Frost # 622, surface mounted, stainless steel c/w #4 brushed finish.

.8 Stainless Steel Shelf: To CSA B651. 455 mm long x 125mm wide, 1.2mm type 304 stainless steel, satin finish. 19mm return edge; front edge hemmed for safety. 1.6mm brackets.

.1 Bobrick B295 x 18

.8A Stainless Steel Folding Shelf: Frost 955

.9 Collapsible Coat Hook: Frost # 1150-SS

.10 Recessed Soap Holder: Bobrick Recessed Heavy-Duty Soap Dish - B4380.

.11 RSS: Retractable Shower Seat (left hand and right hand).

.1 Bobrick B-51981

.12 GB3: Shower Grab Bar (Vertical 1066 mm long) 38 mm dia. Peened finish c/w mounting kits.

.1 Frost # 1001-NP42"

.13 GB4: Shower Grab Bar: (L-shaped) 1000\ x 760 38 mm dia. Peened finish c/w mounting kits.

.1 Frost # 1003-NP33"X30", 90° Angle Grab Bar.

.14 Surface Mounted Hand Dryers: World Dryer SLIM dri # L-973, Automatic hand dryer, 115V, 20 Amp, 2300 Watt, surface mounted, stainless steel, brushed finish.

.15 WR: Waste Receptacle:

.1 Frost # 326, Wall mounted, stainless steel waste receptacle.

2.4 Fabrication

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1.5 mm radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back paint components where contact is made with building finishes, to prevent electrolysis.

.6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CSA G164.

.7 Shop assemble components and package complete with anchors and fittings.

- .8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.
- .9 Provide steel anchor plates and components for installation on studding and building framing.

2.5 Finishes

- .1 Chrome and nickel plating: to ASTM B456, satin finish.
- .2 Baked enamel: condition metal by applying one coat of metal conditioner to ASTM D1187, apply one coat Type 2 primer to CAN/CGSB-1.81 and bake, apply two coats Type 2 enamel to CAN/CGSB-1.88 and bake to hard, durable finish. Sand between final coats. Colour selected from standard range by Consultant.
- .3 Manufacturer's or brand names on face of units not acceptable.

PART 3 EXECUTION

3.1 Installation

- .1 Install toilet and bath accessories in accordance with the Ontario Building Code, CSA B651 and manufacturer's instructions.
- .2 Install and secure accessories rigidly in place as follows:
 - .1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.
 - .2 Hollow masonry units or existing plaster/drywall: use toggle bolts drilled into cell/wall cavity.
 - .3 Solid masonry or concrete: use bolt with lead expansion sleeve set into drilled hole.
- .3 Install grab bars on built-in anchors provided by manufacturer.
- .4 Use tamper proof screws/bolts for fasteners.
- .5 Fill units with necessary supplies shortly before final acceptance of building.
- .6 Install products in strict compliance with manufacturer's written instructions and recommendations, including the following:
 - .1 Verify blocking has been installed properly.
 - .2 Verify location does not interfere with door swings or use of fixtures.
 - .3 Comply with manufacturer's recommendations for backing and proper support.
 - .4 Use fasteners and anchors suitable for substrate and project conditions.
 - .5 Install units rigid, straight, plumb, and level, in accordance with manufacturer's installation instructions and approved shop drawings.
 - .6 Conceal evidence of drilling, cutting, and fitting to room finish.
 - .7 Test for proper operation.
- .7 Install electric hand dryers according to manufacturer's instructions. Installation shall be by an electrician and shall be completed in accordance with all relevant standards and Codes.

3.2 Schedule

- .1 Locate accessories where indicated. Exact locations determined by Owner.

3.3 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean exposed surfaces of compartments, hardware, and fittings using methods acceptable to the manufacturer.
- .3 Touch-up, repair or replace damaged products until Substantial Performance.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 05 50 00 Metal Fabrications
- .3 Section 06 10 00 Rough Carpentry
- .4 Section 06 20 00 Finish Carpentry
- .5 Section 10 28 10 Toilet and Bath Accessories
- .6 Section 12 48 00 Foot Grilles

1.3 Reference Standards

- .1 ASTM International (ASTM)
 - .1 ASTM A312/A312M-24b Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
- .2 Ontario Traffic Manual Book 5 Regulatory Signs.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit detailed shop drawings and where applicable complete colour charts or colour samples for each item specified herein.
- .3 Submit operating and maintenance instructions for all manufactured products and specialties, for inclusion in the Operations and Maintenance Manuals specified in Section 01 78 00-Closeout Submittals.

1.5 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Protect finished surfaces during shipment and installation.

1.6 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Items specified herein shall be standard manufactured items, modified if required and as specified to suit conditions of this project.
- .2 Fabricate work true to dimensions, square and plumb, to suit site conditions.

- .3 Thickness of metals shall be adequate for the various conditions with requirements specified as a minimum.
- .4 Finished work shall be free from warping, open seams, weld marks, rattles and other defects. Drilling shall be reamed and exposed edges finished smooth.
- .5 Provide all fastenings, anchorage and accessories as required to complete the work and as recommended by the manufacturer.
- .6 Fastenings shall be concealed or theft-proof type where possible. Exposed fastenings shall be neatly executed and shall be of the same material and finish as the base metal on which they occur.

2.2 Products

- .1 **Parking Signs:** Heavy-duty, 2.0 mm thick aluminum signs and sign-posts to Ontario Traffic Manual Book 5- Regulatory Signs and Municipal standards. Reflective Aluminum (RA) engineer grade reflective sign face designed to provide increased visibility in low-light conditions with UV-resistant inks to prevent fading during long-term outdoor use. Supplied with top and bottom center holes for post or fence mounting and galvanized steel post. Symbols and markings as indicated.
 - .1 Fabricate posts from steel conforming to ASTM A36/A36M or ASTM A499 and having a minimum yield strength of 207 MPa 30 ksi and a minimum tensile strength of 345 MPa 50 ksi. Galvanize posts after punching in accordance with ASTM A123/A123M.
 - .2 Hardware: Bolts, nuts, post clips, lock and flat washers must be either aluminum alloy or commercial quality stainless steel, hot-dip galvanized or cadmium plated after fabrication. Bolts/nuts must be tamper resistant design. Provide fiber washers of commercial quality.

PART 3 EXECUTION

3.1 Installation - General

- .1 Install manufactured items in accordance with manufacturer's printed instructions and recommendations.

3.2 Installation - Parking Signage

- .1 Signposts consist of a base post and signpost. Drive steel sign base posts with a suitable driving head. Attach signposts to base posts. Replace any base posts damaged during driving or otherwise at no additional cost to the Owner. Embed steel sign base posts in concrete.
- .2 Locate and erect all signs in accordance with the drawings, municipal standards and codes. Vertically mount signs at right angles to the direction of, and facing, the traffic that they are intended to serve. Mounted signs must present a smooth flat surface varying no more than 10 mm from a 1.2 m straightedge placed in any position on the face of the sign after erection. Mount signs on traffic signal posts with strap or clamp type sign supports.

3.3 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-In-Place Concrete
- .2 Section 08 71 10 Door Hardware
- .3 Section 09 65 70 Resilient Sheet Flooring
- .4 Section 09 91 23 Interior Painting

1.3 References

- .1 CSA Group (CSA)
 - .1 CSA B44.1 - Elevator and Escalator Electrical Equipment.
 - .2 CSA B355.19 Platform Lifts and Stair Lifts for Barrier-Free Access
 - .3 CSA C22.1:21 Canadian Electrical Code
 - .4 CSA B613 - Private Residence Lifts for Persons with Physical Disabilities.
- .2 American Society of Mechanical Engineers (ASME)
 - .1 ASME A17.1-2016/CSA B44-2016 Safety Code for Elevators and Escalators
 - .2 ASME A18.1-2017 Safety Standard for Platform Lifts and Stairway Chairlifts.
- .3 American National Standards Institute (ANSI)
 - .1 ANSI B29.2-2007 (R2017) Inverted Tooth (Silent) Chains and Sprockets.
- .4 International Code Council (ICC)
 - .1 ICC A117.1-2017 Accessible and Usable Buildings and Facilities.
- .5 Accessibility for Ontarians with Disabilities Act (AODA)
- .6 Technical Standards & Safety Authority (TSSA)

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Manufacturer's data sheets on each product to be used, including:
 - .1 Manufacturer's installation instructions, including preparation, storage and handling requirements.
 - .2 Include complete description of performance and operating characteristics.
 - .3 Show maximum and average power demands.
- .3 Shop Drawings:
 - .1 Show typical details of assembly, erection and anchorage.
 - .2 Include wiring diagrams for power, control, and signal systems.
 - .3 Show complete layout and location of equipment, including required clearances and coordination with shaftway.
- .4 Selection Samples: For each finished product specified, provide two complete sets of colour chips representing manufacturer's full range of available colours and patterns.
- .5 Provide maintenance data for incorporation into Operation and Maintenance Manual specified in Section 01 78 00 – Closeout Submittals.
 - .1 Include in maintenance data:
 - .1 Replacement parts list

- .2 Legible schematic wiring diagrams covering electrical equipment as supplied and installed, including changes made in final work, with symbols listed corresponding to components or markings.
- .3 Manufacturer's recommended maintenance tasks and frequencies.

1.5 Quality Control

- .1 Use major lift components from standard product line of one manufacturer.
- .2 Use components only that have performed together satisfactorily, under conditions of normal use in not less than ten other public Canadian lift installations, and for a period of not less than one year.
- .3 Major components shall be construed to mean drive means, machine tower, platform and enclosure assembly, and operating and control fixtures.

1.6 Quality Assurance

- .1 Manufacturer Qualifications: Firm with minimum 10 years of experience in manufacturing of vertical platform lifts, with evidence of experience with similar installations of type specified.
- .2 Installer Qualifications:
 - .1 Skilled tradesmen shall be employees of the installing contractor approved by the manufacturer, with demonstrated ability to perform the work on a timely basis.
 - .2 Execute work of this section only by a company that has adequate product liability insurance.

1.7 Requirements of Regulatory Agencies

- .1 Fabricate and install work in compliance with applicable jurisdictional authorities.
- .2 File shop drawings and submissions with local authorities as the information is made available. Company pre-inspection and jurisdictional authority inspections and permits are to be made on timely basis as required.

1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Store products in manufacturer's unopened packaging until ready for installation.
- .3 Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.9 Project Conditions

- .1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install systems under environmental conditions outside manufacturer's absolute limits.
- .2 Do not use wheelchair lift for hoisting materials or personnel during construction period.

1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.11 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of two years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Manufacturer

- .1 Acceptable Manufacturer: Savaria 2 Walker Drive, Brampton, ON, Canada, L6T 5E1; Toll Free Tel: 800-661-5112; Tel: 905-791-5555; Email: request info; Web: www.savaria.com

2.2 Commercial Wheelchair Lift

- .1 Hydraulic Vertical Platform Lifts: Savaria V1504-STD.
- .2 Hydraulic Vertical Platform Lift: The lift described here, shall be a vertical platform lift consisting of a hydraulic tower with a lifting platform. The platform shall be made to accommodate a wheelchair user or a person with impaired mobility.
- .3 Work described in this Section includes providing equipment, incidental material and labour required for complete, operable roped hydraulic wheelchair lift installation. Lifts shall be erected, installed, adjusted, tested and placed in operation by lift system manufacturer, or manufacturer's authorized installer.
 - .1 Lifts shall be in accordance:
 - .1 ASME A18.1 and ADAAG compliant (USA)
 - .2 ASME A18.1 and A117.1 compliant (USA)
 - .3 CSA B355 (Canada)
- .4 The following preparatory work to receive the lifts specified in this Section is part of the work of other Sections:
 - .1 Permanent 120 VAC, 20 amp single phase power to operate lift to be provided from a lockable fused/cartridge type disconnect switch with auxiliary contacts for battery operation. Refer to drawings for permanent power specifications and location of disconnects. Temporary power may be provided to expedite installation of lift.
 - .2 Provide a plumb and square hoistway with smooth interior surfaces, including fascias or furring of the hoistway interior.
 - .3 Provide rough openings per lift contractor's shop drawings.
 - .4 Provide substantial, level pit floor slab as indicated on the lift contractor's shop drawings.
- .5 Characteristics:
 - .1 Rated Load: 340 kg.
 - .2 Rated Speed: 0.10 m/s.
 - .3 Car Dimensions:
 - .1 914 mm wide by 1371 mm deep
 - .4 Levels Serviced:
 - .1 2.
 - .5 Car Configuration:
 - .1 Front/rear exit.
 - .6 Travel: 1067 mm.
 - .7 Pit Depth: As Indicated on Drawings.
 - .8 Powder Coat Finish

- .1 Almond beige – Standard
- .9 Operation: Constant pressure.
- .10 Power Supply: 110 volt, 20 amp, 1 phase, 60 Hz.
- .11 Drive System: 2:1 Roller chain hydraulic.
- .12 Emergency Power:
- .13 Controller: Relay logic based controller.
- .14 Motor/Pump: 1 HP (112 kw), gear type
- .15 Manual Lowering: Outside the hoistway at lower landing.
- .6 Car Enclosure:
 - .1 Cab Configuration:
 - .1 Side Guards of platform shall have a steel frame with a powder coat finish and steel panel inserts to a minimum of 1067 mm high.
- .7 Doors and Gates:
 - .1 First landing door:
 - .1 Door type:
 - .1 80" High 1-1/2 hour UL/ULC fire-rated Prodoor with concealed hinges and a concealed electro/mechanical interlock.
 - .2 Flush closing operation with hoistway side.
 - .2 Operation: Automatic - Concealed 24 volt door opener with battery back-up for fire-rated door.
 - .3 Door Width: 889 mm clear opening.
 - .2 Upper landing door:
 - .1 Door/gate type:
 - .1 80" High 1-1/2 hour UL/ULC fire-rated Prodoor with concealed hinges and a concealed electro/mechanical interlock.
 - .2 Flush closing operation with hoistway side.
 - .2 Operation: Automatic - Concealed 24 volt door opener with battery back-up for fire-rated door.
 - .3 Door Width: 889 mm
- .8 Call Stations: Provide flush, surface or door frame mounted landing call/send stations.
 - .1 Call stations will be keyed (removable in on/off position)
- .9 Car Operation:
 - .1 Car Operating Panel shall consist of constant pressure buttons, emergency stop/alarm button, on/off key switch (when applicable) and emergency LED light mounted on a removable stainless steel panel (Type 304 #4 Stainless Steel Finish).
 - .2 Auxiliary lighting: The car shall be equipped with a battery operated LED light fixture. The battery shall be the rechargeable type with an automatic recharging system.
 - .3 Telephone: The car shall be equipped with a
 - .1 ADA Hands free phone.
- .10 Pumping Unit and Control:
 - .1 The pumping unit and control shall be enclosed in the tower. The controller and pump unit shall be pre-wired and tested prior to shipment. The controller is to be relay logic based operation for ease of maintenance and service. Pump unit shall incorporate the following features:
 - .2 Adjustable pressure relief valve.
 - .3 Manually operable down valve to lower lift in the event of an emergency. This valve shall be activated from outside of the hoistway through a keyed box.
 - .4 Pressure gauge isolating valve, manually operable.

- .5 Gate valve to isolate cylinder from pump unit.
- .6 Electrical solenoid for down direction control.
- .7 Emergency Operation - A manual lowering device shall be located outside the hoistway in a lockable box positioned at a lower landing.
- .11 Cylinder And Plunger:
 - .1 The cylinder shall be constructed of steel pipe of sufficient thickness and suitable safety margin. The top of the cylinder shall be equipped with a cylinder head with an internal guide ring and self-adjusting packing.
 - .2 The plunger shall be constructed of a steel shaft of proper diameter machined true and smooth. The plunger shall be provided with a stop electrically welded to the bottom to prevent the plunger from leaving the cylinder.
- .12 Roller Chains: Two No.50 roller chains with 16 mm pitch. Minimum breaking strength 2773 kg each.
- .13 Leveling Device:
 - .1 The lift shall be provided with an anti-creep device which will maintain the carriage level within 12 mm of each landing.
 - .2 All limit switch and leveling device switches shall be located in a position to be inaccessible to unauthorized persons. They shall be located behind the mast wall and be accessible through removable panels.
- .14 Guide Yoke: The 2:1 guide yoke/sprocket assembly shall be supplied with idler sheaves, roller guide shoes, bearings and guards.
- .15 Terminal Stopping Devices: Normal terminal stopping devices shall be provided at top and bottom of runway to stop the car positively and automatically.
- .16 Guide Rails and Brackets: Steel 'C' guide rails and brackets shall be used to guide the platform and sling. Guide rails shall form part of the structural integrity of the unit and be integral to the mast enclosure, ensuring stability and minimum platform deflection when loaded.
- .17 Car Sling: Car sling shall be fabricated from steel tubing 1116 mm high with adequate bracing to support the platform and car enclosure. Roller guide shoes shall be mounted on the top and bottom of the car sling to engage the guide rails. Guide shoes shall be roller type with 76 mm diameter wheels. Nylon guide shoes shall not be used for better ride quality and durability.
- .18 Wiring: All wiring and electrical connections shall comply with applicable codes. Insulated wiring shall have flame-retardant and moisture-proof outer covering and shall be run in conduit or electrical wire ways if located outside the unit enclosure. Quick disconnect harnesses shall be used when possible.
- .19 Provide all components and custom work to conform to TSSA requirements.

PART 3 EXECUTION

3.1 Examination

- .1 Do not begin installation until substrates have been properly prepared.
- .2 Site dimensions shall be taken to verify that tolerances and clearances have been maintained and meet local regulations.

- .3 Do not begin installation until hoistway and machine room has been properly prepared.
- .4 Verify required landings and openings are of correct size and within tolerances.
- .5 Verify electrical rough-in is at correct location.
- .6 If substrate preparation is the responsibility of another installer, notify Consultant 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, ASME A 17.1, ASME A 18.1 and the manufacturer's instructions.
- .2 Accommodate equipment in space indicated.
- .3 Install all the components of the lift system that are specified in this Section to be provided, and that are required by jurisdictional authorities to license the lift.
- .4 Trained employees of the lift contractor shall perform all installation work of this Section.
- .5 Startup equipment in accordance with manufacturer's instructions.
- .6 Adjust lift for proper operation and clean unit thoroughly.
- .7 Instruct users in operation procedures and Owner's maintenance person in troubleshooting and maintenance procedures.

3.4 Field Quality Control

- .1 Perform and meet inspection tests as required by jurisdictional authorities
- .2 Perform tests in compliance with CSA B355, ASME A17.1 or A18.1 and as required by authorities having jurisdiction.
- .3 Provide two weeks written notice of all tests to Consultant.
- .4 Schedule tests with agencies to ensure that Owner and Contractor are present.
- .5 Provide legible copies of approval certificates as required by jurisdictional authorities.

3.5 Protection

- .1 Protect installed products until completion of project.

.2 Touch-up, repair or replace damaged products before Substantial Performance.

3.6 Cleaning

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

**Electrical
Specifications**

for

**Richard Beasley Elementary School
Renovations
80 Currie Street
Hamilton, Ontario**

HCC PROJECT #24210

HCC ENGINEERING LIMITED

**200 King Street West
Suite 310**

**Toronto, Ontario
M5H 3T4**

Tel: (416) 932-2423

Issued for Tender

April 3, 2025

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PANEL SCHEDULES

SECTION 26 05 00: GENERAL CONDITIONS.

1.1 Project Description

1. The project encompasses the 80 Currie Street, Hamilton facility. In general, the work shall include, without being limited to the following:
 1. Provide new 120/208 Volt utility distribution.
 2. Provide electrical distribution, communications conduit systems, lighting, lighting control system, fire alarm system, etc., as shown on the drawings.
2. The electrical contractor shall provide a comprehensive Methods of Procedures (MOPs) four weeks prior to each and every power shutdown. MOPs must include a detailed sequence of operations to be completed during the respective shutdown as well as a back out plan. MOPs must be approved by client and the electrical engineer prior to any work taking place.

1.2 Reserved

1.3 Substantial Completion Of Contract

1. All the equipment and wire must be cleaned and tested before acceptance by the consultant.
2. This Contractor shall guarantee all equipment and work furnished under this Division for a period of one (1) year (including all prepurchased and prequalified equipment) or such longer periods as may be provided in the warranty of the manufacturer of individual components, whichever is longer from the date of final acceptance by the Engineer. This contractor shall correct all defects developing as a whole or in part, due to defective workmanship, materials or defective arrangement of the various parts or materials damaged as a result of these defects or repairs. All defects shall be made good to the satisfaction of the Engineer at this Contractor's expense.
3. Replace, at no cost, all incandescent lamps burned out during a thirty (30) day period, all burned-out fluorescent and HID lamps for a period of ninety (90) days and all burned out LEDs based on a 70% lumen maintenance within a 5 year warranty period after date of issuance of certificate of Substantial Performance for the contract of this building.
4. Additional requirements as detailed in Section 26 05 00, paragraph 1.7, sentence 9.

1.4 Reserved

1.5 Reserved

1.6 Examination of Premises and Work

1. Visit and examine the site where the work is to be done. Become familiar with all features and characteristics of the site and/or any existing structure before submitting a bid. No allowances will be made by the Owner for any difficulties encountered by this Contractor due to any peculiarities of the site, surrounding public or private property that existed when the Tender was submitted.
2. This Contractor shall examine the structural, mechanical, architectural, electrical and any other drawings issued to satisfy himself that the work can be satisfactorily carried out. Before commencing work or prefabrication, examine the work of other trades and report at once any defect or interference affecting the work of the electrical trade.
3. Where variances occur between the drawings and the specifications, or within either document itself, the item or arrangement of better quality, greater quantity or higher cost shall be included in the contract sum. The Engineer will decide on the item and manner in which the work shall be installed.

1.7 Terms And Conditions

1. DEFINITIONS

1. The term Owner shall be understood to refer to Hamilton Wentworth District School Board.
2. The term consultant shall be understood to refer to Howard Cohen, P. Eng., RCDD/LAN, MBA.
3. Not used.
4. The term electrical contractor shall be understood to refer to the successful bidder to this specification for the electrical systems.
5. The term Contract shall be understood to refer to all items and conditions of this specification, Drawings, the complete tender package, the Contractor's tender submission and any other future contractual arrangements. All such items and conditions shall be binding unless agreed otherwise by the Contractor, Consultant and Owner.
6. The term Project shall be understood to refer to the complete supply and installation of the Electrical System and components, as defined in this specification and Drawings.
7. Wherever the words "equal", "equivalent", "approved", or "approved equal" are used, it shall be understood to mean, "equal", "equivalent", "approved", or "approved equal" in the opinion of the Consultant only.
8. Wherever the words "install", "provide", or "supply and install", are used it shall be understood to mean "provide and install, inclusive of all labour, materials, installation, testing, and connections" for the item to which referred.
9. "Concealed" is defined as "out of sight" in "normal" viewing conditions, and includes buried in concrete, above acoustic tile or gypsum board ceilings, within masonry or gypsum board constructed walls, within cable trays of below raised access floors.
2. These specifications or the drawings shall not be used alone. Any item or subject omitted from one, but mentioned or reasonably implied in the other, shall be provided. Misinterpretation of any requirements of either the specification or drawings shall not result in any additional charge after submission of Tender. This Contractor shall, by careful study of the total requirements, include all necessary components to make each system workable.
3. Not used.
4. The Contractor shall co-operate fully with the Owner, Consultant, landlord and landlord's agent and all contractors, sub-contractors and other persons working on the site.
5. The Contractor shall do the complete installation in accordance with the latest editions of the Ontario Building Code, Electrical Safety Code, CSA, NFPA, or other Codes or governing authorities of competent jurisdiction. In case of discrepancies with this or the manufacturer's specifications, the Contractor shall notify the Consultant immediately.
6. Obtain and pay for permits (note: Building Permit obtained by owner) and inspections required for work performed. Provide Certificate(s) of Acceptance from the Authorities Inspection Department, upon completion of work.
7. Submit required Documents and shop drawings to authorities having jurisdiction in order to obtain approval for the Work. Copies of Contract Drawings and Specifications may be used for this purpose. Prepare any additional information, details and drawings which these authorities may require.
8. The Contractor must comply with all requirements of the Occupational Health & Safety Act.
9. In order to meet the requirements of substantial completion the electrical contractor must complete the following:
 1. Installation and successful testing of all electrical system devices as per mutually agreed to tests and commissioning plan.
 2. Submission of all coordination and permit documentation for the Consultant's review.
 3. Submission of all record and As-built documentation.
 4. Correction of any deficiencies in the electrical system.

1.8 Schedule

1. All work including testing and commissioning of the 'Utility', 'EPS' and 'UPS' electrical systems must be completed as per the schedule provided by the project manager. Refer to schedule provided by the project manager for additional details. Include for all necessary overtime required to carry out the project. The

successful contractor will not be permitted claims as a consequence of this requirement. The successful contractor to submit a full construction schedule before starting any work.

2. Sufficient manpower, materials, equipment, appliances and services are to be kept on site at all times to maintain the scheduled completion of work.
3. All work required to be done after office hours and weekends (including x-raying, core drilling and power shutdowns), shall be included in the tender price. Note: All x-raying and core drilling shall be provided by the electrical contractor.
4. Work associated with power shutdowns (including switching services from permanent, portable or temporary generator distribution back to utility power) and with testing and commissioning of electrical systems (including load bank testing of UPS and EPS) **must be carried out between Sunday @12:01am and 4:00am**. All shutdowns must be approved by Owner.

1.9 Contract Drawings

1. The Drawings for the electrical system work are diagrammatic performance Drawings, intended to convey the scope of work and indicate the approximate sizes and locations of equipment and outlets. The Drawings do not intend to show Designer's Architectural, Mechanical or Structural details.
2. Do not scale or measure Drawings, but obtain information regarding accurate dimensions, from the dimensions shown or by site measurements. Follow the Drawings for laying out the work.
3. Make, at no additional cost, any changes or additions to materials and equipment necessary to accommodate Structural conditions (offsets around beams, columns, etc.).
4. Alter at no additional cost, the location of materials and/or equipment as directed, provided that the changes are made before installation, and do not necessitate additional materials.
5. Change location of termination panels and devices at no extra cost providing cable length increase resulting from relocation does not exceed 3m (10') and information is given before installation.
6. Confirm at the site the exact location of equipment.
7. Any miscellaneous materials, hardware, devices, wiring, etc., not specifically described, but required for the installation and operation of the electrical system, shall be provided and included as part of the Bid.

1.10 Materials And Equipment

1. All materials and equipment shall be completely new and unused products of only the most recent manufacturer model or version number, CSA or UL certified, and manufactured to the Standards specified.
2. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from the local Inspection Department.
3. No damaged, chipped or marked equipment or materials will be accepted and must not be installed.

1.11 Reserved

1.12 Operation And Maintenance Manuals

1. Provide three (3) hard copy sets of operation and maintenance manuals for equipment and products supplied.
2. Provide three (3) soft copy scanned sets of operation and maintenance manuals for equipment and products supplied. Media shall be USB drives.
3. Include the following information in the Operation and Maintenance manuals:
 - Names and address of local suppliers for the items included.
 - Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items and parts lists. Advertising or sales literature is not acceptable.
 - Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of the installation.
4. Review information provided in the maintenance instructions and manuals with the Owners' operating personnel to ensure a complete understanding of the electrical equipment and systems and their operation.

1.13 Progress Payments

1. Submit a complete breakdown of the Contract with each progress billing, indicating percentage of work complete, in a form acceptable to the Owner/Consultant.
2. The amount of monies to be allocated for close out documents must be 3% of contract value. This does not include monies allocated for studies, testing, measurement and verification, commissioning, etc.

1.14 Shop Drawings

1. Submitted Shop Drawings must indicate details of construction, dimensions, capacities, weights and electrical performance and flame spread characteristics of equipment or materials, as well as specification reference Section number and project name.
2. Shop Drawings shall be provided with sufficient space on the front for all Consultant's and Contractor's "review" stamps.
3. Work affected by submittal shall not proceed until review is complete.
4. Review submittal prior to submission to Consultant. 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 the work and Contract Documents and bears the Stamp of Communications Contractor.
5. Changes made to the Shop Drawings by the Consultant will not affect the Contract Price.
6. Submit Shop Drawings for all material and equipment referred to in contract document.

1.15 Field Supervision

1. Throughout the duration of the Project, a properly qualified Electrical Field Supervisor must be available at all times. The Supervisor who starts the work must not be changed unless requested by the project manager, or written permission from the project manager is obtained.
2. In addition, provide proper office supervision of the work. The person responsible for office supervision must visit the site as often as necessary, to ensure work is properly performed, and attend weekly site meetings when so requested.

1.16 Site Responsibilities

1. Maintain work areas to be free of construction debris and waste. The disposal of all materials shall be the responsibility of the Contractor.
2. Make all necessary arrangements to transport materials and equipment to and within the site. The Contractor shall be responsible for arranging for the use of any hoists, lifts, pulleys, winches, cranes or service elevators.
3. The Contractor is responsible for complete storage, handling, delivery, and installation of all materials used in the performance of the work.

1.17 Deliveries / Access

1. Coordinate all deliveries to site with the Building Manager. Book loading dock and service elevators 72 hours in advance. Contractor must pre-arrange all site access and authorization for all site personnel and subcontractor personnel with the Building Project Manager or his representative

1.18 Testing and Commissioning

1. Provide testing and commissioning as per Testing and Commissioning Plan to be reviewed and approved by the Consultant and Project Manager for all items and their related components.
2. Supply all required equipment maintenance and operations manuals, for owner's staff use.
3. Provide all required software for monitoring, annunciation and control/dispatch applications

1.19 Other

1. Not used.
2. It is the responsibility of the Contractor to perform all cutting, patching and repair related to the electrical system work.
3. Work by the electrical contractor shall be protected during erection against disfigurement, contamination or damage by mechanical abuse or harmful materials. Protective covers shall be installed where exposure to potential damage is likely. The contractor shall ensure that no eating, drinking or smoking is carried out in the finished areas. Damages resulting from a breach of these requirements shall be repaired at the cost of the electrical contractor.
4. Existing and adjacent finishes, work and structures shall be protected from damage resulting from work of this project.

1.20 Record and As-Built Drawings

1. The Contractor shall maintain two sets of drawings on site. Clearly mark on these drawings all changes and deviations from the contract drawings and in particular mark the actual location of all feeder conduit locations.
2. All deviations from the contract drawings shall be recorded on the "as-built" drawings, including those changes due to Addenda, Site Instructions or Change Orders.
3. After the date of Substantial Performance, obtain from the Consultant, a set of the most recent Electrical System Drawings in AutoCAD Version 2021 format. These Drawings shall be marked up to record clearly, neatly, accurately and promptly all locations of Electrical System deviations as a result of Change Orders, Consultant's or Owner's Instruction, site conditions, etc. Utilize normal recognized CAD procedures that match the original drafting methodology. Submit the revised As-Built AutoCAD files and full-sized drawings (three sets) with changes clearly indicated to the Consultant for review and final presentation to the Owner.

1.21 Drawings

1. For exact details and quantities, refer to the later sections of this document and to drawing E-1.1 through E-1.4 inclusive, E-2.1, E-9.1 through E-9.5 inclusive, E-10.1 and E-10.2 denoted as 'Issued for Tender April 3, 2025.'

1.22 Contract

1. Conform to the conditions stated in the Contract Form, Document CCDC-2.
2. A confidentiality agreement will form an integral part of the contract and will be provided to the successful contractor.

1.23 Cleaning

1. It is the responsibility of the Contractor to dispose of all waste related to this project.
2. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
3. On a daily basis, remove waste materials, rubbish, tools, equipment, machinery, surplus materials and clean all sight exposed surfaces.
4. All materials must be stacked neatly and safely.
5. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.
6. Cleaning operations shall include those areas used for temporary site access or used on a temporary basis to facilitate work.
7. The contractor will remove all garbage from site on a daily basis at his own expense.
8. Failure to provide housekeeping and/or maintain a clean work area to the satisfaction of the project manager will result in the project manager providing the necessary housekeeping and/or maintenance service with all related costs, including mark-up's, being charged to the electrical contractor.

1.24 Demolition

1. Disconnect and remove existing conduit and wiring in partitions to be demolished and existing 'BX' cables, conduit and wire in ceiling where existing outlets, lighting fixtures, devices and mechanical equipment are to be removed.
2. Remove all branch circuit wiring and raceways originating from the existing receptacle panels. Wiring and raceways shall be removed back to the source panel. Circuits utilized to feed existing to remain mechanical equipment and other 120/208 volt sources to remain must be maintained.
3. Remove all existing electrical outlets and light switches as well as the associated wiring and raceways not being reused and/or not required for new layout (note: existing outlets and switches to be removed are not shown on the drawings). Provide blank coverplates at all locations where electrical and/or communications devices were removed in which partitions are not being demolished.

1.25 Digital Photos

1. Provide digital photos of all progress to date on a weekly basis. Each photo submission must be reviewed and approved by the consultant prior to continuing with the installation.

End of Section

SECTION 26 05 01: COMMON WORK RESULTS - ELECTRICAL.

PART I - GENERAL

1.1 Reference:

1. This section forms part of every section of Division 26.

1.2 Access Doors:

1. Not Required.

1.3 Cleaning:

1. Clean devices and other surfaces that have been exposed to construction dust and dirt. Clean the insides and outsides of panels and other electrical equipment and completely remove all debris and tools from the project.

1.4 Codes and Standards:

1. Complete the installation of the work in accordance with latest editions of the Ontario Building Code, Electrical Safety Code, CSA, ULC, NFPA or other codes, as required.
2. Comply with Electrical Bulletins in force at time of Bid submission. While not identified and specified by number in this Division, they are to be considered as forming part of related Standards.
3. Abbreviations for electrical terms are as per CSA Z85.

1.5 Finishes:

1. All shop finished metal equipment and enclosure surfaces, must be prepared by removal of rust and scale from the raw metal, degreasing, cleaning, application of rust resistance primer inside and outside, and at least two coats of finish enamel paint. Use factory standard colours unless otherwise specified. Colour reference numbers are Sico.
2. Paint exterior surfaces of indoor electrical equipment to manufacturer's standard.
3. Clean and touch-up (to Consultant's acceptance) surfaces of shop-finished equipment that is scratched or marred during shipment or installation, so as to match original paint.
4. Leave with the Owner, 0.22 gal. of paint of each colour used, in the form of liquid or spray, to allow for future touch-up of damaged areas.

1.6 Inserts, Hangers and Sleeves:

1. Provide hangers, inserts, sleeves and supports as required.
2. Inserts are to be of lead shield type.
3. Hangers must not be welded to structural steel members and burning of holes in structural steel is prohibited.
4. Sleeves are to be of a type suitable for the application and be sealed and made watertight. Sleeves through concrete shall be sized for free passage of conduit, and installed flush with underside of concrete slab and extend 100mm (4") above finished floor unless otherwise shown.

1.7 Intent:

1. It is the intent of these drawings and specifications that the Contractor provide complete and operational systems as required.
2. Where differences occur, the maximum condition shall govern.
3. Any miscellaneous items, hardware, devices, wiring, etc., not specifically described, but required for the operation of the system, must be provided and included as part of the Bid.

1.8 Mounting Heights:

1. Mounting height of equipment is from finished floor to center line of equipment unless specified or indicated otherwise.
2. If mounting height of equipment is not indicated, verify with Consultant before proceeding with installation.

1.9 Owners Instruction and Trial Usage:

1. Instruct the Owner's operating personnel in the startup, operation, care and maintenance of all the equipment. All equipment to be tested, operational and commissioned before instruction. Provide sheets for signatures of Owner's representative and operating personnel present at each instruction period.
2. Arrange and pay for the service of the manufacturer's factory service Engineer/Technician to supervise the start-up of his equipment installation, and to check, adjust, balance and calibrate components.
3. Provide these services for such period, and for as many visits as necessary to ensure that the Owner's operating personnel are conversant with all aspects of its care and operation.
4. When commissioning is included in the contract:
 1. Prior to any instruction sessions, commissioning coordinator shall submit check lists of each system or equipment indicating their operation status for acceptance by the Owner.
 2. Coordinate all instruction sessions to suit Owner's operation personnel schedule. Submit proposed instruction session schedule c/w training agenda three weeks prior to session start date to Owner for review.
5. The Owner's operating personnel must be permitted to operate the systems under the contractor's supervision for a reasonable period of time prior to Substantial Completion of Contract. This use shall not be misconstrued as acceptance of the equipment.

1.10 Plywood Backboard:

1. Supply and install all plywood backboards required for the work of this Division. Plywood to be highest quality fire retardant fir. 1200 mm wide x 2400 mm high (4'-0" wide x 8'-0" high), 19mm (3/4") thick unless otherwise specified. Prime and paint backboards on both sides with fire retardant paint, equal to CGSB spec. #1-GP-151M, of a colour to match the equipment and services mounted thereon as defined in "Finishes" above. **Do not paint over fire rated stamps.**
2. Plywood backboards are to be provided for mounting the following surface wall mounted equipment:
 - Cabinets.
 - Contactors.
 - Control Panels
 - Disconnect Switches.
 - Junction Boxes 600mm (2') square and larger.
 - Pull Boxes.
 - Panel Boards.
 - Splitters
 - Transient Voltage Surge Suppression Units.
 - External Breakers
3. Where practical, group devices on a common backboard.

1.11 Protection:

1. Protect exposed live equipment during construction for personnel safety.
2. Shield and mark live parts "LIVE 600 VOLTS", or with appropriate voltage in English.

1.12 Sealing:

1. Where cables or conduits pass through non fire-rated floors, walls or roof, provide internal and external sealing thereto.
2. Retain the service of a specialty sealant contractor for the work required.
3. Comply with manufacturer's installation instructions for all sealant applications.
4. For non-fire rated locations, Sealant shall be silicone, that meets requirements of CGSB 19-GP-23, for the size of the joint required, and the types of materials being bonded.
5. For fire rated locations, the fire stop shall meet the requirements of UL with regards to the type of assembly and the fire separation.
6. Provide architecturally approved air barrier seals and vapor barrier seals to electrical items passing through or terminating within walls, roofs and decks, humidity controlled areas and pressurized areas.
7. All materials used for fire stopping of penetrations must be Hilti Limited manufactured product only.

1.13 Sprinkler Proofing:

1. All areas of this building are protected by a wet sprinkler system. **All electrical equipment** to be configured for installation in such an environment.

1.14 Warning Signs:

1. Provide warning signs, as specified to meet requirements of Department of Labor Safety Inspection, Inspection Department, Authorities having jurisdiction and Consultant.
2. Use decal signs, in English minimum as required by Authorities.

1.15 Wire Pulling Lubricant:

1. Lubricant to be non-corrosive and NFPA 70 approved for the type of cable used.
2. Lubricants to be soap or wax based, depending upon application. Use soap based for short runs and for semi-conducting insulated wires, and wax based for long runs.

End of Section

SECTION 26 05 20: WIRE AND BOX CONNECTORS (0-1000V).

PART I - GENERAL

1.1 Work Included:

1. Provide all wire and box connectors required for a complete electrical system installation.

PART II - PRODUCTS

2.1 Materials:

1. Pressure type wire connectors are to be manufactured to CSA C22.2 No.65. Clamps and connectors are to be manufactured to CSA C22.2 No. 18.
2. Building Wire Connectors shall be:
 1. For wire sizes up to #6 AWG - Ideal "Wing Nut" or Gardner - Bender "Wing Gard".
 2. For Wire Sizes #4 AWG and larger:
 - End to end splices - Burndy YS.
 - Parallel splices - Burndy YC & YH (CU) or YHO & YHD (CU / AL).
 - At studs and bus bars - Burndy YA (CU) or YA-A (CU / AL).
 - Two or three conductors in parallel - Burndy KA-U (CU / AL).
3. Cable connectors shall be:
 1. For armored TECK cables, watertight type, with open compounded head - T&B series "Spin-on 2" with corrosion resistant boot.
 2. For armored cables steel type with nylon insulated throat - T&B "TITE-Bite".
 3. Clamps or connectors for armored cable, flexible conduit non-metallic sheathed cable shall be as required.

PART III - EXECUTION

3.1 Installation:

1. Remove insulation carefully from ends of conductors and:
 1. Install connectors and tighten as recommended by manufacturer.
Installation shall meet secureness tests in accordance with CSA C22.2 No.65.
2. Install bushing stud connectors in accordance with NEMA 1Y-2.

End of Section

SECTION 26 05 21: WIRE AND CABLES.

PART 1 - GENERAL

1.1 Work Included:

1. Provide building wire as detailed below and as required for a complete electrical installation.

PART II - PRODUCTS

2.1 Materials

1. Wire in Conduit:

1. Conductor material to be annealed commercial grade, copper, 98 percent conductivity, up to #10 AWG solid, with RW90 insulation, #8 and larger, stranded, with RW90 insulation, unless noted otherwise, 300V rating for fire alarm, security and other low voltage circuits, 600V rating for 120 / 208V circuits, 1000V rating for 230 / 400V circuits, 1000V rating for 277 / 480V circuits, 1000V rating for 347 / 600V circuits.

2. Colour Coding (must be approved by ESA Field Inspector):

1. Two conductor, 1 phase: 1 black, 1 white
Three conductor, 1 phase: 1 red, 1 black, 1 white
Three conductor, 3 phase: 1 red, 1 black, 1 blue
Four conductor, 3 phase: 1 red, 1 black, 1 blue, 1 white

2. Ground wires: green.

3. Low voltage Armored Cables Type AC-90:

1. Type to be AC-90, Multi-conductor, with solid, annealed commercial grade 98 percent conductivity tinned copper conductors and cross-linked polyethylene with R90 insulation, 600 volt rating, on #10 and #12 size only.

2. Colour Coding:

- Two conductor, 1 phase: 1 black, 1 white
Three conductor, 1 phase: 1 black, 1 red, 1 white

3. Grounding to be uninsulated, solid copper, with impregnated paper separator.

4. Low voltage Armored Cables - TECK:

1. Type to be TECK, single conductor with annealed. Class B, stranded copper conductors and cross linked polyethylene, RW90 insulation, 1000 volt rating for #8 AWG and larger.
2. The inner and outer jackets to be PVC "Flamenol" suitable for -40°C, with mylar tape separator and aluminum strip, armour helically wound and interlocked.

5. Two Hour Fire Rated Cable - Mineral Insulated

1. Mineral Insulated Cables:

1. Mineral insulated cables shall be manufactured to CSA C22.2 No. 124.
2. Conductors are to be solid, bare, soft annealed copper, sized as required.
3. Insulation to be compressed powdered magnesium oxide, to form compact homogeneous mass throughout entire length of cable.
4. Overall covering to be annealed seamless copper sheath, type LW MI, rated 600 volt, 250°C.

PART III - EXECUTION

3.1 Installation:

1. General:

1. Wire shall be installed in conduit and sized for the connected load(s) and protection as required, unless otherwise specified.
2. Provide a dedicated #12AWG neutral from panel board to wiring devices ran with each of Phase 'A', 'B', 'C' conductors (ie: dedicated neutral per phase). Minimum power conductor wire size shall be #12 AWG.
3. Minimum power conductor wire size shall be #12 AWG, unless otherwise stated. Home runs in excess of 30 m (90') for circuits protected by a 15A over current device, shall be #10 AWG.
4. The current carrying capacity of the feeders, subfeeders and branch circuit conductors shall be sized to equal or better than shown on the drawings. If wire or cable sizes with equivalent current carrying capacity other than that specified is used, ensure that the voltage drop shall not be more than 2%.
5. The number of wires indicated for various systems is intended to show the general scheme only. The required number and type of wires shall be installed in accordance with the manufacturer's diagrams and with the requirements of the installation.

2. Wire in Conduit:

1. Provide pigtails at all outlets for wiring devices. All neutrals and branch circuits shall be connected in each outlet box to avoid a break in the neutral or the circuit wire when fixture or wiring device is disconnected.
2. At each junction, pull and outlet box make a 360 degree loop of the stripped uncut ground conductor under the ground screws.

3. Low Voltage Armored Cables - (Feeders):

1. Do not directly bury in or below concrete slabs or walls.
2. Do not encircle single conductor cable with ferrous metal.
3. No splices will be permitted.
4. Single conductors of the three or four wire circuit shall be run with uniform spacing of not less than one cable diameter throughout the feeder length.
5. Use wood throated cable clamps to ensure proper and uniform cable spacing.
6. Where cables are installed on walls, provide mechanical protection over them up to 2.4m (8') above finished floor, using a 12 gauge U section aluminum cover.
7. Cable connections to all enclosures, boxes and panels shall be by means of a watertight malleable aluminum connector.

4. Mineral Insulated Cable:
 1. Run cable exposed as required, securely supported by straps.
 2. Make cable terminations by using factory made kits.
 3. Use thermoplastic sleeving over bare conductors at cable terminations.
 4. Do not splice cable.
 5. MI cables must be rigidly supported at maximum spacing of 1m (3'). Do not use aluminum products for support.
 6. MI cables shall be used for emergency system feeders and branch circuits requiring a one (1) hour fire rating.

End of Section

SECTION 26 05 27.00: GROUNDING

PART I - GENERAL

1.1 Work Included:

1. Provide all grounding to conform with the Canadian Electrical Code and the latest instructions of the Inspection Authority, with any further requirements as noted herein.

PART II - PRODUCTS

2.1 Materials:

1. All grounding conductors stranded copper, bare or insulated as indicated on Drawings or in Specifications.
2. All ground wires are to be FT-4 rated factory green. Green tape, spray paint or any other means to alter the colour of the conductor is not permitted.
3. Use Cadweld or Burndy Thermoweld process for all weld connections. AMP of Canada Ltd. Wrench-Lok grounding connectors are an acceptable equivalent to welded connections.
4. All ground connectors to be designed and approved for grounding purposes.

PART III - EXECUTION

3.1 Installation:

1. Ground all conduit, and all non-current carrying metal parts, equipment cases, frames, bases, brackets, etc.
2. Grounding of all trays, AFCRs, racks, cabinets, etc. provided by the electrical contractor.
3. Ground each piece of fixed equipment back to the panel feeding that equipment, by one of the following methods:
 1. Conduit shall **not** be utilized for the ground return conductor.
 2. Where the conduit is flexible, install a separate bare soft drawn copper ground inside the conduit. At the switchboard or distribution panel, provide a grounding bushing, loop the ground conductor through the bushing, and connect to the switchboard ground bus. At the fixed equipment, connect to an internal ground bus, or connect to the inside of the metal enclosure utilizing approved screws and connectors (remove all paint).
 3. Run a separate (dedicated) insulated ground wire in all conduits to all devices and fixtures.
 4. Where equipment is fed by a multi-conductor power cable, provide a ground conductor in the cable. At the switchboard or panel, connect to the ground bus. Use a grounding connector on the cable for positive grounding of the metallic sheath. Loop the ground wire to the grounding connector.
 5. Run a separate ground wire in all flexible conduits. Connect each end to ground bus or lug or connector.
 6. Where mechanical protection is required for insulated grounding conductors install in rigid conduit.
 7. Provide weld connection or wrench type grounding connectors for:
All connections between grounding conductors.
All connections to building steel.
All connections between grounding conductors and cable lugs.
 8. Arrange grounding to provide the minimum impedance paths for ground fault currents. Provide any additional grounding required for approval by the inspecting authorities.

3.2 Equipment Grounding

1. Install grounding connections to typical equipment including non-current carrying metal parts of transformers, generators, motors, circuit breakers, cable sheaths, raceways, pipe work, screen guards, switchboards, meter and relay cases, any exposed building metal and building structural steel.

End of Section

SECTION 26 05 29: HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS:

PART I - GENERAL

1.1 Work Included:

1. Provide Hangers and Supports for Electrical Systems as required for a complete electrical system installation.

PART II - PRODUCTS

2.1 Support Channels:

1. U shape pre-galvanized steel, size 41 mm x 41 mm x 22 mm (1-5/8" x 1-5/8" x 7/8"), for surface mounting, suspending, or inserting into poured concrete walls and ceilings as required.
2. All channel fittings to suit channel type.
3. All other fittings to suit equipment weight, location and surface as required.

PART III - EXECUTION

3.1 Installation:

1. Secure plywood backboards, channels, luminaires, equipment and fittings to wood with wood screws, to solid masonry, tile and plaster surfaces with lead anchors, to poured concrete with self-drilling expandable inserts, and to hollow masonry walls with toggle bolts.
2. All ceiling mounted equipment shall be independently supported from the structure. Do not support equipment from ceiling support system.
3. Support equipment, conduit or cable using clips, spring loaded bolts, or cable clamps designed as accessories to basic channel members.
4. Fasten exposed conduit or cables to building using:
 1. Two-hole steel straps to secure surface conduits and cables 50 mm (2") and smaller.
 2. Two-hole steel straps for conduits and cables larger than 50 mm (2").
 3. Beam clamps to secure conduit to exposed steel work.
5. For suspended support system:
 1. Support individual cable or conduit runs with 6 mm (1/4") diameter threaded rods and spring clips.
 2. Support two or more cables or conduits on channels support by 6 mm (1/4") diameter threaded rod hangers where direct fastening to building construction is impractical.
 3. Support suspended luminaire using two or more lengths of Weldless "Single Jack", bright zinc plated steel chain, American Standard #10 gauge, 13 links per foot.
6. Provide metal brackets, frames, hangers, clamps and related type of support structure 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 and approval of Consultant.
10. Install Hangers and Supports for Electrical Systems as required for each type of equipment, cable and conduits, and in accordance with manufacturer's installation recommendations.

End of Section

SECTION 26 05 31: SPLITTERS, JUNCTION BOXES, PULL BOXES AND CABINETS.

PART I - GENERAL

1.1 Work Included:

1. Provide splitters, junction boxes, pull boxes and cabinets as shown on the drawings and as required for a complete electrical installation.

PART II - PRODUCTS

2.1 Splitter Troughs:

1. Splitter trough construction is to be based on CSA C22.2 No. 76.
2. They shall have sheet steel enclosure, with welded corners and formed hinged cover suitable for locking in closed position.
3. Connection bars are to match required size and number of incoming and outgoing conductors as indicated.
4. Provide at least three spare terminals on each set of lugs in splitter troughs less than 400A and feed through lugs where required.
5. Provide double lugs for neutrals where required.
6. Enclosures shall be CSA/EEMAC Type 1 modified to sprinkler proof enclosure.

2.2 Junction and Pull boxes.

1. Junction and pull boxes construction is to be based on CSA C22.2 No. 40.
2. They shall be suitable for surface mounting and be of welded steel construction with screw-on flat covers.
3. For flush-mounted pull and junction boxes, provide covers with 25 mm (1") minimum extension all around.

2.3 General Cabinets:

1. Type D or E to be sheet steel, for surface mounting, complete with screw on cover (D) or hinged door (E), and return flange overlapping sides, handle and catch.

PART III - EXECUTION

3.1 Splitter Installation:

1. Install splitter troughs where required. Mount plumb, true and square to the building lines.
2. Extend splitters for full length of equipment arrangement except where indicated otherwise.
3. Provide **watertight connections** for all services entering the top of the splitter trough.

3.2 Junction, Pull Boxes and Cabinet installation:

1. Install junction, pull boxes and cabinets in inconspicuous but accessible locations.
2. Only certain junction and pull boxes are indicated. Provide pull boxes so as not to exceed 30 m (100') of conduit run between boxes, and after every two (2) 90 degree bends.

3.3 Identification:

1. Install nameplates.

End of Section

SECTION 26 05 32: OUTLET AND CONDUIT BOXES AND FITTINGS.

PART I - GENERAL

1.1 Work Included:

1. Provide outlet and conduit boxes and fittings as required for a complete electrical system installation.

PART II - PRODUCTS

2.1 Outlet and Conduit boxes - General

1. The construction of outlet boxes, conduit boxes and fittings is to be based on:
 - Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
 - Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, [ferrous alloy] [aluminum], Type FD, with gasketed cover.
 - Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C
2. Boxes shall be suitable for the utilization voltage.
3. Combination boxes shall have barriers where outlets for more than one system are grouped.
4. Recessed 100 mm (4") square or larger outlet boxes shall be complete with single or ganged plaster rings to suit application.

2.2 Sheet Steel Outlet boxes:

1. Electro-galvanized steel single and multi-gang device boxes for flush installation, shall be minimum size 75 mm x 50 mm x 37 mm (3" x 2" x 1-1/2") unless otherwise specified or required. 100 mm (4") square outlet boxes shall be used when more than one conduit enters one side, with extension and plaster rings as required.
2. Boxes for door switches and push buttons shall be sized as required.
3. Utility boxes for connection to surface mounted EMT conduit, shall be minimum 100 x 54 x 48 mm (4" x 2-1/8" x 1-7/8") size.
4. Square or octagonal outlet boxes for lighting fixture outlets, shall be minimum 100 mm (4") size.
5. Square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster or tile walls, shall be minimum 100 mm (4") size.

2.3 Masonry Boxes:

1. Electro-galvanized steel masonry single and multi-gang MBD boxes shall be used for flush mounted devices in exposed block walls.

2.4 Concrete boxes:

1. Electro-galvanized sheet steel concrete boxes shall be used for flush mounting in concrete, with matching extension and plaster rings as required.

2.5 Conduit Boxes:

1. Cast FS or FD ferrous alloy boxes with factory-threaded hubs and mounting feet shall be used for outlets connected to surface mounted rigid conduit.

2.6 PVC Boxes:

1. F series and octagon boxes shall be moulded type, with fastening ears and screwed secured covers as required.

2.7 Fittings - General:

1. Bushing and connectors shall be with nylon insulated throats.
2. Provide knock-out fillers to prevent entry of foreign materials.
3. Use conduit outlet bodies for conduit up to and including 32 mm (1-1/4") and pull boxes for larger conduits.
4. Provide double locknuts and insulated bushings on sheet metal boxes.

PART III - EXECUTION

3.1 Installation:

1. Support boxes independently of connecting conduits.
2. Fill boxes with paper, foam sponges or similar approved material to prevent entry of construction material.
3. Size box wiring chambers in accordance with Electrical Safety Code.
4. Gang boxes together where wiring devices are grouped.
5. Provide matching blank cover plates for boxes without wiring devices.
6. Use combination boxes where outlets for more than one system or voltage are grouped.
7. For flush installations, mount outlets flush with finished wall using plaster rings to permit wall finish to come within 5mm (1/4") of opening.
8. Provide correct size of openings in boxes for conduit and armored cable connections. Reducing washers are not allowed.

End of Section

SECTION 26 05 34: CONDUITS, CONDUIT FASTENINGS AND CONDUIT FITTINGS.

PART I - GENERAL

1.1 Work Included:

1. Provide conduits, conduit fastenings and conduit fittings as detailed below and as required for a complete electrical installation.

PART II - PRODUCTS

2.1 CONDUITS

1. Rigid and epoxy coated conduit shall be threaded, galvanized steel and shall be manufactured to CSA C22.2 No. 45.
2. Electrical metallic tube (EMT) conduit and couplings shall be manufactured to CSA C22.2 No. 83.
3. Flexible metal conduit and liquid tight - flexible metal conduit shall be manufactured to CSA C22.2 No. 56.

2.2 CONDUIT FASTENINGS

1. Conduit straps shall be steel, double hole for rigid or EMT conduit. **Single hole straps are not acceptable.**

2.3 CONDUIT FITTINGS

1. Fittings for conduits shall be manufactured to CSA C22.2 No.18. Provide coatings as per conduit.
2. Fittings for rigid conduit shall be steel threaded type.
3. Fittings for EMT conduit to be steel set screw type fittings.
4. Fittings for flexible conduit and exposed conduit outdoors to be liquid-tight type, straight or angled threaded for rigid and compression for EMT conduit.
5. Expansion fittings for rigid or EMT conduits shall be of the watertight type, with an integral bonding assembly, suitable for deflection in all directions.

2.4 PULLING CABLES

1. Pulling cables shall be 1/4" diameter polypropylene and of a strength suitable for tension to be pulled.

2.5 WATERPROOF MEMBRANE

1. Conduits penetrating waterproof membranes shall be PEM #6372.

PART III - EXECUTION

3.1 INSTALLATION (GENERAL)

1. The conduits for the following circuits and systems shall be run separately:
 - 120/208 volt utility power distribution.
 - 347/600 volt utility power distribution.
 - 120/208 volt emergency power distribution.
 - 347/600 volt emergency power distribution.
 - Normal power to luminaries.
 - Emergency power to luminaries and exit signs.
 - Fire alarm system multiplex loop devices.
 - Fire alarm system signaling devices.
 - Access Control and CCTV System devices.
 - Telephone and data systems.
 - Control wiring.
 - Net Status devices.
2. All conduits to be surface mounted (exposed, EMT) in mechanical and electrical service spaces and rooms and concealed elsewhere unless otherwise shown.
3. Wiring in ceiling spaces and in all partitions shall be EMT.
4. Exposed conduits shall be installed to conserve headroom and cause minimum interference in spaces through which they pass.
5. Use rigid conduit up to 2.4 m (8' -0") above finished floor where exposed indoors
6. **Use RGS conduit PVC coated galvanized rigid steel Robroy Permacote in all outdoor locations and in areas that are not environmentally controlled.**
7. Use electrical metallic tubing (EMT) above grade, and above 2.4 m (8' -0") above finished floor where exposed indoors.
8. Use flexible liquid tight metal conduit for connection to motors, and transformers.
9. Bend conduit without heating. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
10. Mechanically bend conduit over 20mm (3/4") diameter.
11. Field threads on rigid conduit must be of sufficient length to draw conduits tight.
12. Install pulling cables in all conduits that are to remain "empty".
13. A maximum of two (2), 90 degree bends, or equivalent up to 180 degrees, will be permitted without installation of a pull box. Radius of bends must be no less than ten (10) times the conduit diameter.
14. Conduits must be dry, before installing wires.
15. Support all branch conduits from building structure. Do not clip conduits to ceiling hangers, sprinkler pipes, plumbing or BAS wiring hangers.

3.2 SURFACE CONDUITS

1. Surface conduits shall be run parallel or perpendicular to building lines.
2. Conduits located near any heat producing equipment shall have 1500 mm (5 ft.) clearance.
3. Conduits adjacent to structural steel, beams or columns shall be run within the flanged portion, unless otherwise shown.
4. Group exposed conduits on surface or suspended channels.
5. Do not pass conduits through structural members except where indicated and approved by landlord.
6. Do not locate conduits less than 75 mm (3") parallel to steam or hot water lines. Provide a minimum clearance of 25 mm (1") at crossovers.

3.3 CONDUIT SIZE

1. The minimum conduit size shall be 19 mm (3/4").
2. All undimensioned conduits in the drawings are 19 mm (3/4").

3.4 EXPANSION FITTINGS

1. Conduit expansion fittings shall be provided on all conduits crossing expansion joints, and at maximum of 60 m (200') spacing.
2. Install expansion fittings perpendicular to expansion joint.
3. Refer to structural drawings for location of expansion joints.

End of Section

SECTION 26 27 26: WIRING DEVICES.

PART I - GENERAL

1. Provide all wiring devices indicated on drawings and described below.

PART II - PRODUCTS

2.1 Standards:

1. Construction of manually operated general purpose AC switches is to be based on CSA C22.2 No. 111, snap switches on CSA C22.2 No.55, and receptacles, plugs and similar wiring devices on CSA C22.2 No. 42.
2. Devices shall be Specification Grade and of one manufacturer throughout

2.2 Switches:

1. Switches shall be suitable for the voltage and load controlled and shall be single pole or three way as indicated.
2. They shall have terminal holes approved for No. 10 AWG wire, silver alloy contacts, and urea or melamine moldings for parts subject to carbon tracking.
3. They shall be suitable for back and side wiring, and rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
4. White decorator style switches shall be used for 120V circuits, in all finished areas.
5. White decorator style switches shall be used for 347V circuits in all areas.

2.3 Receptacles:

1. Duplex receptacles shall be NEMA Type 5-15R, 125 volt, 15 Amp, U ground and NEMA Type 5-20R (T Slot), 125 volt, 15/20 Amp, U Ground.
2. They shall be decorator style.
3. They shall be suitable for No. 10 AWG, back and side wiring, have break-off links for use as split receptacles and shall have eight (8) back wired entrances, four (4) side wiring screws and double wipe contacts with riveted grounding contacts.

2.4 Coverplates:

1. Coverplates shall be white in finished areas and stainless steel in unfinished areas.
2. Use die cast aluminum coverplates for wiring devices mounted for surface mounted FS or FD boxes, and pressed steel coverplates for utility surface boxes.
3. Use weatherproof spring-loaded, cast aluminum coverplates complete with gaskets for exterior mounted single receptacles and switches, or where indicated.

PART III - EXECUTION

3.1 Installation:

1. Switches:
 1. Install single throw switches with lever in “UP” position when switch closed.
 2. Install switches in gang type outlet box when more than one switch is required in one location.
2. Receptacles:
 1. Install receptacles in gang type outlet box when more than one device is required in one location.
3. Coverplates:
 1. Protect coverplate finish until painting and other work is finished or install after painting is complete.
 2. Do not use flush type coverplates on surface mounted boxes.

End of Section

SECTION 26 28 13.01: FUSES

PART I - GENERAL

1.1 Work Included:

1. Supply and install fuses in disconnect switches, etc. as required to complete this contract.

PART II - PRODUCTS

2.1 Fuses - General:

1. Plug and cartridge fuses shall be manufactured to CSA C22.2 No. 59.
2. HRC fuses shall be manufactured to CSA C22.2 No. 106 and to have interrupting capability of 200,000A symmetrical.
3. Fuses shall be the product of one manufacturer.
4. Fuse type reference L1, L2, J1, R1, etc. have been adopted for use in this specification.

2.2 Fuse Types:

1. HRCI - J fuses.
 1. Type J1, time delay, capable of carrying 500% of its rated current for 10 seconds minimum.
 2. Type J2, fast acting.
2. HRC - L.
 1. Type L1, time delay, capable of carrying 500% of its rated current for 10 seconds minimum.
 2. Type L2, fast acting.
3. HRC - R fuses (For UL Class RK1 fuses, peak let-through current and I^2t values not to exceed limits of UL 198E table 10.2.)
 1. Type R1, (UL Class RK1), time delay capable of carrying 500% of its rate current for 10 seconds minimum, to meet UL Class RK1 maximum let-through limits.
 2. Type R2, time delay, capable of carrying 500% of its rated current for 10 seconds minimum.
 3. Type R3, (UL Class RK1), fast acting Class R, to meet UL Class RK1 maximum let-through limits.
4. HRCII - C fuses.

PART III - EXECUTION

3.1 Installation:

1. Install fuses in mounting devices immediately before energizing circuit.
2. Ensure circuit fuses fitted to physically matched mounting devices. Install Class R rejection clips for HRCI-R fuses.
3. Ensure correct fuses fitted to assigned electrical circuit.
4. Fuses protecting motor loads and transformers to be type J1 for up to and including 600A and L1 for ratings above 600A.
5. Fuses protecting feeder circuits to be type J2 for up to and including 600A and type L2 ratings above 600A.
6. Fuses protecting other services or equipment shall be of the type required for that purpose.

End of Section

SECTION 26 28 23: DISCONNECT SWITCHES - FUSED AND NON-FUSED

PART I - GENERAL

1.1 Work Included:

1. Provide all disconnect switches shown on the drawings and as required for motors.

PART II - PRODUCTS

2.1 Equipment

1. Fuseholder assemblies to CSA C22.2 No. 39
2. Fusible and non-fusible disconnect switches shall be installed in CSA enclosures.
3. Provide for padlocking in "OFF" switch position by one lock.
4. Provide a mechanically interlocked door to prevent opening when handle in "ON" position.
5. Provide fuses sized as required.
6. Fuseholders in each switch shall be suitable without adapters, for type of fuse as specified.
7. Provide quick make, quick break action.
8. Provide ON-OFF switch position indication on switch enclosure cover.
9. Enclosures shall be CSA/NEMA Type 1 modified to sprinkler proof enclosure.

PART III - EXECUTION

3.1 Installation:

1. Install disconnect switches with or without fuses as required.
2. Provide **watertight connections** for all services entering the top of the disconnect switches.

End of Section

SECTION 26 60 01: ELECTRICAL IDENTIFICATION.

PART I - GENERAL

1.1 Work Included:

1. Identify electrical equipment as specified herein.

1.2 Manufacturer's Nameplates:

1. Have the manufacturer's nameplates affixed to each item of all equipment showing the size, name of equipment, serial number and all information usually provided, including voltage, cycle, phase, horsepower, etc., and the name of the manufacturer and his address. Ensure that all stamped, etched or engraved lettering on plates is perfectly legible. Ensure that nameplates are not painted over. Where apparatus is to be concealed, attach the nameplate in an approved location on the equipment support or frame.
2. Ensure that panels and other apparatus which have exposed faces in finished areas do not have any visible trademarks or other identifying symbols. Mount nameplates behind doors.

PART II - PRODUCTS

2.1 Lamacoid Plates:

1. Green background with black engraved letters 10 mm (0.4") high or 25 mm (1") high as noted for normal power distribution.
2. Red background with black engraved letters 10 mm (0.4") high or 25 mm (1") high as noted for EPS power distribution.

2.2 Conductor Markers:

1. Cable diameter less than 13 mm (1/2") - Electrovert type Z.
2. Cable diameter 13 mm (1/2") and larger - Electrovert #510 strap-on.
3. Colour - white with black markings except fire alarm and life safety system which shall be white with red markings.

PART III - EXECUTION

3.1 Conduit Services - Power:

1. Locate identification:
 - Behind each access door.
 - At each change of direction and at junction boxes.
 - At not more than 10 m (40') apart in straight runs of conduit behind removable enclosures such as lay-in type ceiling, but on both sides of sleeves through walls or floors.
 - Above each floor or platform for vertical exposed conduits, preferably 1500 mm (60") above floor or platform.
 - Use stencils and stencil paint or lamacoid plates on all conduits.
 - Use minimum 25 mm (1") high letters.
 - The identification shall describe system voltage and service, i.e., "120 / 208 volt lighting to panel AA".

3.2 Conduits and outlet boxes:

1. Identify conduits and outlet boxes for the various systems by the use of the following distinctive colour paints. Apply a small area of paint to the inside of each outlet box, pull box and panel as it is being installed. Identify junction boxes in suspended ceiling areas with colour on both inside and outside.
 1. 120 / 208 volt system. -Black
 2. Fire Alarm systems. -Red
 3. 347/600 volt system. -Blue
 4. Security Alarm system -Orange
2. Use the colour coding as defined in NEC Section 210.
3. Where the existing colour coding differs from these Specifications, notify the Consultant of colours used and maintain existing colour coding.

3.3 Equipment Nameplates:

1. Identify all equipment listed below with lamacoid plates, letters 10 mm (0.4") high, unless otherwise noted.
 1. Lighting and Power Panels - Plates to be on outsides of door. Typical identification: "Lighting Panel C 120/208V, 3PH, 4 W MAINS 225 AMP 18KA RMS. Supplied from Panel BB".
 2. Disconnect switches and starters - Plates to be mounted externally on switch cover. Typical identification: "Fan S4, 208V, 3PH".
 3. Transformers - Plates to be mounted externally on case. Typical identification: "Transformer TR-UPSA 225 KVA/416/120/208V, 3PH / 4W fed from Panel UPS A".
2. Secure with mechanical fastening devices except on the inside of panel doors where gluing will be acceptable.

3.4 Wiring Colour Code:

1. Power and Lighting Conductors:
 1. Phase A - Red
 2. Phase B - Black
 3. Phase C - Blue
 4. Neutral - White
 5. Ground - Green
2. For sizes available in black only, use coloured tape markers at junction boxes and terminal points to match phase coding described above.
3. Band green isolated ground conductors with yellow tape.
4. Control conductors - Orange
5. Fire Alarm System Conductors.
 1. Alarm initiating devices and manual pull stations - red and blue.
 2. Alarm signaling devices - black and white.

3.5 Conductor Markers:

1. For power feeders, install markers at either end of the conductors where terminated inside of equipment to match wiring diagram conductor identification or panelboard circuit numbers. Typical identification Panel AA circuits - 21; use "AA-21". For a three phase circuit provide identification on phase A conductor only. For a single phase circuit provide identification on the phase conductor.
2. For Branch circuits supplying single phase and three phase devices such as receptacles and connections to equipment identify conductors at panel and in device outlet box. Install marker on phase conductor inside outlet box. Typical identification if device is connected to Panel B - circuit 14, marker identification "B-14".

End of Section

SECTION 26 60 02: TESTING AND COMMISSIONING OF ELECTRICAL SYSTEMS.

PART I - GENERAL

1.1 Description:

1. Include in work of this section, the testing and commissioning of all new electrical and component systems.
2. Include any specific testing of equipment required by the Hydro Inspection or Supply Authorities.
3. The complete costs of the site, load bank and factory testing and commissioning witnessing of Electrical Equipment is to be included in the Bid price.
4. Inform manufacturers of all factory and site testing requirements and include all their costs in the Bid price.
5. At their own discretion, testing is to be witnessed by the Owner and the Electrical Consultant.

1.2 Scope:

1. Include factory testing and approved certification, where required.
2. Coordinate with the equipment manufacturer, notify the Electrical Consultant in writing, 10 (ten) days before any factory testing to confirm Consultant's desired presence, and be present for all site testing.

1.3 Completion of Work:

1. All electrical systems and equipment shall be totally commissioned and operating before date of "Substantial Completion".
2. Coordinate with other trades and the building operations staff for work which affects the operation of the electrical systems, before submitting request for testing and commissioning. Failing to comply, bear all costs including Consultant's time cost, incurred for re-testing and re-commissioning.

PART II - PRODUCTS

2.1 Materials:

1. Provide all tools, equipment, labour and materials required to perform electrical testing and commissioning as specified. Provide the test results report (s).

PART III - EXECUTION

3.1 General:

1. Perform site testing and commissioning only after all equipment is installed and operational.
2. Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
3. Provide four (4) copies of certificates of all factory and site testing in complete detail bearing in each case, the seal of the engineer responsible for the tests.
4. Submit all test results for Consultant's review.
5. All equipment or system deficiencies identified by factory or site testing procedures, to be corrected by the Contractor prior to obtaining a "Certificate of Substantial Completion".
6. Submit report, at completion of measurements, listing phase and neutral currents on panelboards, dry-type transformers and motor control centres, operating under normal load. Include hour and date on which load was measured, and voltage at time of test.
7. General operations: energize and operate electrical circuit and item. Repair, alter, replace, test and adjust as necessary for a complete and operating electrical system.

8. Test systems and obtain written confirmation from manufacturers that components have been installed correctly and system functioning as intended. Submit certification for power distribution, communications systems and emergency power to Owner's Consultant.
9. Provide labour, instruments, apparatus and pay expenses required for testing. Owner's Consultant reserves right to demand proof of accuracy of instruments used.
10. Perform the following tests on completed power systems:
 1. Supply voltage: measure line voltage of each phase at load terminals of main breakers and report results in writing to Owner's Consultant. Perform test with majority of electrical equipment in use.
 2. Motor loading: measure line current of each phase of motors with motor operating under load, and report results in writing to Owner's Consultants.
 1. Upon indications of imbalances or overloads, thoroughly examine electrical connections and rectify defective parts or wiring.
 2. If electrical connections are correct, report overloads due to defects in driven machines in writing to Owner's Consultant.
 3. Insulation resistance tests:
 1. Megger circuits, feeders and equipment up to 350V with a 500V instrument for at least one (1) minute.
 2. Megger 350-600V circuits, feeders and equipment with a 1000V instrument for at least one (1) minute.
 3. Check resistance to ground before energizing.
 4. Coordinate and carry out motor testing at same time as driven equipment is being tested. In addition to motor loading tests, provide labour and instruments to read and record motor load readings required to supplement tests on driven equipment through various load sequences, as required by driven equipment tests.
11. Immediately prior to occupancy, test entire electrical system by performing loss and return of utility power test. Demonstrate operation of:
 1. Low voltage service equipment and metering
 2. Exit and emergency lighting
 3. Restabilization of systems after power return. Attach report printouts as evidence of expected operation on systems.
 4. User equipment shut-down and auto-restart.

3.2 Field Tests

1. Provide advance notice to Owner's Consultant of proposed testing schedule.
2. Perform tests at time of acceptance of work.
3. Conduct and pay for field tests:
 1. Power distribution, including phase voltage, grounding and load balancing.
 2. Circuits originating from branch distribution panels.
 3. Lighting and lighting control. Motors, heaters and associated control equipment, including sequenced operation.
 4. Emergency Power Systems
4. Perform tests in presence of Owner's Representative.
 1. Provide instruments, meters, equipment and personnel required to conduct required tests.
 2. Test systems to verify operation as specified.
5. Conduct di-electric tests, hi-pot tests, insulation resistance tests and ground continuity tests as required by nature of various systems and equipment

3.3 General Testing:

1. With the system completely connected, perform the following tests:
 1. Control and Switching - all circuits shall be tested for the correct operation of devices, switches and controls.
 2. Polarity Tests - all sockets shall be tested for correct polarity.

3. Voltage Test - a voltage test shall be made at the last outlet of each circuit. The maximum drop in potential permitted will be 2% on 120 and 208 volt branch circuits and on 208 volt feeder circuits. Any deficiency in this respect shall be corrected.
4. Phase Balance - measure the load on each phase at each splitter, and lighting and power panelboard and report the results in writing to the Consultant. Rearrange phase connections as necessary to balance the load on each phase as instructed by the Consultant, with the re-arrangement being restricted to the exchanging of connections at the distribution points mentioned in this paragraph. After making any such changes, make available to the Consultant drawings or marked prints showing the modified connections.
5. General Operations - energize and put into operation each and every electrical circuit and item. Necessary repairs, alterations, replacements, tests and adjustments required shall be made for complete and satisfactory operating systems.

3.4 Sealing:

1. Ensure and verify that all penetrations of electrical equipment have been properly sealed with appropriate material and to the manufacturer's requirements.

3.5 Noise and vibration:

1. Ensure and verify that all isolation equipment has been installed where required and to the manufacturers' recommendations. Include the locations of and measurements of static deflection of spring isolators.

3.6 Coordination Study

1. For the entire electrical distribution system provided as part of this contract and for the existing high voltage base building switchgear and low voltage base building switchgear, supply a report from an independent test agency of the short circuit, protection, co-ordination study of the electrical distribution system. An existing coordination study is not available for contractor's use.
2. Procure (coordinate and pay for) the services of Brosz Technical Services Inc. Kyle Bunte kbunte@brosz.net or Krka Power Inc. David Bibic david@krka.ca to prepare the coordination study and arc flash analysis.

Co-ordination of Protective Devices:

- .1 Ensure circuit protective devices such as overcurrent trips, relays, circuit breakers and fuses are installed to values and settings so as to provide protection by means of opening the closest device to the fault.
- .2 Submit a short circuit, protection and co-ordination study as follows:
 1. Obtain and organize all electrical protection data for all the equipment. This will consist of obtaining the relay types and settings, transformer impedances, cable sizes, fuse sizes and types, motor data, etc., required to carry out the short circuit.
 2. Perform a short circuit analysis to determine short circuit current levels at all critical points in the distribution system, having obtained the available short circuit current available from the Hydro Supply Authority.
 3. Generate appropriate settings for all relays and protective devices from the level of the Hydro Supply Authority feeder protective devices to the largest downstream device on all the feeder secondary distribution levels.
- .3 Provide a complete, comprehensive report at the conclusion of the short circuit, protection and co-ordination study consisting of the following:
 1. A set of time current curve characteristics of all protective devices in the system plotted on log/log graph paper with corresponding short circuit current levels.

2. Time current damage curves for all transformers, large motors and cables are also to be plotted.
3. Provide a complete schedule of all main protective relays, fuses and other protective device listing device locations, function number, manufacturer, model number, size, range, setting, etc.
4. The complete study will illustrate and ensure that the settings and sizes of all protective devices for each voltage level have been chosen to ensure maximum or optional protection and co-ordination during electrical fault or overload conditions.
5. These generated settings will then be applied by “in-field” testing methods to the respective devices.

3.7 Ground Fault Protection System

1. Inspect relays visually for condition and clean where necessary.
2. Check all connections for tightness.
3. Apply settings to each relay as specified in the short circuit, protection and co-ordination study and test operation by means of a relay test set.
4. Verify each protective system by means of a primary current injection through the zero phase sequence transformer. This will provide correct operation of both the transformer and relay as well as proper functioning of the circuitry through to the breaker tripping elements.

3.8 Arc Flash Analyses

1. For the entire electrical distribution system provided as part of this contract and the existing electrical distribution system shown on the drawings, conduct an electrical arc flash hazard analysis as prescribed under NFPA 70E (CSA Z462-18) and provide a written report summarizing the findings and recommended control measures to be taken. The arc flashing analysis results must be deemed acceptable prior to the equipment purchase.
2. The power systems software utilized to perform the study must be SKM Powertools.
3. Provide appropriate labels for all equipment (including all prepurchased equipment and equipment supplied by owner). The labels shall warn a qualified worker who intends to open the equipment for analysis or work that a serious hazard exists and that the workers should follow appropriate work practices and wear appropriate personal protection equipment (PPE) for the specific hazard.
4. An existing coordination study is not available for the electrical contractor's use.
5. Procure (coordinate and pay for) the services of Brosz Technical Services Inc. Kyle Bunte kbunte@brosz.net or Krka Power Inc. David Bibic david@krka.ca to prepare the coordination study and arc flash analysis.

3.9 Emergency Light Level Measurements

1. As part of this scope of work procure the services of a third party professional engineer to measure and record emergency lighting levels in foot candles throughout the scope of work areas with a calibrated light meter. Readings shall be taken based on a minimum of one reading for every 20' center in open office areas, equipment rooms and corridors / hallways and one reading in each closed office, meeting room, boardroom and stairwell.
2. All light level readings are to be taken during non-daylight hours.
3. Provide a letter identifying light level readings and stating that the emergency lighting levels meet the requirements of the Ontario Building Code (OBC). Notify Owner and Consultant at least ten (10) days prior to proposed testing date and schedule testing at time and date acceptable to Owner and Consultant.

3.10 Test Results

1. Submit test results to Owner's Consultant for review.
2. Testing methods and test results: to CSA, NEC 2017 and authorities having jurisdiction.
3. Remove and replace conductors found damaged with new materials.
4. Provide required labour and tools, if during testing the Owner's Representative requests equipment be opened and removed from their housings to examine equipment, terminations and connections.

End of Section

SECTION 28 31 00.01: MULTIPLEX FIRE ALARM SYSTEM – BASE BUILDING

PART I – GENERAL

1.1 Work Included:

1. Provide all labour, material, products, equipment and services specified, indicated or required to provide a complete operating fire alarm system. The system shall be in accordance with the Ontario Building Code (O Reg. 403/97), National Standard of Canada (CAN/ULC – S524-19) and the Electrical Safety Code (CSA-C22.1-06).
2. Refer to drawings for fire alarm device locations, quantities and requirements.
3. Scope of work shall be carried out by qualified personnel acceptable to the authority having jurisdiction. As a minimum, the site supervisor (foreman) as well as all field personnel installing fire alarm system devices or participating in the testing, inspection and verification process must have successfully completed the Canadian Fire Alarm Association Technology Program or have successfully completed an equivalent course, subject to the approval of the engineer.

1.2 Reference

1. Comply with the requirements of the latest edition of the following:
 - Ontario Building Code
 - CAN/ULC-S524, Installation of Fire Alarm Systems.
 - CAN/ULC-S525, Audible Signal Appliances for Fire Alarm.
 - CAN/ULC-S526, Visual Signal Appliances, Fire Alarm.
 - CAN/ULC-S527, Control Units.
 - CAN/ULC-S528, Manual Pull Stations.
 - CAN/ULC-S529, Smoke Detectors.
 - CAN/ULC-S530, Heat Actuated Fire Detectors.
 - CAN/ULC-S531, Smoke Alarms.
 - CAN/ULC-S533, Egress Door Security and Releasing Devices
 - CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems.
 - CAN/ULC-S537, Verification of Fire Alarm Systems.
 - CAN/ULC-S541, Speakers for Fire Alarm Systems
 - CAN/ULC-S553, Installation for Smoke Alarms

1.3 Connections To Other Systems:

1. Motor control connections for fire alarm system shutdown of building fans.

1.4 Existing Fire Alarm System

1. The existing fire alarm system shall remain operational at all times during construction. Ensure that the project manager and the building manager are advised of any required shutdowns at least two (2) weeks in advance.
2. Make necessary arrangements for special temporary devices, equipment and/or connections required for shutdowns described above.
3. Once the new fire alarm system is fully operational and verified, the existing system, the existing connections to other systems, and the existing devices and the associated riser and branch wiring and raceways for all of the above, shall be removed and properly disposed of.
4. Include in the tender price to carry out all existing fire alarm system bypasses, isolations and shutdowns required to complete this project. Notify the project manager, security and the facilities operator each day of all system bypasses, isolations and shutdowns required for the current day.

5. Provide stainless steel blank cover plates and white fixture canopies for all wall and ceiling mounted devices removed respectively. Fire stop all openings through fire rated enclosures left from conduits and cables removed as part of this project.

1.5 Shop Drawings

1. Submit shop drawings in accordance with Section 16100 for the following:
 1. All devices.
 2. Control panel, cabinets, processors.
 3. Transponder panels
 4. Batteries.
 5. Annunciators.
 6. Cable sample board (plywood board with full size drawing)
 7. 3 x 24" lengths of two-hour fire rated cables
2. Submit:
 1. Description of the operational sequences of the system.
 2. Submit programming schedules, arrangement and wording of fire alarm zones for system control units and annunciators to the local fire department and if required provide all labeling changes requested.
 3. Complete set of drawings, indicating location of all devices, control and annunciator panels, all interconnections to ancillary equipment, all conduit routing and sizes, all wire sizes, types, number and a riser for each control panel indicating all of the above.
 4. Pictorial drawings of control equipment indicating the location of the components and parts and their respective catalogue number and electrical characteristics.
 5. Internal schematic diagrams of control equipment.
 6. Interconnecting diagrams and cable manual showing exact point to point connections and identifications including junction and pull boxes.
 7. System descriptions of the actual installation.
 8. Battery calculations on a per power supply/charger basis. These calculations shall clearly indicated the quantity of devices, the device part numbers, the supervisory current draw, the alarm current draw, totals for all categories, and the calculated battery requirements (which reflect a 20% DEGRADE, for 24 Hour supervisory, 30 minute alarm operation). Battery calculations shall also reflect all control panel component, remote annunciator, and auxiliary relay current draws. Failure to provide these calculations shall be grounds for the complete rejection of the submittal package.
 9. Maintenance and operating instructions.
 10. Proposed verification procedures and approved forms and documents to be completed.
 11. Following completion of verification and acceptance by the authority having jurisdiction, submit four (4) sets of all verification results, bound in hard cover, and titled "Verification and Certification of Fire Alarm System".

1.6 Maintenance

1. Provide one year's maintenance commencing from the date of total system substantial completion, with one inspection of the entire system per ULC Standard (M536) by the manufacturer at the end of the year. Include in the Tender Price to repair or replace all deficiencies noted during the inspection.

1.7 Certification

1. Submit letter of certification from the manufacturer indicating their technical representatives having tested, inspected and verified the system and confirm that the methods of installation, connection and operation are in accordance with drawings and specifications.

1.8 System Description

1. The fire alarm system shall be an electrically supervised, addressable, single stage, zoned, non-coded, micro-processor based, fully integrated fire alarm communication system employing multiplexing for data acquisition, distribution and control. The system shall be complete with all necessary hardware, software and memory, specifically tailored for this installation. The fire alarm system shall conform to OBC 3.2.4, "Fire Alarm and Detection Systems", and shall include all required control and indication means. The fire alarm system shall include, but not be limited to fire alarm control panel (FACP), complete with required control and indication, remote annunciators, passive graphics, initiating devices such as manual pull stations, automatic smoke and heat detectors, signal devices such as audible and visual, auxiliary devices, initiating circuits, signal circuits and auxiliary circuits and power and circuit wiring.
2. The fire alarm system shall be an active/interrogative type system where each addressable device is repetitively scanned, causing a signal to be transmitted to the main fire alarm control panel (FACP) indicating that the device and its associated circuit wiring is functional. Loss of this signal at the main FACP shall result in a trouble indication as specified hereinafter for the particular input.
3. The system shall provide a means to recall alarms, supervisory and trouble conditions in chronological order for the purpose of recreating an event history. The system shall maintain a history file of the last 4000 events, each with a time and date stamp. History events shall include all alarms, troubles, operator actions, and programming entries. The control panels shall also maintain a 1000 event Alarm History buffer, which consists of the 1000 most recent alarm events from the 4000 event history file.
5. Fire alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority Two, Supervisory and Trouble events have second-level, and third-level priority respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.
6. An event on one zone does not prevent the receipt of signals from any other zone. All zones are manually resettable from the FACP after the initiating device or devices are restored to normal. The activation of an addressable device does not prevent the receipt of signals from subsequent addressable device activations.
7. The main CPU shall be a field re-programmable control panel with password protected software algorithms to carry out fire alarm protection functions, such as receiving signals, alarm verification, initiating alarm, sound and visual sequences, supervising the system continuously, actuating built-in and remote zone annunciators, data storage and print out and initiating trouble signals.
8. The system shall have the ability to disable and enable individual circuits for maintenance and/or testing purposes.
9. All on site programming changes to the fire alarm system shall be password protected. During the construction stage, all program and custom label changes shall be approved in writing by the Engineer.
10. All system controls shall be housed in surface wall mounted steel cabinets.
11. All network intelligence and decision making capabilities shall be distributed amongst the control panels and transponders in a peer to peer fashion.
12. Remote smart transponders shall be configured as single stage, zoned, non-coded, indicating, standalone addressable systems complete with Local Alert and EVAC tone oscillators and amplifiers. Transponders shall be modular in design with solid state microprocessor based electronics. Each transponder's microprocessor, memory, and associated circuitry shall have the ability to detect losses of communications circuit wiring. Transponders shall be fully sprinklerproof.
13. All control and transponder cabinets are to be properly grounded to building ground. Conduit ground will **not** be acceptable. The green coloured grounding loop shall be a minimum #6 AWG insulated copper run in conduit. The ground loop shall be connected to the main building electrical ground source. Ground wire must **not** be run in the same conduit as the fire alarm and communication wiring.
14. Communications between the CPU and the transponders shall be via a true Class 'A' loop, with two (2) hour fire rated MICC cable. Each channel shall operate independent of the other. Faults on one channel shall not affect the operation of the other.
15. All control cabinets are to be properly grounded to building ground. Conduit ground will not be acceptable. The green coloured grounding loop shall be a minimum #6 AWG insulated copper run in conduit. The ground loop shall be connected to the main building electrical ground source. Ground wire must not be run in the same conduit as the fire alarm and communication wiring.
16. The fire alarm system shall also include, but not be limited to the following components:

- The required components to annunciate low battery voltage, generator trouble, generator running, elevator signaling, door holder release, a signal to any and all building security and automation systems and annunciation/control points as scheduled.
- Automatic and manual alarm addressable initiating devices.
- Audible signal devices (horns / speakers).
- Visual signal devices.
- End-of-line devices.
- Remote Printer/annunciators/controls.

1.9 System Operation

1. Activation of any alarm initiating device (sprinkler flow switch, manual pull station, ceiling mounted multisensor, heat or smoke detector, duct mounted smoke detector, etc..) to initiate operations to occur as follows:

1. Alarm

1. Annunciate the Alarm Zone, in English language, at the control unit and all remote annunciators, printers and interactive computers.
2. Automatically activate all pressurization fans as shown on contract documents.
3. Log the alarm in the Historical Alarm Log File.
4. Activate the City Connect Alarm control point whenever a fire alarm condition exists.
5. Activate the automatic elevator recall system. If the alarm did not originate from the ground floor level, all identified elevators shall automatically be returned to the ground floor. If the alarm originated from the ground floor level, all elevators shall automatically be returned to the designated alternate floor. Refer to the zone schedules for interconnections required and confirm this sequence with the Consultant. Utilize dual voltage relays in red coloured junction boxes for elevator recall.
6. Elevator smoke and heat detector sequences shall comply with local, provincial and CSA B44-07 requirements for main/alternate floor recalls, and shunt trip activations.
7. Shut down ventilation fans through energizing coils in dual voltage relays to be installed in the motor branch current for each supply air and exhaust air fan. The DVR's shall have sufficient number of contacts to wire to each fan.
8. Transmit signals and wire to building automation system, automatic magnetic door releasing system and auxiliary systems as identified in contract documents. A separate signal per smoke management zone shall be transmitted and wired to each system.
9. Activate the horn / speaker control circuits.
10. Activate strobe lights.

2. Activate "Fire Do Not Enter" Signs.

3. System Reset

1. It shall not be possible to reset the fire alarm system until all the alarm zones have been properly reset or cleared.

4. System Trouble Operation

1. A trouble initiated by the actuation of a sprinkler system supervisory trouble switch shall cause the following to occur:
 1. An audible and visual trouble signal shall sound at the control panel and remote annunciators until acknowledged by an operator.
 2. Annunciate the Supervisory Trouble Alarm at the control panel and remote annunciators.
 3. Print the time, date and the trouble zone on all printers.
 4. Log the supervisory trouble alarm in the Historical Trouble Log File.

5. Any monitor or control point trouble, or other system trouble shall cause the following to occur:

1. An audible and visual trouble signal shall sound at the control panel and remote annunciators, until acknowledged by an operator.
2. Annunciate the Point Trouble Alarm at the control panel and remote annunciators.
3. Print the time, date and the system trouble on all remote printers.
4. Log the trouble condition in the Historical Trouble Log File.

1.10 Work Related to Elevators

1. All work required and/or shown on the drawings related to the elevators and elevator shafts shall be included in the Tender Price. Employ and pay for the services of the base building elevator contractor where elevator shaft access and supervision and connections to elevator controls for elevator homing are required. Provide all dual voltage relays, conduit and wire required by the elevator contractor to interconnect the fire alarm system with the elevator recall system.

1.11 Network Operation

1. Each connected local control panel, CACF panel and transponder panel shall communicate via a DCLA multiplex loop to the next panel at 57.6 Kbaud. In the event that the path to the next panel experiences a communication failure, the panel shall communicate in the other direction and report the communication failure immediately to the interactive computer and printer.
2. In the event that a group of panels become isolated from the network, that group shall form a sub-network with all remaining common interactions, monitoring and control intact.

PART II – PRODUCTS

2.1 Manufacturer

1. All equipment shall be new (unless indicated otherwise), CSA approved, ULC listed and manufactured, tested, installed and verified to the following minimum standards:
 1. Power supply: CAN4-S524.
 2. Audible signal devices: ULC-S525.
 3. Control unit: ULC-S527.
 4. Manual fire alarm stations: ULC-S528.
 5. Smoke detectors: ULC-S529.
 6. Thermal detectors: ULC-S530.
2. All equipment used for the fire alarm system shall be designed and supplied by a single system manufacturer.
3. Acceptable product manufacturer:
 1. Tyco
4. The system supplied under this specification shall utilize node-to-node, direct wired, multi-priority peer-to-peer network operations. The system shall utilize electronically addressed, smoke detectors, heat detectors and input/output modules as described in this specification. The peer-to-peer network shall contain multiple nodes consisting of the command center, main controller, remote control panels, LCD/LED annunciation nodes, and workstations. Each node is an equal, active functional member of the network, which is capable of making all local decisions and generating network tasks to other nodes in the event of node failure or communications failure between nodes.
5. All integrated life safety system equipment shall be arranged and programmed to provide an integrated system for the early detection of fire, the notification of building occupants, the automatic summoning of the local fire department, the override of the HVAC system operation, and the activation of other auxiliary systems to inhibit the spread of smoke and fire, and to facilitate the safe evacuation of building occupants. In all operating modes, the processing of fire alarms shall have the highest priority.

2.2 Central Processing Unit (CPU)

1. The system Central Processing Units (CPU's) shall be housed in the control panel.
2. The Central Processing Units shall come complete with an operator's interface panel containing the following:
 1. 80 Character backlit Alphanumeric LCD Display module complete with 32-character user defined device message.
 2. 10 digit alphanumeric keypad for password entry and specific menu driven operation, programming and maintenance functions.
 3. Common Alarm LED and Push-Button Acknowledge Switch
 4. Common Trouble LED and Push-Button Acknowledge Switch
 5. Signal Silence Switch
 6. System Reset Switch
 7. Power On Indicator
 8. Lamp Test Switch
 9. 'Drill' switch to sound evacuation tone throughout the without activating the city tie connections.
3. All components shall be fully operational while the system is operating on the standby batteries.
4. CPU electronics shall be microprocessor-based. Basic Life Safety Software shall be retained in erasable programmable read-only-memory, EPROM, and executed from random-access-memory, RAM, to allow password protected field editing. The CPU shall have the capacity for 2000 intelligent input devices.
5. The CPU shall be capable of loading or editing of special instructions and/or operating sequences as required. It shall be capable of on site programming to accommodate expansion and changes. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control panel. Loss of primary and secondary power shall not erase the instructions stored in memory.
6. The CPU must incorporate circuitry to continuously monitor the communications and data processing cycles of the microprocessor. On CPU failure, an audible and visual alarm shall operate to advise attending personnel.
7. The CPU shall be capable of supporting a minimum of five (5) RS-232-C I/O ports. CPU data output to the I.O. ports shall be in a parallel ASCII format at field adjustable baud rates of 1200, 2400 and 4800.
8. Opening the cabinet door shall provide access to all operating controls. All electrical connections shall be front accessible through the hinged door and removable dead front panel.
9. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of any other initiation circuit. All alarm receiving circuits shall be configured as Class DCLA wiring, current limited.
10. Horn circuits and strobe light circuits shall be independently supervised and fused such that a fault on one circuit shall not affect the operation of any of the other circuits. All signal circuits shall be configured as follows:
 1. Class B wiring, current limited.
 2. Rated at two amps of continuous power.

2.3 Control Panel

1. The control panel shall provide operation controls and backlit alphanumeric LCD type annunciator panel.
2. The control panel shall be enclosed in a surface wall mounted cabinet with a hinged door and clear glass viewing window, such that all annunciator indications and operating instructions are clearly visible. The door shall be complete with a lock.
3. All controls and indicators for the system shall be provided at the control panel. Controls and indicators for the following systems shall be provide:
 1. Fire alarm annunciator/control
 2. Damper monitor/control
 3. Fan control
 4. Magnetic hold open door control
4. Provide the following control switches and LEDs for the functions listed below. Bypasses listed below shall cause a fire alarm system trouble signal when operated.
 1. One three-position maintained switch for each fan and damper complete with two yellow and one green status LEDs for each switch.
 2. System reset switch
 3. Signal silence switch
 4. Audible signals bypass switch
 5. Fan/damper bypass switch and LEDs.
 6. Maglock bypass switch and LEDs.
 7. Spare Bypass function and LEDs.
 8. Spare Bypass function and LEDs.
5. Each addressable analog loop shall be circuited so device loading is not to exceed 70% of loop capacity in order to allow for the addition of future devices.
6. Control panel shall house power amplifiers to suit the load required per contract documents plus an additional spare amplifier sized to meet the requirements of the largest amplifier in the system, with automatic transfer on priority. All amplifiers and circuitry to be supervised. Amplifiers to be loaded to 60% capacity.
7. Control panel shall be capable of chronologically logging and storing 300 events in an alarm log and 300 events in a trouble log. The historical logs shall be stored in the CPU's memory and shall be protected by a lithium battery that is supervised for a low battery condition. Each recorded event shall include the time and date of that event's occurrence. The alarm log file must be separate from the trouble log file. It shall be possible for the user to generate a report of both logs upon request.
8. Provide dry contact auxiliary control circuits as follows:
9. DPDT fused 2 amp @ 24vdc, Form C misc. control relays.
10. Each of the following types of remote equipment associated with the fire alarm system shall be provided with a form 'C' control relay contact as shown on the drawings, but shall be typically as follows:
 1. Provide one (1) shutdown control relay contact for each HVAC fan system.
 2. Provide one (1) shutdown control relay contact for each HVAC supply fan.
 3. Provide one (1) shutdown control relay contact for each HVAC return fan.
11. Provide a dedicated 24VDC circuit to feed all auxiliary relays required for inductive loads. Circuits shall be supervised via an end-of-line relay and addressable input module. Auxiliary relays shall not derive their power from the starter or load being controlled.
12. System expansion modules connected by ribbon cables shall be supervised for module placement. Should a module become disconnected the system trouble indicator must illuminate and audible trouble signal must sound.
13. The control panel shall have provision for disabling and enabling all circuits individually for maintenance or testing purposes. Capability must be password protected.
14. Silent Walktest with History Logging:
 1. Each control panel shall be capable of being tested by one person. While in testing mode the alarm activation of an initiating device circuit shall be silently logged as an alarm condition in the historical data file. The panel shall automatically reset itself after logging of the alarm.

2. The momentary disconnection of an initiating or indicating device circuit shall be silently logged as a trouble condition in the historical data file. The panel shall automatically reset itself after logging of the trouble condition.
3. Should the walktest feature be on for an inappropriate amount of time it shall revert to the normal mode automatically.
4. Should an alarm condition occur from an active point, not in walktest mode, it shall perform operations described in System Operation Section.
15. All system controls shall be housed in a surface wall mounted steel cabinet. Finish shall be in accordance with the manufacturer's standards.
16. All modules shall be secured behind hinged locked doors with a full viewing tempered plastic window. The hinged locked door shall give access to all the operating controls but shall not expose live connections.
17. All control cabinets are to be properly grounded to building ground. Conduit ground will not be acceptable.
18. Addressable Device Network:
 1. The system must provide communication with addressable initiating devices. All of these devices will be annunciated on the control panel's main LCD display. Annunciation shall include the following conditions for each point:
 1. 80 Character Zone/Device Location
 2. Type of Device
 3. Detector Status (Normal/Alarm/Trouble)
 4. Device Missing/Failed
 2. A minimum of 600 addressable devices may be multi-dropped from a single transponder. Systems that require factory reprogramming to add or delete devices are unacceptable.
 3. The communication format must be a completely digital poll/response protocol. A high degree of communication reliability must be obtained by using parity data bit error checking routines for address codes and check sum routines for the data transmission portion of the protocol.
 4. Each addressable device must be uniquely identified by an address code entered on each device at time of installation.
 5. The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions. Systems which cannot support 100% of their point capacity in alarm simultaneously cannot assure appropriate system response and are not acceptable.
 6. The system shall allow a line distance of up to 2,500 feet to the furthest addressable device on a Class A communications circuit. The appropriate quantity of isolator modules shall be installed so that a wiring fault (short, open or ground) within one floor area/fire alarm zone shall not prevent the normal operation of other addressable devices on other floor areas/fire alarm zone.
 7. The panel shall have an interface module for remote site monitoring. The module shall have a dialer (Digital Alarm Communicator Transmitter (DACT)) module to transmit alarm, supervisory and trouble signals to a Central Monitoring Station (CMS). The DACT shall support dual telephone lines, Contact I.D. communications, and configured for dual tone multi-frequency (DTMF) or pulse modes. It shall be possible to delay AC power failure reports, auto test call, and be site programmable. The dialer shall be capable of transmitting every individual alarm condition to the central station.
 8. The system shall use full digital communications to supervise all addressable loop devices for placement, correct location, and operation. It shall allow swapping of "same type" devices without the need of addressing and impose the "location" parameters on replacement device. It shall initiate and maintain a trouble if a device is added to a loop and clear the trouble when the new device is mapped and defined into the system.
19. Analogue Smoke Detection System:
 1. The system shall maintain the sensitivity level set, for each detector, constant over time by automatically compensating for environmental factors such as dust and dirt accumulations in a smoke detector's chamber. The smoke detector shall be a smoke density measuring device having no self-contained set-point. The alarm decision for each detector shall be determined by the control panel.
 2. The system shall automatically indicate when an individual detector needs cleaning. When a detector's average value reaches a predetermined value a 'Dirty Detector' trouble condition shall be audibly and visually indicated at the control panel for the individual detector. When 'Dirty Detector' trouble

conditions are reported, the detector's sensitivity level shall not be compromised by the dust and dirt accumulation in its chamber.

3. It shall be possible for the USER to obtain a report of all smoke detectors that are 'Almost Dirty' and will require cleaning in the near future before they initiate a 'Dirty Detector' trouble condition.
4. All data transmissions, including the analogue value, between the smoke detectors and the control panel shall be digitally transmitted and incorporate parity and checksum digital data checks of each transmission. The system must verify that the proper detector type is in the base to match the desired software configuration.
5. An operator from the control panel, having a proper access level, shall have the ability to manually access and print the following information for each detector in a report format that can be easily understood by the user:
 1. Device Type and Location
 2. Primary Status
 3. Present Average Value
 4. Present Sensitivity Selected
 5. Highest Peak Detection Values
 6. Detector Chamber Status (Normal, Almost Dirty, Dirty, Excessively Dirty)
 7. It shall be possible to program the control panel to automatically change the sensitivity settings of each detector based on time-of-day and day-of-week.
6. The control panel shall have the capability of programming each detector for a two-stage function. This function allows a control function to occur when for example, a detector programmed for 3% smoke obscuration reaches the threshold of 1.5% smoke obscuration.
7. All ancillary and auxiliary devices and functions shall be supervised for shorts, opens and grounds and shall cause a common visual and audible trouble signal at the CPU and remote annunciators.

2.4 Annunciator Panels.

1. Remote Panel
 1. The annunciator panel shall be LED type, with engraved/etched designation cards (5mm minimum sized letters) to indicate zone. Cards shall be colour coded. (Scheme to be determined during construction).
 2. Provide the number of LEDs as required plus an additional 25% (over and above those shown on fire alarm system zone schedule) with the corresponding label, "spare for future use".
 3. LEDs shall be supervised, including trouble signal for lamp failure or open circuit.
 4. Provide a "60 Second Delay" indicator to illuminate indicating the system is generating an uninterruptible 60 second period of signaling throughout.
 5. Annunciator panels shall be enclosed in steel cabinets suitable for semi-flush or surface mounting as indicated on the drawings. All modules shall be secured behind hinged locked doors with a full viewing tempered plastic window.
2. Passive Custom Graphic Annunciators
 1. Provide 11.0" x 17.0" generated drawings (customized graphics) of each floor showing fire alarm zoning with different colours as well as major features such as stairs, elevators and corridors.
 2. Each of the above generated floor drawings are to be laminated. All drawing and cover assemblies are to be contained within a hard covered 3-ring binder chained to the wall. Provide two (2) complete sets of generated drawing packages.
 3. Provide one (1) 11.0" x 17.0" generated drawing (customized graphics) for each floor showing the geographical location of the isolator modules. Drawings are to be mounted in a metal frame behind glass. Mount the drawings.
3. LCD Panel
 1. The LCD remote annunciator panel shall contain the following:
 1. 80 Character backlit Alphanumeric LCD Display module complete with 32-character user defined device message.
 2. 10-digit alphanumeric keypad for password entry and specific menu driven operation, programming and maintenance functions.

3. Common Alarm LED and Push-Button Acknowledge Switch
4. Common Trouble LED and Push-Button Acknowledge Switch
5. Signal Silence Switch
6. System Reset Switch
7. Lamp Test Switch

2.5 Control Panel and Transponders

1. The control panel and transponders shall be provided with 120 VAC power via a dedicated circuit breaker complete with lock off from emergency panels (as indicated on the drawings).
2. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the control panel/transponder and the remote active CRT annunciator. A green 'Power On' LED shall be displayed continuously while incoming power is present.
3. Control Panel and transponder power supply shall have the following operating characteristics:
 1. Rated for five amps continuous duty.
 2. Sufficiently sized to power all remote system components plus adequate spare capacity to power no less than 50% additional addressable devices.
 3. 24 VDC filtered and regulated.
 4. Power limited with a range of 20.4 VDC to 32 VDC.
 5. Automatic 'Brownout' transfer to standby batteries when supply voltage drops to 102 VAC.
4. The system shall be provided with sufficient standby capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of twenty-four hours with two hours of alarm operation at the end of this period. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic.
5. The system batteries shall be supervised so that a low battery condition or disconnection of the batteries shall be audibly and visually annunciated at the control panel/transponder.

2.6 Alarm Initiating Devices

1. Addressable Pull Stations
 1. The addressable manual pull station shall be non-coded, single-stage, single action, with additional normally closed contact for security requirements and shall operate on any addressable detection circuit. The addressable manual fire station shall have a single addressable unit for the first stage alarm.
2. Addressable Analogue Detector Bases
 1. All addressable analogue smoke, multisensor and heat detector heads shall twist lock onto their bases. The electronics that communicate the detector's status (analogue value) to the control panel shall be contained in the base or the head. The same base will be compatible for multisensor, smoke and thermal detectors. Upon removal of the head, a trouble signal will be transmitted to the control panel. The detector's address will be set at the time of installation.
 2. Where required by the design documents, by Code or by local by-laws, provide an additional alarm relay (Form C, SPDT), normally open contact, for auxiliary functions and wire to control point (i.e. elevator machine rooms).
 3. Each detector base or head shall contain a LED that will flash each time it is scanned by the control panel (once every four seconds). When the control panel determines that a detector is in alarm that detector's LED will turn on steady indicating the abnormal condition.
 4. Each detector shall be scanned by the control panel for its type identification to prevent inadvertent substitution of another detector type. The control panel shall operate with the installed device but shall initiate a 'Wrong Device' trouble condition until the proper type is installed or the programmed detector type is changed.
3. Analogue Photoelectric Smoke Detector
 1. The addressable smoke detector shall be of the photoelectric type and shall communicate the digital equivalent of the actual analogue smoke chamber values to the system control panel or transponder once every four seconds.

2. The sensitivity range of each photoelectric detector set in the control panel shall be from 0.5% to 3.7% smoke obscuration. Each detector shall have 7 different programmable sensitivity levels within this range (0.5, 1.0, 1.5, 2.0, 2.5, 3.0 and 3.7%).
 3. The detectors shall be of a low profile design and ULC Listed for both ceiling and wall mount applications.
 4. Detector shall be equipped with a fine 30 mesh insect screen.
 5. The detector's electronics shall be immune from false alarms caused by EMI and RFI. All detector heads shall be designed with voltage and RF transient suppression techniques, smoke signal verification circuits and an insect screen.
4. Analogue Ionization Smoke Detector
1. The addressable smoke detector shall be of the ionization type and shall communicate the digital equivalent of the actual analogue smoke chamber values to the system control panel or transponder once every four seconds.
 2. The sensitivity range of each ionization detector set in the control panel shall be from 0.5% to 1.7% smoke obscuration. Each detector shall have 4 different programmable sensitivity levels within this range (0.5, 0.9, 1.3 and 1.7%).
 3. The detectors shall incorporate a single radioactive source with an outer sampling chamber and an inner reference ionization chamber to provide stable operation under fluctuations in environmental conditions such as temperature and humidity.
 4. The detectors shall be of a low-profile design and ULC Listed for both ceiling and wall mount applications.
 5. The detector's electronics shall be immune from false alarms caused by EMI and RFI. All detector heads shall be designed with voltage and RF transient suppression techniques, smoke signal verification circuits and an insect screen.
5. Addressable Analogue Duct Smoke Detectors
1. Duct smoke detector assemblies shall come complete with duct housing, photoelectric smoke detector head and sampling tubes as required. The duct housing base shall come complete with an auxiliary set of form C dry contacts rated at 120 VAC, 3 Amps and terminals for a remote lamp unit.
 2. The electronics that communicate the detector status (analogue value) to the control panel shall be contained in the duct housing base. Upon removal of the detector head, a trouble signal will be transmitted to the control panel. The detector's address will be set at the time of installation.
 3. The duct housing assembly shall consist of an airtight housing mounted on the side of the duct. This housing shall contain the detector base into which the photoelectric detector head is inserted.
 4. The system shall automatically indicate when an individual duct detector needs cleaning.
 5. It shall be possible to obtain a list of all duct smoke detectors that will require cleaning in the near future before they initiate a 'Dirty Detector' trouble condition.
6. Analogue Thermal Detector
1. The analogue thermal detector shall be programmable for any one of the following functions:
 1. Fixed Temperature Detector Type.
 2. Rate of Rise Detector Type.
 3. Rate Compensated Fixed Temperature Type.
 2. The detector's small thermal mass shall allow for an accurate up-to-date temperature reading of each detector to be logged at the control panel. It shall be possible for the heat detector to monitor and report temperatures of 32 to 128°F without causing a fire alarm condition.
 3. The rate-of-rise operation shall be selectable for either a 15°F (8.3°C) per minute or a 20°F (11.1°C) per minute rate of temperature rise.
 4. The fixed temperature setting is selectable for 117°F (47.2°C) or 135°F (57.2°C) and is entirely independent of the rate-of-rise operation.
 5. Both the rate-of-rise and fixed temperature operations shall be self restoring.
7. Flame Detectors

1. Flame detectors shall be of the infra-red type which is highly sensitive to all flaming fires using a pyro-electric detector. Flame detectors are to have a two level sensitivity adjustment. Flame detectors shall be weatherproof, infra-red type, suitable for Class I or II locations, with a built-in response indicator.
8. Analog Multisensor Detectors
 1. The addressable multisensor detector shall contain photoelectric and heat sensing elements.
 2. The detectors shall be of a low-profile design and ULC Listed for both ceiling and wall mount applications.
 3. Detector shall be equipped with a fine 30 mesh insect screen.
 4. The detector's electronics shall be immune from false alarms caused by EMI and RFI. All detector heads shall be designed with voltage and RF transient suppression techniques, smoke signal verification circuits and an insect screen.
 5. Dynamic filters and algorithms shall be utilized to allow the system to distinguish between deceptive phenomenon and an actual fire. System delay time shall be a maximum of 5 seconds.
 6. The sensitivity range of each multi sensor detector set in the control panel shall be 0.6% to 3.7% obscuration/foot. Each detector shall have 5 different programmable sensitivity levels within the range specified above.
9. Initiating Device Interface and Control Modules
 1. Zone Addressable Modules shall be used for the monitoring of water flow, valve tamper and non-addressable devices, as well as for control of fans or dampers, beacons and other devices that require shutdown or manual control in an alarm condition.
 2. Initiating device interface modules shall monitor any N/O contact device. The module will communicate the zone's status (normal, alarm, trouble) to the transponder. The modules zone address shall be set at the time of installation.
 3. Control modules shall be able to provide supervised control of any control function. The module will communicate the zone's status (normal, trouble) to the transponder. Each control module shall provide a double pole double throw relay for switching loads of up to 120 VAC. Each common leg of the relay shall be equipped with a replaceable 2 AMP fuse. The module zone address shall be set at the time of installation.
- 2.7 Audible Signal Devices
 1. Horns
 1. In all finished areas provide a low-profile horn.
 2. Capable of mounting to single gang backbox.
 3. Minimum of two field configurable outputs.
 4. Horn housing shall be white in colour with 'Fire' markings.
- 2.8 Visual Alarm Signal Devices
 1. Strobe Lights
 1. Strobe lights shall be indoor/outdoor type with red Lexan lens and xenon flash tube. They shall be connected to receive signal from transponder to flash or strobe.
 2. Capable of mounting to single gang backbox.
 3. Minimum of four field configurable strobe outputs, including 75 and 100 cd.
 4. Strobe housing shall be white in colour with 'Fire' markings.
- 2.9 End-Of-Line Resistors
 1. End-of-line resistors for signaling circuits shall be sized to ensure the correct supervisory current flows in each circuit.
 2. All end-of-line resistors shall be mounted on a stainless steel plate for mounting on a standard single gang plate and bear the ULC label.
- 2.10 Isolator Module
 1. Provide class A isolator modules for circuit isolation upon short circuit. When a short is detected, the isolator module shall isolate the affected segment of the circuit, allowing the remaining devices to continue operation. Modules shall operate within 23 milliseconds of a short circuit condition on the

multiplex loop. The modules must be self-restoring automatically reconnecting to circuit segment when the fault is removed.

2.11 Ancillary Devices

1. 'Fire Do Not Enter' signs
 1. 24-volt DC, with wording at least 200 mm high letters, visible only when illuminated during actual fire condition, with 1200 lumen minimum output. Maximum height of 210 mm, minimum length 300 mm.

2.12 Beam Smoke Detector

1. Beam smoke detectors shall consist of receiver and transmitter components each separately powered suitable for protecting the high ceiling areas as shown on the drawings.
2. Provide a remote test station and annunciator.

2.13 Lockable Enclosures

1. All lockable enclosures for fire alarm system control panel, annunciators and transponders must be keyed alike. Provide the owner with five (5) sets of keys at the completion of the project.

2.14 Remote LED

1. High intensity LED lamps electrically connected to device for which unit is to provide remote identification.
2. Mount unit on standard single gang back box.
3. Faceplate to be brushed stainless steel.

2.15 Transponders

1. Transponders shall be configured as single-stage, zoned, non-coded, microprocessor based, indicating, standalone systems functioning as data gathering panels for fire alarm initiating device circuits and as a triple channel emergency voice communication system.
2. The fire alarm transponder's construction shall be modular in design with solid state microprocessor based electronics. Each transponder microprocessor memory and associated circuitry shall have the ability to detect losses of communication with the control panel CPU that result from defects in the communications circuit wiring.
3. In the event of a loss of communications between the control panel CPU and the transponder, the transponder shall operate on a standalone basis and assume full control over the monitor, speaker and control circuits it supervises. The standalone transponder fire alarm and voice communication control programs must be independent of the main CPU programs but execute the same type of algorithms. Transponder programs shall be completely field programmable with all changes stored in a non-volatile programmable memory.
4. The fire alarm transponder shall allow for loading or editing of special instructions and operating sequences as required. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control panel. Loss of primary and secondary power shall not erase the instructions stored in memory. All on site programming changes to the fire alarm system shall be password protected.
5. Each transponder shall house power amplifiers to suit the load required per contract documents plus an additional spare amplifier sized to meet the requirements of the largest amplifier in the system, with automatic transfer on priority. All amplifiers and circuitry to be supervised. Amplifiers to be loaded to 60% capacity.
6. Each transponder shall be capable of chronologically logging and storing 300 events in an alarm log and 300 events in a trouble log. The historical logs shall be stored in the CPU's memory and shall be protected by a lithium battery that is supervised for a low battery condition. Each recorded event shall include the time and date of that event's occurrence. The alarm log file must be separate from the trouble log file. It shall be possible for the user to generate a report of both logs upon request.
7. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of any other initiation circuit. All alarm receiving circuits shall be configured as follows:
 1. Class DCLA wiring, current limited.
 2. Capable of powering sixty (60) initiation devices.

8. Not used.
9. Horn circuits and strobe light circuits shall be independently supervised and fused such that a fault on one circuit shall not affect the operation of any of the other circuits. All signal circuits shall be configured as follows
 1. Class B wiring, current limited.
 2. Rated at two amps of continuous power.
10. Provide dry contact auxiliary control circuits as follows:
 1. DPDT fused 2 amp @ 24vdc, Form C misc. control relays.
11. System expansion modules connected by ribbon cables shall be supervised for module placement. Should a module become disconnected the system trouble indicator must illuminate and audible trouble signal must sound.
12. The transponder shall have provision for disabling and enabling all circuits individually for maintenance or testing purposes. Capability must be password protected.
13. Silent Walktest with History Logging:
 1. Each control panel shall be capable of being tested by one person. While in testing mode the alarm activation of an initiating device circuit shall be silently logged as an alarm condition in the historical data file. The panel shall automatically reset itself after logging of the alarm.
 2. The momentary disconnection of an initiating or indicating device circuit shall be silently logged as a trouble condition in the historical data file. The panel shall automatically reset itself after logging of the trouble condition.
 3. Should the walktest feature be on for an inappropriate amount of time it shall revert to the normal mode automatically.
 4. Should an alarm condition occur from an active point, not in walktest mode, it shall perform operations described in System Operation Section.
14. All system controls shall be housed in a surface wall mounted steel cabinet. Finish shall be in accordance with the manufacturer's standards.
15. All modules shall be secured behind hinged locked doors with a full viewing tempered plastic window. The hinged locked door shall give access to all the operating controls but shall not expose live connections.
16. All transponder cabinets are to be properly grounded to building ground. Conduit ground will not be acceptable.
17. Addressable Device Network:
 1. The system must provide communication with addressable initiating devices. All of these devices will be annunciated on the control panel's main LCD display. Annunciation shall include the following conditions for each point:
 1. 80 Character Zone/Device Location
 2. Type of Device
 3. Detector Status (Normal/Alarm/Trouble)
 4. Device Missing/Failed
 2. A minimum of 600 addressable devices may be multi-dropped from a single transponder. Systems that require factory reprogramming to add or delete devices are unacceptable.
 3. The communication format must be a completely digital poll/response protocol. A high degree of communication reliability must be obtained by using parity data bit error checking routines for address codes and check sum routines for the data transmission portion of the protocol.
 4. Each addressable device must be uniquely identified by an address code entered on each device at time of installation.
 5. The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions. Systems which cannot support 100% of their point capacity in alarm simultaneously cannot assure appropriate system response and are not acceptable.
 6. The system shall allow a line distance of up to 2,500 feet to the furthest addressable device on a Class A communications circuit. The appropriate quantity of isolator modules shall be installed so that a wiring fault (short, open or ground) within one floor area/fire alarm zone shall not prevent the normal operation of other addressable devices on other floor areas/fire alarm zone.

- 2.16 Fire Alarm System Software Upgrades
 - 1. Provide the owner with the fire alarm system manufacturer's latest release software upgrades for three (3) years following substantial completion of this project.
 - 2. Include for in the tender price the cost associated with supplying and installing the software upgrades on a six months basis.
- 2.17 Fire Alarm System Monitoring Panel
 - 1. Provide a new CAN/ULC S561-03 listed fire alarm system monitoring panel via digital (analog telephone line) and GSM cellular communications c/w dedicated conduit and analog telephone line.
 - 2. Acceptable manufacturer:
 - 1. Chubb
 - 2. Mircom
 - 3. Notifier

PART III – EXECUTION

- 3.1 Installation
 - 1. Install all equipment in accordance with the manufacturer's instructions, CSA/ULC-S524, OBC, Electrical Safety Code and these documents.
 - 2. Smoke detectors and multi sensor detectors shall be mounted a minimum of 900 mm from an air supply outlet and 600 mm from an air exhaust outlet. Maintain a clear space of at least 600 mm on the ceiling, below and around smoke and multi sensor detectors.
 - 3. Duct mount smoke detectors shall be installed in the main supply duct, downstream of the mixing box, filters and fan.
 - 4. Install main control panel as indicated and connect to power supply.
 - 5. Install manual alarm stations as indicated and connect to alarm circuits.
 - 6. For smoke detectors in elevator machine rooms, provide additional contacts and wiring to terminate at the elevator controllers.
 - 7. Install end-of-line devices at the end of signaling circuits as required and locate in room housing transponder.
 - 8. Install annunciators where indicated and connect to annunciator circuits.
 - 9. Locate and install smoke control fan starter wiring and status wiring for LEDs to indicate fan operating and damper position.
 - 10. Locate and install sprinkler and standpipe system supervisory, pressure and flow switch wiring where indicated, and connect to alarm circuits.
 - 11. Make connections to generator trouble, generator running, generator starter in 'off' position.
 - 12. Connect wiring to magnetic door holder.
 - 13. Joints in wiring are not allowed.
 - 14. Label conductors at the panel and each junction point, with plastic wire markers indicating, audible or control circuit number.
 - 15. Be responsible for all wiring to fan damper electro-pneumatic (EP) switches via DVR relays.
 - 16. Supply and install all necessary dual voltage relays in red coloured junction boxes beside each loose starter, motor control centre, dampers, elevator controllers or annunciation and control of all items as identified in documents. Provide all wiring from fire alarm system to double voltage relays and to items monitored or controlled.
 - 17. For smoke exhaust and pressurization fan control, provide conductors from Form 'C' contacts to starters.
 - 18. The type, quantity and size of all fire alarm system component wiring shall be to the manufacturer's requirements with minimum size being #18 AWG solid.
 - 19. Provide a minimum of two (2) different signal circuits (A and B) per speaker zone loaded to 60% of base amplifier circuit capacity. Signal circuits A and B corresponding to the same speaker zone must be powered from separate amplifiers.
 - 20. T-tapping of circuit wiring is not allowed.
 - 21. Wiring for fire alarm initiating devices and for signaling devices must be in two separate conduit systems.

22. Surface mount all stairwell and wall mounted devices utilizing EMT conduit and finished manufacturer surface mounted backboxes.
23. Power requirements for ancillary devices and visual signaling devices must be provided from local transponder.
24. In mechanical spaces, mount rotating beacons at 8' AFF. Provide suitable hangers and threaded rod extensions.
25. Addressable smoke detectors in rooms shall be addressed with respective room number. Addressable smoke detectors in corridors shall be addressed with the corridor designation.
26. Install and configure all software packages provided to carry out all features specified.
27. Provide all modifications of existing sprinkler devices to accommodate monitoring by the new fire alarm system.
28. Duct smoke detectors shall be furnished, wired and connected as part of this scope of work. Provide duct opening to install the duct smoke detectors.

3.2 Testing and Certification

1. Arrange with the manufacturer to conduct a complete inspection and test of all installed fire alarm equipment, including all components such as manual pull stations, signalling devices, fire detectors, controls, etc. Test and verify connections to equipment of other divisions such as sprinkler valves, etc.
2. Once the entire system is fully operational, test and verify the complete life safety system to ensure satisfactory operation in conformance with CAN/ULC S537-M97, 'Standard for the Verification of Fire Alarm System Installations'. All testing must be witnessed by Owner's representative prior to acceptance. Tests shall include recording of audibility levels (dB reading) with alarm tone in every corridor and room of the entire Facility.
3. All factory and site testing must be carried out by members in good standing of the Canadian Fire Alarm Association (CFAA).
4. Contractor must be present and witness factory testing of all hardware and software components of the system.
5. Prepare data sheets in duplicate with spaces to record:
 1. Date.
 2. Manufacturer's name and system number.
 3. Control panel serial number.
 4. Transponder serial number(s).
 5. Annunciator serial number(s).
 6. Testing methodology, results of tests and remedial work undertaken.
 7. Signatures of testing and manufacturer's Engineers indicating concurrence with results of tests and that some equipment is at site that was factory tested.
6. Prior to verification, thoroughly clean all multisensor and smoke detectors.
7. All verification results shall be recorded onto forms prepared by the Canadian Fire Alarm Association.
8. After the site testing and verification and after all deficiencies have been rectified, notify the Electrical Consultant and the Fire Department and in their presence demonstrate the proper functioning of the entire system. Include in the Tender Price for 100 percent repeat verification of the complete system including all equipment, components and connections to equipment of other Divisions in the presence of the Fire Department.
9. Provide an approved "Certificate of Verification" to the Electrical Consultant. Display one copy near the control panel and retain a copy with the system documentation. Provide an equipment schedule listing each device and showing confirmation that it was verified.
10. Inspect all equipment installed as part of the system for visible damage or tampering which might interfere with its intended operation.
11. Ensure correct operation of all PA/voice EVAC zones, input and output signal quality and controls.
12. Test annunciator(s) to ensure proper operation, voltage, zoning and visibility of all legends.
13. For all required system testing, inspection and verification, provide qualified personnel to monitor and operate control panel. In addition, provide a minimum of two (2) qualified personnel to walk with the Fire Department during 100% repeat verification.

3.3 Sequence of Testing and Verification

1. Carry out testing, verification and certification as discussed above as follows:

1. System test in conjunction with the manufacturer.
 2. Test and verification in conformance with CAN/ULC S537 (most current edition).
 3. Correction of all deficiencies.
 4. Test and verification in conformance with CAN/ULC S1001, Integrated Systems Testing Of Fire Protection And Life Safety Systems. Provide a satisfactory Integrated Testing Report. As part of the base bid price, electrical contractor must coordinate and pay for an Integrated Testing Coordinator, responsible to develop and implement the Integrated Testing Plan.
 5. Submission of test results and audibility levels to Consultant for review including letter of Certification from the manufacturer.
 6. Re-testing and reverification of the complete system in the presence of the Fire Department (authority having jurisdiction), Consultant and manufacturer's representative.
 7. Correction of any deficiencies noted by the authority having jurisdiction.
 7. Submission of manuals with final verification sheets (each verification sheet must be signed by the technician and must include the technician's CFAA registration number).
- 3.4 Password
1. At the completion of the verification, change the password for the manufacturer's programming function.
- 3.5 Demonstration and Training
1. Provide for twenty-four (24) hours of hands-on training at the site covering system operations and management. Allow for a minimum of 3 training sessions with each session consisting of 8 personnel each.
 2. Training must be carried out by the manufacturer's representative.
 3. Digitally record all training sessions and provide recording to owner on a USB stick(s).
- 3.6 Paragraph not used.

3.7 Additional Devices

1. In addition to the field devices indicated on the drawings to be provided under this contract, include in the tender price to supply and install the following quantities of additional devices complete with 100'-0" of conduit and wiring, programming, testing and certification, labeling, verification and 100% repeat verification for each device:

Quantity of Devices	Device Type
0	Manual pull station
1	Multisensor detector head and base
0	Duct smoke detector head and base, housing and sampling tubes
0	Heat detectors
1	Fire Alarm System Horn
1	Fire Alarm System Strobe light
0	'Fire Do Not Enter' sign (100' 2-hour fire rated cable)
2	End of line resistor
0	Flame detector
0	Isolator module
0	Initiating device interface and control modules
4	Program and custom label changes.

3.8 Integrated Systems Testing

1. Test and verification in conformance with CAN/ULC S1001, Integrated Systems Testing Of Fire Protection And Life Safety Systems. Provide a satisfactory Integrated Testing Report. As part of the base bid price, electrical contractor must procure (engage, coordinate and pay for) an Integrated Testing Coordinator, responsible to develop and implement the Integrated Testing Plan. The systems which must be included as part of the integrated systems testing to be determined by the Integrated Testing Coordinator hired by the electrical contractor. All costs related to the integrated systems testing must be included as part of the base bid price. Electrical contractor is responsible to provide all requirements to all required trades through the construction manager / general contractor during the bid period. The integrated systems testing must be completed after hours.
2. Electrical contractor must include the following scopes of work as part of the base bid price specific to the CAN/ULC S1001, Integrated Systems Testing Of Fire Protection And Life Safety Systems:
 - Fire Alarm Technician required for operations and resetting of the fire alarm control panel for the duration.
 - Electrician required for operations and initiating alarms, demonstrating wiring, etc., for the duration.

End of Section

Project: 24210

Panelboard: LP-C

Voltage (V):

Phase/Wire:

Bus and Lugs Rating (A):

CCT NO	Load	Breaker			CCT NO	Load	Breaker	
		Amp	Pole				Amp	Pole
1	CCT FROM LP-C(EX)	15	1		2	CCT FROM LP-C(EX)	15	1
3	CCT FROM LP-C(EX)	15	1		4	CCT FROM LP-C(EX)	15	1
5	CCT FROM LP-C(EX)	15	1		6	CCT FROM LP-C(EX)	15	1
7	CCT FROM LP-C(EX)	15	1		8	CCT FROM LP-C(EX)	15	1
9	CCT FROM LP-C(EX)	15	1		10	CCT FROM LP-C(EX)	15	1
11	CCT FROM LP-C(EX)	15	1		12	CCT FROM LP-C(EX)	15	1
13	CCT FROM LP-C(EX)	15	1		14	CCT FROM LP-C(EX)	15	1
15	CCT FROM LP-C(EX)	15	1		16	CCT FROM LP-C(EX)	15	1
17	CCT FROM LP-C(EX)	15	1		18	CCT FROM LP-C(EX)	15	1
19	CCT FROM LP-C(EX)	TBD			20	CCT FROM LP-C(EX)	TBD	
21			2		22			2
23	CCT FROM LP-C(EX)	TBD			24	CCT FROM LP-C(EX)	TBD	
25			2		26			2
27	CCT FROM LP-C(EX)	TBD			28	CCT FROM LP-C(EX)	TBD	
29			2		30			2
31					32			
33					34			
35					36			
37					38			
39					40			
41					42			

Project: 24210

Panelboard: LP-C

Voltage (V):

Phase/Wire:

Bus and Lugs Rating (A):

CCT NO	Load	Breaker			CCT NO	Load	Breaker	
		Amp	Pole				Amp	Pole
43	BOYS WR WASH FOUNTAIN	20	1		44	WASHROOM 128 HAND DRYER	20	1
45	BOYS WR WASH FOUNTAIN	20	1		46	WASHROOM 128 CHANGE TABLE	20	1
47	BOYS WR HAND DRYER	20	1		48	WASHROOM 128 BBH-1	15	1
49	BOYS WR HAND DRYER	20	1		50	WASHROOM 128 LIFT	20	1
51	BOYS WR FFH	15			52	WASHROOM 128 DOOR/DURESS	15	1
53			2		54			
55	GIRLS WR FFH	15			56	WASHROOM 112 HAND DRYER	20	1
57			2		58	WASHROOM 113 HAND DRYER	20	1
59	GIRLS WR HAND DRYER	20	1		60			
61	GIRLS WR HAND DRYER	20	1		62			
63	GIRLS WR WASH FOUNTAIN	20	1		64			
65	GIRLS WR WASH FOUNTAIN	20	1		66			
67					68			
69	LIFT	20	1		70			
71					72			
73					74			
75					76			
77					78			
79					80			
81					82			
83					84	LIGHTING	15	1

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 02 41 14 Asphalt Paving Removal
- .2 Section 03 30 00 Cast-In-Place Concrete
- .3 Section 32 12 16 Asphalt Paving
- .4 Section 32 16 23 Sidewalks
- .5 Section 32 92 23 Sodding

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM D698-12(2021) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³))
 - .2 ASTM D1557-12(2021) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
- .2 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 805 Construction Specification for Temporary Erosion and Sediment Control Measures
 - .2 OPSS 180 General Specification for the Management of Excess Materials
 - .3 OPSS 206 Construction Specification for Grading
 - .4 OPSS 1010 Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
- .3 Ontario Provincial Standard Details (OPSD)
 - .1 OPSD 219.130 Heavy Duty Silt Fence Barrier
 - .2 OPSD 805 Temporary Erosion and Sediment Control Measures
- .4 The Occupational Health and Safety Act.
- .5 Ontario Regulation O Reg 406/19 On-Site and Excess Soil Management

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit shop drawings of shoring and bracing required in connection with excavation. Drawings to show clearly procedural sequence to be followed.

1.5 Definitions

- .1 Earth: Site excavated material, including shale, rubble rock, building debris, shrub and tree roots and soil.
- .2 Soil: Site excavated material, free from shale, rubble rock, building debris, shrub and tree roots.
- .3 Fill: Approved materials, other than earth, clay and unapproved soil. Approved soil may be used only with approval of the Consultant in writing.
- .4 Rock: All solid rock in ledges, stratified deposits, unstratified masses, and all conglomerate deposits or any other material so firmly cemented by process of nature as to present all the

characteristics of solid rock, being so hard or firmly cemented that it cannot be excavated and removed with a power shovel except after thorough and continuous drilling and blasting.

.5 Backfilling: The operation of supplying and installing fill and approved soil materials.

.6 Engineered Fill: Approved material used to build-up to design elevations.

1.6 Examination

.1 Examine the building site and determine the nature and extent of the materials to be removed or the additional fill required to provide depths and levels indicated on drawings. Field check the site to review existing conditions. Verify locations of all existing utilities and services that will affect the work.

.2 Refer to drawings for all building and site development details.

1.7 Setting Out Work

.1 The drawings indicate the building components location and proposed and final grades. Be responsible to construct the work according to levels and locations shown on the drawings. Report any errors or discrepancies to the Consultant before commencing work.

.2 Commencement of any part of the work shall constitute acceptance of drawings as being correct.

.3 Employ a competent instrument man and provide all lines and levels, limit lines and boundary stakes for the execution of the work as required. All benchmarks shall be carefully protected.

.4 Provide and be responsible for, all lines, levels and dimensions which trades require to relate their work to the work of other trades. All trades shall be notified that all such levels and dimensions must be obtained from the Contractor.

1.8 Existing Underground Utilities

.1 Arrange underground locates of all utility assets prior to excavating. Do not commence excavation in a location prior to utility members marking the location of their utilities or indicating that none exist within the outlined excavation limits. Where necessary, employ the services of a private utility locator to ensure that all utilities are located in a timely manner.

.2 Verify the location and elevation of all existing utilities within the limits of the Work. Observe the locations of the stake outs, prior to commencing the Work. In the event there is a discrepancy between the locations of the stake outs and the locations shown on the Contract Documents, that may affect the Work, immediately notify the Consultant and the affected utility companies, in order to resolve the conflict.

.3 All existing buried utilities located within the excavation zone and any other facilities adjacent to the excavation shall be carefully supported and protected from damage as a result of the Contractor's operations. Be responsible for repairing any damaged underground utilities, as a result of actions during the course of the work at no extra cost to the Owner.

.4 All costs associated with this work shall be considered incidental to all related items of work in the Contract. No separate payment will be made for costs incurred in obtaining utility locates.

1.9 Protection of Existing Services

- .1 Notify the Owner, Public Utility or Municipal authorities in advance of planned excavations adjacent to their services.
- .2 Take care not to damage or displace encountered known and unknown services.
- .3 When such services are encountered during the execution of work, immediately notify the Consultant and protect, brace and support active services. Where repairs to these services become necessary use the following procedure:
 - .1 Known services, repair at no expense to the Owner.
 - .2 Unknown services, forward to the Consultant a complete breakdown of the estimated cost of such work. Proceed only upon written authorization.
- .4 In the case of damage to, or cutting off of an essential service, notify Consultant, the Owner, and Public Utility or Municipal authorities immediately and repair the service under the Consultant's direction.

1.10 Inspection and Testing

- .1 Provide proper and sufficient samples, ample opportunity and access at all times for the Consultant or Testing Agency to inspect materials, operations and completed works carried out under this Section.
- .2 Sample and test excavated material prior to shipping to landfill off the site in accordance with the requirements of O. Reg. 406/19. Samples shall be tested for compliance of acceptable material for landfill. Furnish to the Owner the results of all testing and location of landfill site used. This testing will not be undertaken by the Owner's Inspection and Testing Agency.
- .3 Provide 24 hours notice to inspection laboratory and request tests as follows:
 - .1 Sieve Analysis: Proposed fill materials will be tested to confirm stability for intended use and conformity with specifications.
 - .2 Density Test: Tests will be conducted on compacted fill, to ASTM D698.
 - .3 Frequency Test: Excavated Surfaces: When existing compacted fill surface is being prepared, make a series of three tests of surface for each 500 m² area.
 - .4 Fills under Pavement or Slabs on Grade: Make three tests for every two lifts of compacted fill for each 500 m² area.
 - .5 Backfill Structural Walls: Test each different material for approximately each 30 metres of wall being backfilled at depth increments of 610 mm.

1.11 Standards

- .1 Carry out all work in accordance with the applicable OPSS, OPSD and site drawings. The applicable Ontario Provincial Standard Specifications are listed hereafter.
- .2 The following shall apply:
 - .1 OPS 180 Management and Disposal of Excess Material
 - .2 OPS 206 Grading, Nov. 2005
 - .3 OPS 314 Untreated Granular Subbase, Base, Surface, Shoulder and Stockpiling
 - .4 OPS 408 Adjusting or Rebuilding Maintenance Holes, Catch Basins Ditch Inlets and Valve Chambers
 - .5 OPS 805 Temporary Erosion and Sediment Control Measures

1.12 Shoring and Bracing

- .1 Shoring and trench timbering, in addition to requirements of local authorities, shall be carried out in accordance with the requirements of The Occupational Health and Safety Act, "November 1992 Ontario Regulation 213/91" and Regulations for Construction Projects by Ontario Ministry of Labour and to Construction Safety Association brochure "Trenching Safety April 1994".
- .2 Erect necessary shoring for excavations in such a manner that:
 - .1 Whenever a trench or excavated face is necessary, shore and brace to prevent failure. Engage a registered Professional Engineer fully qualified in this line of work to design, stamp shop drawings and assume responsibility for the shoring and bracing. Submit shop drawings to the Consultant.
 - .2 It will properly retain the banks of the excavations and prevent caving-in or displacement or damage to surrounding or adjacent buildings or other property.
 - .3 All other work in connection with this Contract, including the Mechanical and Electrical Trades, may be carried out while it is still in place if necessary.
 - .4 It will be entirely free of footings, foundation walls or other such work so that it may be removed entirely or in sections when it is no longer required or when directed, without causing any damage or injury to the structural work that has been completed.

1.13 Sedimentation Control

- .1 Maintain and/or repair sedimentation control at all watercourses and catch basins to prevent contamination by excavated fill.
- .2 Sedimentation control shall be in accordance with the Ontario Provincial Standard Specifications, OPSS 805 and local authorities.
- .3 Refer to details and notes on site development drawings.
- .4 Install additional sedimentation control as required and obtain Consultant's approval prior to commencement of site works.

1.14 Dewatering

- .1 Keep excavations and backfill dry at all times.

PART 2 PRODUCTS

2.1 Materials

- .1 Type A Fill: Class "A" material conforming to OPSS1010, latest edition.
- .2 Type B Fill: Class "B" material conforming to OPSS 1010, latest edition.
- .3 Sand Fill: Clean, well graded compactable sand to OPSS 1010, Granular "M" fill.
- .4 Engineered Fill: fill placed below Type A and Type B fill to bring excavation to the design elevations. To be Type B fill or approved fill, approved in writing by the Consultant.
- .5 Silt fence: heavy duty geotextile, Mirafi Envirofence or equivalent.

PART 3 EXECUTION

3.1 Preparation

- .1 Clearing: Refer to Section 31 10 00 - Site Clearing.
- .2 Lines and Levels: Refer to Section 01 71 00 - Examination and Preparation.
- .3 Stock Piles: Materials shall not be stockpiled on the site except with the prior approval of the Consultant. Where permitted, stockpile materials in a manner to prevent segregation and contamination. Piles not to exceed 2000 mm in height. Stockpile materials in a location and manner not interfering with ongoing operation and use of the site and building by the Owner.
- .4 Install silt fencing as detailed and in accordance with reference standards.

3.2 Excavation Work

- .1 Excavate to elevations and dimensions indicated or required by the work, plus sufficient space to permit erection of forms, shoring and inspection. Excavation shall be made to clean lines to minimize quantity of fill material required.
- .2 Remove large rocks, stumps and other obstructions of whatever nature encountered in the course of excavation and haul away off the site. Remove all concrete, masonry, rubble or other construction debris encountered during the work.
- .3 Unauthorized Excavation - Excavation to greater than required depth shall be corrected by the Contractor at his own expense in a manner as directed by the Consultant. Fill over-excavated areas under structure bearing surfaces and footings with concrete as specified for foundations.
- .4 Keep excavation free of water by bailing, pumping or a system of drainage as required and provide pumps, suction and discharge lines or well points of sufficient capacity and maintain until such time as the permanent drainage system is installed or until the Consultant's approval of removal of equipment is obtained. Take all necessary measures to prevent flow of water into the excavation.
- .5 Protect the bottom and sides of excavated pits and trenches from freezing. Protect also from exposure to the sun and wet weather to prevent cave-ins and softening of the bed upon which concrete or drains rest.
- .6 Excavations must not interfere with the normal 45 degree plane of bearing from the bottom of any footing.
- .7 Keep bottoms of excavations clean and clear of loose materials levelled and stepped at changes of levels with exception of excavations made for drainage purposes and those to slope as required.
- .8 If the excavations reveal seepage zones, springs or other unexpected sub-surface conditions which may necessitate revisions or additions to any drainage system, inform the Consultant immediately so that remedial action can be taken.
- .9 If removal of earth causes displacement of adjacent earth, the disturbed earth shall be removed at no additional cost to the Owner.
- .10 Conditions of Excavated Surfaces

- .1 Excavate to a depth sufficient to expose firm undisturbed subsoil, free of organic matter and to the Testing Agency's approval.
- .2 Remove soft, wet or unconsolidated ground and organic material encountered in excavating.
- .3 Should the nature of the sub-soil at the depths shown prove to be unsatisfactory to the Consultant for the placing of the concrete work, then upon the Consultant's written order, the Contractor shall excavate to greater depth until a satisfactory bottom is reached.

- .11 Tolerances: General excavation shall be to the elevations shown on the drawings, plus or minus 25 mm.

3.3 Hydro Excavation

- .1 Utilize hydro excavation services when working near and around known utilities to avoid damage.

3.4 Backfilling

- .1 Proceed promptly with backfilling as the building progresses, and as work to be backfilled has been inspected and approved by the Consultant. The backfill in areas where settlement cannot be tolerated, e.g. service and footing trenches under the floor slab, should be compacted to at least 100 per cent of its Standard Proctor Maximum Dry Density. The backfill should be placed in lifts not greater than 200 mm thick in the loose state, each lift being compacted with a suitable compactor to the specified density.
- .2 Do not commence backfilling operations until mechanical and electrical services, site drainage systems, perimeter and underslab insulation has been inspected and approved by Consultant and authorities having jurisdiction. Existing floor subgrade must be proof rolled before backfilling.
- .3 Withdraw shoring material during backfill. Lumber left in place without the Consultant's approval will not be paid for by the Owner.
- .4 Backfill evenly on both sides of foundation walls to avoid unequal fill pressures on walls.
- .5 Place fill around foundation walls and footings so that footings will have a minimum of 1200 mm coverage, measured at an angle of 45 degrees from bottom of footing to protect against frost until final grading is complete.
- .6 Where fill is placed adjacent to structures or vulnerable building components or in restricted areas, the fill shall be compacted to the same degree as specified by suitable equipment approved by the Consultant. Avoid damage to or displacement of walls, columns, piers, underground services, and process/ production equipment.
- .7 Add water in amounts required only to achieve the optimum moisture content, in accordance with ASTM D1557.
- .8 Backfill shall be free of snow and ice, topsoil, construction debris and oversized boulders greater than 150 mm.

3.5 Rough Grading

- .1 Preparation and Layout
 - .1 Establish extent of grading by area and elevation.

- .2 Prior to commencement of grading work, establish location and extent of all underground utilities occurring in work areas. Maintain, reroute or extend as required. Pay all costs for this work, except costs borne by utilities companies.
- .3 Slope grade away from building as indicated on drawings.
- .4 Cut temporary drainage swales and create containment ponds and structures for temporary surface run-offs, until storm sewer system is installed.
- .5 Regrade all areas that retain or pond water.
- .6 Rough grade all areas to tolerance of plus or minus 50 mm.

3.6 Fills Unders Concrete Slab

- .1 The fill shall be deposited in layers of such thickness that the equipment being used for compacting can produce the specified density but in no cases, more than 200 mm thickness. If lumps are present in the material each layer shall be continuously disced in order to ensure proper compaction.
- .2 The exposed subgrade shall be proof rolled to ensure its integrity. If the subgrade consists of engineered fill, the fill shall be compacted to at least 98% of its maximum Standard Proctor Dry Density for native materials or 100% compaction for Granular "A" and "B" materials, using equipment approved by the Consultant. Any loose, wet or deleterious material shall be sub-excavated and replaced by the Contractor with Type B Engineered fill which must be compacted to 98% Standard Proctor Maximum Density.
- .3 Immediately after levelling, each layer of fill shall be thoroughly compacted by the use of approved mechanical equipment.

3.7 Compaction Density

- .1 Use approved equipment for compaction. Maintain materials at optimum moisture content to obtain required compaction. Special care shall be taken to prevent disturbance of the existing subgrade and adjacent structures and equipment.
- .2 Be responsible for damage to the subgrade and installed materials due to improper compaction methods. Make good to approval of the Consultant.
- .3 The minimum density of fill in place shall be the following values of Standard proctor densities for corresponding locations in accordance with ASTM D698.
 - .1 Type A Fill: To 100% Standard Proctor Maximum Density.
 - .2 Type B Fill: To 100% Standard Proctor Maximum Density.
 - .3 Engineered Fill: To 98% Standard Proctor Maximum Density.
- .4 If during progress of work, tests indicate that compacted materials do not meet specified requirements, remove defective work, replace and retest at own expense.
- .5 Ensure compacted fills are tested and approved before proceeding with placement of surface materials.

3.8 Fill Locations

- .1 Type A Fill:
 - .1 Under all interior and exterior concrete slabs 150 mm minimum thickness.
 - .2 Below all mechanical or electrical services, from 150 mm below invert, to springline.

- .2 Type B Fill:
 - .1 Around all footings, foundations, grade beams and walls up to the underside of Type A fill.
 - .2 From top of approved compacted subgrade to underside of concrete slabs (interior or exterior) but not less than 200 mm thickness.
 - .3 At all areas on the site indicated to be paved with asphalt.
- .3 Sand Fill:
 - .1 Below all mechanical or electrical services, minimum 150 mm deep.
 - .2 Above all mechanical or electrical pipes and trenches, from springline to 300 mm above pipe obvert.

3.9 Water on Prepared Surfaces

- .1 Promptly remove, by approved methods, water rising from seeping of the soil or resulting from rainfall wherever such water is on the surface of sub-grade soil and compacted fill.
- .2 Where proper drainage and pumping is not carried out as specified herein, and any prepared sub-grade soil for under structural work, and any compacted fill for under concrete slabs, is softened or disturbed by water due to improper drainage and pumping, the Contractor shall remove the unsatisfactory soil and fill, and bear all incidental costs in connection with additional excavation and placing and compacting of granular fill under floor slabs.

3.10 Adjustments

- .1 All manhole frames and covers, catch basin frames and covers, drains and valves including those existing scheduled to remain, shall be adjusted and set flush with finished elevation.
- .2 Adjustments to manholes and catch basins shall be done using concrete adjustment units as per OPSS 408 and OPSD 704.010

3.11 Surplus Soil Disposal

- .1 Surplus soil and excavated material shall be promptly removed and disposed of off the site at legal dump sites. Conform to local bylaw requirements for trucking and disposal.
- .2 Comply with the requirements of Ontario Regulation O. REG 406/19, "On-Site and Excess Soil Management", for the importation of new soils and fill materials and the exportation, removal and disposal off-site, of excavated materials. Complete testing of imported and exported materials as required. Unless noted elsewhere, costs for such testing is the responsibility of the contractor and is not included in any allowances. Maintain and submit to authorities having jurisdiction all required test reports, certificates and documentation.

3.12 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 As excavation proceeds, keep roads and aisles clean of dirt and excavated material.
- .3 Clean up and wash down to remove all dirt and excavated materials caused by the work of this section daily.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 31 23 10 Excavating, Trenching and Backfilling
- .3 Section 32 16 23 Sidewalks
- .4 Section 32 17 23 Pavement Markings

1.3 References

- .1 Ontario Provincial Standard Specification (OPSS)
 - .1 OPSS 1003 (2013) Material Specification for Aggregates - Hot Mix Asphalt
 - .2 OPSS 1010 (2013) Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
 - .3 OPSS 1101 (2014) Material Specification for Performance Graded Asphalt Cement
 - .4 OPSS 1103 (2012) Material Specification for Emulsified Asphalt
 - .5 OPSS 1150 (2008) Material Specification for Hot Mix Asphalt
- .2 Ontario Regulation O Reg 406/19 On-Site and Excess Soil Management

1.4 Submittals

- .1 Provide submittals in accordance with Section 01 33 00 Submittals.
- .2 Submit asphalt mix designs.

1.5 Protection

- .1 Protect work of all trades and adjacent properties from damage from the work of this section.
- .2 Barricade paved areas to prevent vehicle traffic for at least 24 hours after completion.

1.6 Quality Assurance

- .1 All work of this Section shall be completed by a bona fide road building contractor engaged in paving work for a minimum of 5 years and having all equipment necessary to complete the work as specified.

1.7 Inspection and Testing

- .1 The Owner will engage an independent inspection and testing company.
- .2 The inspection and testing company shall perform the following services:
 - .1 Sample proposed sources of fill materials and advise as to acceptability, maximum densities obtainable and compaction procedures.
 - .2 Carry out density tests to ensure that the required density is achieved and report the results of such tests in writing.
- .3 The cost of employing the inspection and testing company shall be paid for by the Contractor out of the cash allowances.

PART 2 PRODUCTS

2.1 Engineered Fill

- .1 Compacted Granular 'B' fill or other suitable fill as approved by the Consultant to thickness required to bring subgrade to level of underside of Granular 'B' base course.

2.2 Granular Base Materials

- .1 Granular 'B' Base Course: Crushed or uncrushed bank or pit gravel or stone obtained from an approved source, conforming to requirements for Granular 'B' aggregate, Ontario Provincial Standard Specifications Form No. 1010.
- .2 Granular 'A' Base Course: Crushed gravel or stone, obtained from an approved source conforming to requirements for Granular 'A' aggregate, Ontario Provincial Standard Specifications Form No. 1010.

2.3 Asphalt Materials

- .1 Asphalt Cement: OPSS 1101
- .2 Aggregates: OPSS 1003 and OPSS 1010
- .3 Filler: OPSS 1003
- .4 Asphalt (H.L.8) conforming to OPSS Form 1150
 - .1 Bituminous First Course - shall be dense graded, hot mixed, hot laid.
- .5 Asphalt (H.L.3) conforming to OPSS Form 1150
 - .1 Asphalt surface course shall be hot mixed, hot laid.
- .6 Emulsified Asphalt OPSS 1010 or MTO primer.

2.4 Joint Painting Material and Asphaltic Primer

- .1 SS-1 Emulsion to OPSS 1103.

2.5 Cold Patch

- .1 Asphaltic patching materials in accordance with Ontario Provincial Standard Specifications.

2.6 Painted Line Markings

- .1 As specified in Section 32 17 23 – Pavement Markings.

PART 3 EXECUTION

3.1 Surface Conditions

- .1 Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- .2 Verify that asphalt pavement may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

- .3 Check rough grading, re-grade, re-level and re-compact as required. Soft spots, wet holes, shall be dug out and filled with granular fill placed in not over 150 mm layers and compacted. Remove surplus material from the site.
- .4 Sub-grade shall be fully stabilized, compacted to 100% of standard Proctor Density and levelled to a tolerance of not more than 13 mm measured on a 3.0 m straight edge.
- .5 In the event of discrepancy, immediately notify the Consultant.
- .6 Place and compact engineered fill in sufficient quantities to bring subgrade up to specified level of underside of Granular 'B' base course. Compact engineered fill to 95% Standard Proctor Density.

3.2 Placement of Granular Base

- .1 Granular material shall be placed in layers of such thickness that the equipment being used can produce the specified density.
- .2 Immediately after leveling the material shall be compacted to the specified density.
- .3 Compaction: All granular material shall be compacted to a minimum of 100% Standard Proctor Maximum Density.
- .4 Finished elevation tolerance will be to within 13 mm of the required elevation.

3.3 Placement of Asphaltic Surfacing

- .1 Asphalt driveway surfacing shall be placed in accordance with Ontario Provincial Standard Specification for Hot Mix Hot Laid Asphaltic Concrete. Materials, equipment and construction methods shall be in accordance with the current edition of OPSS 1010 including all amendments thereto.
- .2 Place asphalt driveway paving where indicated on the drawings.
- .3 Pavement structures including asphalt course and fill shall be as noted on the drawings.
- .4 Finished surface shall be smooth of uniform density and texture and true to established finished elevations. Paving shall be of thickness specified and when checked with a 3 m straight edge shall show no irregularity exceeding 6 mm in depth. Surface shall be sloped in order that all surface water will be drained to perimeter of asphalt.
- .5 Paint contact edges of abutting concrete paving with a thick coat of hot asphalt cement before paving mixture is placed against them.
- .6 Joints in asphalt shall be kept to a minimum. Joints in base and top asphalt shall be staggered.
- .7 Base asphalt shall be thoroughly cleaned prior to placing of top course of asphalt.
- .8 Where asphalt does not adjoin concrete paving, edges shall be trimmed and hand tamped to a clean straight line.

3.4 Patching Asphalt Pavement

- .1 Saw cut perimeters of areas to be patched or joined. Remove existing asphalt and base material to depth required.
- .2 Grind top surface of asphalt to depth of 38 mm for width of 300 mm from saw cut. Paint exposed edge of asphaltic joints, edge of maintenance holes and catch basin frames, curbs and similar items with SS-1 emulsified asphalt.

3.5 Asphalt Prime

- .1 Paint contact of curbs and like structures with thin, uniform coat of asphalt prime material.
- .2 Do not apply prime when air temperature is less than 5 ° C or when rain is forecast within 2 hours.
- .3 Where traffic is to be maintained, treat no more than one-half width of surface in one application.
- .4 Prevent overlap at junction of spreads.
- .5 Do not prime surfaces that will be visible when paving is complete.
- .6 Apply additional material to areas not sufficiently covered.
- .7 Keep traffic off primed areas until asphalt prime has cured.
- .8 Permit prime to cure before placing asphalt paving.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 32 12 16 Asphalt Paving
- .2 Section 32 16 23 Sidewalks

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C109/C109M-21 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)
 - .2 ASTM C260/C260M-10a(2016) Standard Specification for Air-Entraining Admixtures for Concrete
 - .3 ASTM C330/C330M-17a Standard Specification for Lightweight Aggregates for Structural Concrete
 - .4 ASTM C494/C494M-19e1 Standard Specification for Chemical Admixtures for Concrete
 - .5 ASTM C827/C827M-16 Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures
 - .6 ASTM C939/C939M-22 Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)
- .2 CSA Group (CSA)
 - .1 CSA A23.1-14/A23.2:19 Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
 - .2 CSA A23.4-16 (R2021) Precast Concrete - Materials and Construction
 - .3 CSA A3000:18 Cementitious Materials Compendium
 - .4 CSA G30.18:21 Carbon Steel Bars for Concrete Reinforcement

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's product data sheets.

1.5 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.6 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Portland Cement: to CSA A3000.

- .2 Water: to CAN/CSA-A23.1.
- .3 Aggregates: to CAN/CSA-A23.1.
 - .1 Coarse aggregates to be normal density.
 - .2 Low density aggregate for lightweight concrete: to ASTM C330.
- .4 Air entraining admixture: to ASTM C260.
- .5 Chemical Admixtures: to ASTM C494. Use of accelerating or set retarding admixtures for cold and hot weather placing to approval of Consultant.
- .6 Supplementary cementing materials: to CSA-A23.5.
- .7 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and elasticizing agents.
 - .1 Compressive strength: 32 MPA at 28 days.
 - .2 Consistency:
 - .1 Fluid: to ASTM C827. Time of efflux through flow cone (ASTM C939), under 30 s.
 - .2 Flowable: to ASTM C827. Flow table, 5 drops in 3 s, (ASTM C109, applicable portion) 125 to 145%.
 - .3 Plastic: to ASTM C827. Flow table, 5 drops in 3 s, (ASTM C109, applicable portions) 100 to 125%.
 - .3 Dry pack: to manufacturer's requirements.
- .8 Reinforcing Steel: to CSA G30.18, Grade 400R.
- .9 Curb Anchors: steel dowels or pins to CAN/CSA-G30.18, minimum 16 mm diameter x 610 mm length.

2.2 Concrete Mixes

- .1 Proportion concrete in accordance with CSAA23.1, Alternative 1, to meet manufacturer's standard specifications for Class C-2 exposure.

2.3 Fabrication

- .1 Fabricate: to CSA A23.4
- .2 Parking Bumper curbs to be 280 mm wide x 150 mm high x 2440 mm long.
- .3 Finish: standard grade.
- .4 Fabricate 2 holes per unit, as indicated, to permit securing with curb anchors.

2.4 Product

- .1 Parking Bumper Curbs: Prefabricated steel reinforced curb weighing 220 kg as manufactured by Brooklin Concrete Products Ltd.

PART 3 EXECUTION

3.1 Installation

- .1 Install curbs as indicated.
- .2 Secure curbs in position by driving curb anchors into pavement with top of anchor no higher than top of curb.
- .3 Replace damaged and defective units as directed by Consultant.

3.2 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 07 92 00 Joint Sealants
- .3 Section 31 23 10 Excavating, Trenching and Backfilling
- .4 Section 32 17 296 Cast-in-Place Tactile Warning Surfacing

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C171-20 Standard Specification for Sheet Materials for Curing Concrete
 - .2 ASTM C309-19 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM D698-12(2021) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³))
- .2 CSA Group (CSA)
 - .1 CSA A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete.
 - .2 CSA A3000-18 Cementitious Materials Compendium
- .3 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 351 Construction Specification for Concrete Sidewalk
 - .2 OPSS 1010 Material Specification for Aggregates - Granular A, B, M and Select Subgrade Material
 - .3 OPSS1308 Material Specification for Joint Filler (Concrete)
- .4 Ontario Provincial Standard Details (OPSD)
 - .1 OPSD 310.010 Concrete Sidewalk

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Concrete Mix Designs:
 - .1 Submit concrete mix designs for review. Specify intended use for each mix design.
 - .2 Review of mix design does not relieve Contractor from responsibility for compliance with Contract Documents.
 - .3 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CSA A23.1. Mix design shall be adjusted to prevent alkali aggregate reactivity problems.
 - .4 Provide certification that plant, equipment, and all materials to be used in concrete comply with the requirements of CSA A23.1.
 - .5 Submit written requests for use of admixtures not specified, for site mixing of concrete, and for use of bonding agents.
 - .6 Submit in writing, proposed method of in-situ strength testing.

1.5 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Base: Granular "A", OPSS 1010.
- .2 Concrete: CSA A23.1-M.
- .3 Curing Compound: Chlorinated rubber based, ASTM C309 Type 2, suitable for exterior use.
- .4 Joint Filler: Pre-moulded, non-extruding and resilient bituminous. OPSS 1308 Type A joint filler.
- .5 Form Lumber: No. 2 S.P.F., 28 x 89 mm, free of twist and warp.
- .6 Reinforcing Steel: 152 x 152 mm MW18.7/MW18.7 welded wire mesh, in flat sheets, not rolls.
- .7 Polyethylene Sheeting: 0.100 mm thickness, to CGSB CAN2-53.33.

2.2 Concrete Mixes

- .1 Concrete Mixes and materials: in accordance with Section 03 30 00.

PART 3 EXECUTION

3.1 Preparation

- .1 Establish lines and levels as required for completion of work.
- .2 Check adequacy of preparations for sidewalks done under Section 31 23 10. Ensure that sub-base is compacted to 98% of Standard Proctor density ASTM D698.

3.2 Placing Granular Base

- .1 Sub-grade must be dry and compacted to smooth surface and required grade prior to placing granular base material.
- .2 Place Granular Base to a uniform cross-section over required area in minimum 100 mm thickness.
- .3 Finish granular base surface true to sidewalk founding elevations and compact to minimum of 98% of Standard Proctor density, ASTM D698.

3.3 Installation

- .1 Construct Sidewalks to OPSD 310.010
- .2 Coordinate installation of tactile warning surfacing specified in Section 32 17 29.
- .3 Erect formwork for sidewalks to achieve lines and grades shown on the drawings.
- .4 Cut expansion joint filler to full cross sectional shape of the sidewalk and place at intervals not exceeding 6.0 m. Locate expansion joints at intersections in accordance with OPSD 310.010. Refer to plans for patterns.

- .5 Place expansion joint filler between sidewalks and curbs, between sidewalks and building foundations and between sidewalk and any poured concrete bases or piers.
- .6 Pour concrete on prepared sub-base to required levels and dimensions. Execute all concrete work to CSA A23.1, and CSA A23.2.
- .7 Pour concrete sidewalks with minimum 125 mm depth, and with transverse slope of 2 mm/ 100 mm (2%). Sidewalk thickness adjacent to curbs shall be 150 mm thick.
- .8 Do not pour concrete when air temperature is or may fall below 5 ° C during or within 24 hours of pour, unless precautions are taken to prevent damage to concrete resulting from low temperature.
- .9 Remove and replace any concrete damaged by freezing at no extra cost.
- .10 Finish concrete with light broom finish, transverse to direction of travel.
- .11 Trowel smooth edges, minimum 75 mm wide.
- .12 Apply membrane forming curing compound as soon as surface is free of bleed water to uniformly cover exposed concrete surfaces at rate of not less than 1.0 litre/5 m². Maintain this protection for minimum 7 days.
- .13 Divide sidewalk between expansion joints into lengths not exceeding 1.5 m on centre equally spaced between expansion joints, with power driven carbide tipped blade, or other device approved for use by the Consultant.
- .14 Tool contraction joints with smooth edges, 75 mm wide.

3.4 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 32 12 16 Asphalt Paving

1.3 References

- .1 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 710 Construction Specification for Pavement Marking
 - .2 OPSS 1716 Water-Borne Traffic Paint
 - .3 OPSS 1750 Traffic Paint Reflectorizing Glass Beads
- .2 United States Federal Standards
 - .1 Federal Standard 595B, Colors Used in Government Procurement
- .3 The Accessibility for Ontarians with Disabilities Act, 2005 (AODA)

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's product data.
- .3 Submit following material sample at least 4 weeks prior to commencing work.
 - .1 Paint colour selection.
 - .2 Mark samples with name of project and its location, paint manufacturer's name and address, name of paint, reference specification number and formulation number and batch number.

1.5 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.6 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Paint:
 - .1 To OPSS 1716.
 - .2 Colour: Federal Standard FS Federal 595B, Yellow 33538.
 - .1 Provide H.C. Blue (Pantone 293 C) to OPSS standards for accessible parking spaces.
 - .3 Paint shall be non-slip.
- .2 Glass beads: Overlay type: OPSS 1750 Traffic Paint Reflectorizing Glass Beads.

PART 3 EXECUTION

3.1 Equipment

- .1 Paint applicator to be an approved pressure type mobile distributor capable of applying paint in single, double and dashed lines. Applicator to be capable of applying marking components uniformly, at rates specified, and to dimensions as indicated, and to have positive shut-off.
- .2 Distributor to be capable of applying reflective glass beads as an overlay on freshly applied paint.

3.2 Condition of Surfaces

- .1 Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.

3.3 Application

- .1 Lay out pavement markings.
- .2 Unless otherwise approved by Consultant, apply paint only when air temperature is above 10° C, wind speed is less than 60km/h and no rain is forecast within next 4 hours.
- .3 Apply traffic paint evenly at rate of 3m² /L.
- .4 Do not thin paint unless approved by Consultant.
- .5 Symbols and letters to conform to dimensions indicated.
- .6 Paint lines to be of uniform colour and density with sharp edges.
- .7 Paint accessible parking spaces blue with a painted pavement marking in the centre of the space, in contrasting colour to the pavement, 1000mm in length, with the International Symbol of Accessibility.
- .8 Thoroughly clean distributor tank before refilling with paint of different colour.
- .9 Apply glass beads at rate of 200g/m² of painted area immediately after application of paint.

3.4 Tolerance

- .1 Paint markings to be within plus or minus 12 mm of dimensions indicated.
- .2 Remove and replace incorrect markings.

3.5 Protection

- .1 Protect pavement markings until dry.

3.6 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 32 16 23 Sidewalks

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM B117-19 Standard Practice for Operating Salt Spray (Fog) Apparatus
 - .2 ASTM C501-21 Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser
 - .3 ASTM D543-21 Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents
 - .4 ASTM D570-98(2018) Standard Test Method for Water Absorption of Plastics
 - .5 ASTM D638-22 Standard Test Method for Tensile Properties of Plastics
 - .6 ASTM D695-15 Standard Test Method for Compressive Properties of Rigid Plastics
 - .7 ASTM D696-16 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer
 - .8 ASTM D790-17 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 - .9 ASTM D1037-12(2020) Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
 - .10 ASTM D2486-17 Standard Test Methods for Scrub Resistance of Wall Paints
 - .11 ASTM D5420-21 Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)
 - .12 ASTM E84-23d Standard Test Method for Surface Burning Characteristics of Building Materials
 - .13 ASTM G155-21 Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
- .2 Accessibility for Ontarians with Disabilities Act (AODA)

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit manufacturer's literature describing products, installation procedures and routine maintenance.
- .3 Samples for Verification Purposes: Submit two (2) tile samples minimum 610 x 610 mm of the kind proposed for use.
- .4 Shop drawings showing fabrication details, composite structural system, tile surface profile, sound on cane contact amplification feature, plans of tile placement including joints, and material to be used as well as outlining installation materials and procedure.
- .5 Material Test Reports: Submit complete test reports from qualified accredited independent testing laboratories to qualify that materials proposed for use are in compliance with requirements and

meet or exceed the properties indicated in the specifications. All tests shall be conducted on a Cast In Place Detectable/Tactile Warning Surface Tile system as certified by a qualified independent testing laboratory.

- .6 Maintenance Instructions: Submit copies of manufacturer's specified installation and maintenance practices for each type of Detectable Warning Surface Tile and accessory as required for inclusion in the Operation and Maintenance Manuals specified in Section 01 78 00-Closeout Submittals.

1.5 Quality Assurance

- .1 Provide Cast in Place Warning tiles and accessories as produced by a single manufacturer with a minimum of three years' experience in the manufacturing of Cast in Place Warning tiles.
- .2 Installer's Qualifications: Engage an experienced installer certified in writing by Cast in Place Warning tile manufacturer as qualified for installation, who has successfully completed installations similar in material, design, and extent to that indicated for the project.
- .3 Provide Cast in Place Warning tiles which are in compliance with the following standards (or most recent):
 - .1 Americans with Disabilities Act (Title III Regulations, 28 CFR Part 36 ADA Standards for Accessible Design, Appendix A, Section 4.29.2 Detectable Warnings on Walking Surfaces).
 - .2 Accessibility for Ontarians with Disabilities Act

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Cast In Place Detectable/Tactile Warning Surface Tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy plastic wrappings to protect tile from concrete residue during installation and tile type shall be identified by part number.

1.7 Project Conditions

- .1 Environmental Conditions and Protection: Maintain minimum temperature of 5° C in spaces to receive Cast Iron Detectable/Tactile Warning Surface Indicator Plates for at least 24 hours prior to installation, during installation, and for not less than 24 hours after installation.
- .2 The use of water for work, cleaning or dust control, etc. shall be contained and controlled and shall not be allowed to come into contact with the general public. Provide barricades or screens to protect the general public.

1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.9 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of five years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Manufacturer

- .1 The Vitrified Polymer Composite (VPC) Cast In Place Detectable/Tactile Warning Surface Tile specified is based on Armor-Tile manufactured by Engineered Plastics Inc. (800-682-2525) as distributed by Kinesik Engineered Products, 2213 North Sheridan Way Mississauga, Ontario L5K 1A3
- .2 Existing engineered and field tested products, which have been in successful service for a period of three years and in compliance with requirements, may be incorporated in the work and shall meet or exceed the specified test criteria and characteristics.

2.2 Cast In Place Detectable/Tactile Warning Surface Tile

- .2 Vitrified Polymer Composite (VPC) Cast in Place Warning tiles shall be an epoxy polymer composition with an ultra-violet coating employing aluminum oxide particles in the truncated domes; "Armor Tile" as distributed under license by Engineered Plastics or equivalent product approved prior to project award.
- .3 Dimensions: The tile shall incorporate an in-line pattern of truncated domes measuring nominal 5.08 mm height, 22.86 mm base diameter, 11.43 mm top diameter spaced center-to-center 60 mm as measured on a diagonal and 42 mm as measured side by side in-line. For wheelchair safety the field area shall consist of a non-slip surface with a minimum of 40 - 90° raised points 11.43 mm high, per 25 mm square. Cast in Place Warning tiles shall be held within the following dimensions and tolerances:

Part No.	Size
ADA-C-2448	160 X 1220 mm

- .4 Product Data: Vitrified Polymer Composite (VPC) Cast in Place Warning tiles shall meet or exceed the following test criteria:

ASTM Reference	Test Description	Value
ASTM D695	Compressive Strength	≥ 28,000 psi
ASTM D790	Flexural Strength	≥ 25,000 psi
ASTM D638	Tensile Strength	≥ 19,000 psi
ASTM D5420	Impact Resistance	≥ 550 in-lbf/in
ASTM D696	Coefficient of Thermal Expansion	2.78 x 10-6/oF
ASTM E84	Flame Spread Index	≤ 25
ASTM D570	Water Absorption	≤ 0.05%
ASTM C501	Abrasive Wear Index lw	≥ 500
ASTM D2486	Abrasive Scrub Test	≤ 0.06
ASTM B117	Salt Spray (300 hrs)	No Failure
ASTM D1037	Accelerated Aging Cycle Testing	No Failure
ASTM D543	Chemical Resistance	No Failure
ASTM G155	Accelerated Weathering	ΔE < 3

- .5 Colour: Yellow conforming to Federal Colour No. 33538. Colour shall be homogeneous throughout the tile.

PART 3 EXECUTION

3.1 Installation

- .1 During Cast In Place Detectable/Tactile Warning Surface Tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
- .2 Prior to placement of the Cast In Place Detectable/Tactile Warning Surface Tile system, review manufacturer and contract drawings prior to construction and refer any and all discrepancies to the Consultant.
- .3 The physical characteristics of the concrete shall be consistent with the contract specifications while maintaining a slump range of 4 - 7 to permit solid placement of the Cast In Place Detectable/Tactile Warning Surface Tile system. An overly wet mix will cause the tile to float. Under these conditions, suitable weights such as 2 concrete blocks or sandbags (25 lb) shall be placed on each tile.
- .4 The concrete pouring and finishing operations require typical mason's tools, however, a 1220 mm long level with electronic slope readout, 25 lb. weights, and a large non-marring rubber mallet are specific to the installation of the Cast In Place Detectable/Tactile Warning Surface Tile system. A vibrating mechanism may be employed, if desired. The vibrating unit should be fixed to a soft base such as wood, at least 300 mm square.
- .5 The factory-installed plastic sheeting must remain in place during the entire installation process to prevent the splashing of concrete onto the finished surface of the tile.
- .6 When preparing to set the tile, no concrete shall be removed in the area to accept the tile. It is imperative that the installation technique eliminates any air voids under the tile. Holes in the tile perimeter allow air to escape during the installation process. Concrete will flow through the large holes in each embedment flange on the underside of the tile. This will lock the tile solidly into the cured concrete.
- .7 The concrete shall be poured and finished true and smooth to the required dimensions and slope prior to the tile placement. Immediately after finishing concrete, the electronic level should be used to check that the required slope is achieved. The tile shall be placed true and square to the curb edge in accordance with the contract drawings. The Cast In Place Detectable/Tactile Warning Surface Tiles shall be tamped (or vibrated) into the fresh concrete to ensure that the field level of the tile is flush to the adjacent concrete surface. The embedment process should not be accomplished by stepping on the tile as this may cause uneven setting which can result in air voids under the tile surface. The contract drawings indicate that the tile field level (base of truncated dome) is flush to adjacent surfaces to permit proper water drainage and eliminate tripping hazards between adjacent finishes.
- .8 In cold weather climates it is recommended that the Cast In Place Detectable/Tactile Warning Surface Tiles be set deeper such that the top of domes are level to the adjacent concrete on the top and sides of ramp and that the base of domes to allow water drainage. This installation will reduce the possibility of damage due to snow clearing operations.
- .9 Immediately after placement, the tile elevation is to be checked to adjacent concrete. The elevation and slope should be set consistent with contract drawings to permit water drainage to curb as the design dictates. Ensure that the field surface of the tile is flush with the surrounding concrete and back of curb so that no ponding is possible on the tile at the back side of curb.

- .10 While concrete is workable, a 10 mm radius edging tool shall be used to create a finished edge of concrete, then a steel trowel shall be used to finish the concrete around the tile's perimeter, flush to the field level of the tile.
- .11 During and after the tile installation and the concrete curing stage, it is imperative that there is no walking, leaning or external forces placed on the tile that may rock the tile causing a void between the underside of tile and concrete.
- .12 Following tile placement, review installation tolerances to contract drawings and adjust tile before the concrete sets. Two suitable weights of 25 lb each may be required to be placed on each tile as necessary to ensure solid contact of the underside of tile to concrete.
- .13 Following the concrete curing stage, protective plastic wrap is to be removed from the tile surface by cutting the plastic with a sharp knife, tight to the concrete/tile interface. If concrete bled under the plastic, a soft brass wire brush will clean the residue without damage to the tile surface.
- .14 If desired, individual tiles can be bolted together using ¼ inch or equivalent hardware. This can help to ensure that adjacent tiles are flush to each other during the installation process. Tape or caulking can be placed on the underside of the bolted butt joint to ensure that concrete does not rise up between the tiles during installation. Any protective plastic wrap which was peeled back to facilitate bolting or cutting, should be replaced and taped to ensure that the tile surface remains free of concrete during the installation process.
- .15 Tiles can be cut to custom sizes, or to make a radius, using a continuous rim diamond blade in a circular saw or mini-grinder. Use of a straightedge to guide the cut is advisable where appropriate.
- .16 Any sound-amplifying plates on the underside of the tile, which are dislodged during handling or cutting, should be replaced and secured with construction adhesive. The air gap created between these plates and the bottom of the tile is important in preserving the sound on cane audible properties of the Armor-Tile system as required in various jurisdictions.

3.2 Protection

- .1 Protect tiles against damage during construction period to comply with manufacturer's specification.
- .2 Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.

3.3 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean Tactile Tiles not more than four days prior to date scheduled for inspection intended to establish date of Substantial Performance in each area of project. Clean Tactile Tile by method specified by manufacturer.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

- .1 Nursery Sod Growers Association of Ontario (NSGA)
- .2 Ontario Regulation O Reg 406/19 On-Site and Excess Soil Management

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit grass seed mix.
- .3 Submit name and address of sod farm.

1.5 Quality Assurance

- .1 Topsoil from each source, native and imported, shall be tested for N.P.K., atrazine, minor elements, as well as clay and organic matter contents and acidity (pH) range. Topsoil shall be tested, written test report submitted and approved by Consultant, prior to delivery to site.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Protect sod during transportation, for delivery to the site in a fresh and healthy condition.
- .3 Install sod immediately, no later than 48 hours after arrival on site. Keep moist and fresh until installation.
- .4 Handle sod carefully to prevent breaking or tearing. Immediately remove damaged and dried-out sod from the site.

PART 2 PRODUCTS

2.1 Topsoil

- .1 Clean topsoil imported material approved by the Consultant, and free from admixtures of subsoil, clay lumps, stones or roots over 25 mm diameter, free of toxic substances or any other foreign matter which would inhibit growth. Minimum 150 mm thickness.
- .2 Comply with the requirements of Ontario Regulation O. REG 406/19, "On-Site and Excess Soil Management", for the importation of new soils. Complete testing of imported materials as required. Unless noted elsewhere, costs for such testing is the responsibility of the contractor and is not included in any allowances. Maintain and submit to authorities having jurisdiction all required test reports, certificates and documentation.

2.2 Sod

- .1 Sod shall be a Certified No. 1 sod, grown and sold in accordance with the latest specifications of the Nursery Sod Growers Association of Ontario (NSGA), composition of 50% Kentucky Blue Grass and 50% Merion Blue Grass.
- .2 At the time of delivery, sod shall have a strong, fibrous root system, be free of disease, stones, burned or bare spots, with a healthy green colour and containing not more than 1% twitch grass and other weeds.
- .3 Sod shall be cut and rolled in sections of max. 1.0 m² in area and approximately 30 mm thick as specified by the NSGA.

2.3 Wooden Pegs

- .1 Hardwood pegs, 25 x 25 mm square and at least 250 mm long, or longer as required for satisfactory anchorage of sod.

2.4 Fertilizer

- .1 Commercial type having a 10-10-10 ratio and shall be applied such that actual nitrogen is 9.0 kg/10 m².

PART 3 EXECUTION

3.1 Preparation

- .1 Adjust subgrade to allow the placing of topsoil to minimum depths specified.
- .2 Scarify subgrade to at least 75 mm deep and remove debris and all stones 50 mm in diameter and larger.
- .3 Arrange for inspection of finished subgrade by Consultant.
- .4 Spread and grade topsoil evenly over approved subgrade. Provide minimum 150 mm thick topsoil. No less will be accepted.
- .5 Finished sodded area top surface shall be uniform and evenly graded between elevations indicated, free of bumps, ridges and depressions. Remove all stones and lumps over 25 mm in diameter and foreign materials.
- .6 Unless recommended otherwise on soil analysis report, apply a 10-10-10 fertilizer at the rate of 9.0 kg/10 m².
- .7 Work fertilizer well and uniformly into the topsoil within 48 hours before laying sod.
- .8 Fine grade, rake and roll surface until smooth and firm against foot prints, and free of depressions, lumps and irregularities.

3.2 Installation

- .1 Place sod closely knit together, so that no open joints are visible, and pieces are not overlapping.
- .2 Install sod to blend tightly and uniformly with adjoining grass areas and, unless otherwise detailed, to be flush with paving, top of curbs.
- .3 On slopes of 3:1 and steeper, place sod perpendicularly to the slope and stake every row with wooden pegs at maximum 600 mm intervals. Drive pegs flush with sod.
- .4 Immediately after installation, water with sufficient amount to saturate sod and underlying topsoil.
- .5 As soon as sod has dried sufficiently to prevent damage, roll with roller to ensure a good bond between sod and topsoil and to remove minor depressions and irregularities.

3.3 Maintenance

- .1 Maintain all sodded areas, from date of installation and until one full growing season is complete (minimum 6 months). Obtain Consultant's approval at end of maintenance.
- .2 Maintenance shall include all necessary measures to establish and maintain grass in a healthy, vigorous growing condition, for one full growing season.
- .3 Maintenance shall include, but not be limited to the following work:
 - .1 Mow grass areas at regular intervals as required to maintain grass height between 50 mm and 60 mm. Not more than $\frac{1}{3}$ of grass blade shall be cut during one mowing. Hand clip where necessary and keep edges neatly trimmed. Remove heavy clippings immediately after mowing and trimming.
 - .2 Control weeds by cutting. Use of chemicals is strictly prohibited.
 - .3 Fertilize not less than once per season (Spring, Summer, Fall).
 - .4 Water when necessary, with sufficient quantities of water to prevent sod and underlying soil from drying out.
 - .5 Roll all sodded areas to remove minor depressions and irregularities.
 - .6 Repair all erosion damage resulting from faulty workmanship and/or maintenance.
 - .7 Replace all grass which has deteriorated, or which shows bare spots.
 - .8 Protect all grass areas against damage, including erosion and trespassing, by providing and maintaining proper safeguards. Remove safeguards at end of maintenance period.

3.4 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean up all areas and remove debris

End of Section