



**Waterloo Region
District School Board**

REQUEST FOR TENDER

GRAND RIVER COLLEGIATE INSTITUTE

FAMILY STUDIES ROOMS & ROSEMOUNT WING RENOVATION

PROJECT NO. 26-7875-RFT

ISSUE DATE: April 10, 2026

The Bidding System will receive ELECTRONIC SUBMISSIONS, no later than **2:00:00 p.m. local time, on May 4, 2026** (“Closing Date and Time”)

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22 05 53	Identification of Plumbing Services
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23 05 49	HVAC Vibration and Noise Control Measures
23 05 53	Identification of HVAC Services
23 07 11	Testing, Adjusting, and Balancing (TAB) of HVAC Systems
23 08 11	HVAC Contractor Commissioning Requirements
23 10 13	Duct Insulation
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23 11 23	Facility Natural-Gas & Propane Piping
23 23 13	Refrigerant Piping and Specialties
23 25 13	Water Treatment for Closed-Loop Hydronic Systems

23 31 13	Metal Ducts
23 32 13	Fabricated, Metal Air Plenums
23 33 13	Duct Accessories
23 33 14	Volume-Control Dampers
23 33 16	Fire Dampers
23 33 17	Smoke Control Dampers
23 33 18	Operating Dampers
23 33 46	Flexible Ducts
23 33 53	Duct Liners
23 34 23	Packaged Exhausters
23 37 13	Diffusers, Registers, and Grilles
23 37 23	Louvres, Intakes, and Exhaust
23 38 13	Commercial-Kitchen Hoods
23 75 24	Custom Outdoor, Indirect Fired Make-Up Air Unit (Heat only)
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26 05 19	Wires and Cables
26 05 20	Splitters, Junction, and Pull Boxes
26 05 21	Outlet Boxes, Conduit Boxes, and Fittings
26 05 22	Wire and Box Connectors – 0 –1000 V
26 05 33	Conduits, Conduit Fastenings, and Conduit Fittings
26 05 74	Short Circuit/Coordination Study Arc Flash Hazard Analysis
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DIVISION 28 – ELECTRICAL SAFETY AND SECURITY
28 31 26 Fire Alarm System (Renovation)

DIVISION 31 – EARTHWORK- NOT APPLICABLE

DIVISION 32 – EXTERIOR IMPROVEMENTS- NOT APPLICABLE

DIVISION 33 – UTILITIES- NOT APPLICABLE

00 01 00 Consultant/Professional Seals

- 1.1 The following professional seals and signatures are provided as required by Paragraph 1.21.1 (4) Division C of the Ontario Building Code and apply to the areas of expertise for which each consultant was commissioned.

1.1.1 Architect

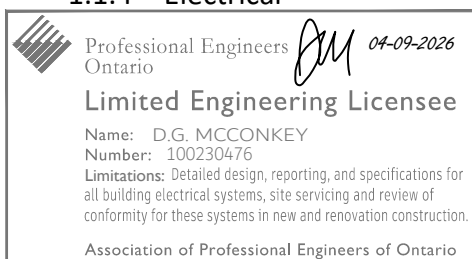


1.1.2 Structural

1.1.3 Mechanical



1.1.4 Electrical



END OF SECTION

DIVISION 00 – BIDDING AND CONTRACT DOCUMENTS

00 21 13 - Instructions to Bidders

1.1 Designated Representative

To contact the Waterloo Region District School Board (“WRDSB” or the “Board”) or ask questions in relation to this Procurement, bidders must initiate communication electronically through the Bidding System. The WRDSB will not accept any communications by any other means, except as specifically stated in the Procurement. Bidders must not communicate in any manner with anyone other than the Designated Representative.

The Designated Representative for this procurement process is:

Procurement Lead: Ardith Inapan

Title: Buyer

Waterloo Region District School Board

Email: ardith_inapan@wrdsb.ca

1.2 Consultant

The WRDSB has hired the following consultant to assist in the preparation of this Procurement: BJC architects + associates

The Consultant and any subconsultants are not to respond to any questions or communicate with bidders and/or any interested parties from the bid issue date to the bid award notification. Reference: 1.5 Communication and Question Protocol.

The Consultant will be responsible for the contract administration of the project after the purchase order has been issued or the contract has been signed by the WRDSB.

1.3 Blackout Period

A blackout period shall exist between the deadline for questions and the date of award. During this period, there shall be no communication between the Bidders, the WRDSB, or any WRDSB consultants or employees, unless initiated by the Board’s Designated Representative, noted above.

1.4 Doing Business with the Waterloo Region District School Board

Waterloo region District School Board (WRDSB) serves approximately 65,000 students in 123 schools, as well as alternative and continuing education sites. WRDSB is committed to creating learning environments that support the achievement and well-being of all students through partnering with staff, parents, families, caregivers, and communities to promote success in learning and life.

Bid opportunities above \$10,001 CAD will be solicited through an electronic bidding system ([bids&tenders](#)) or the WRDSB may also utilize Supplier roster lists awarded through a competitive process, participate in cooperative procurements with various public entities, or buying groups. These may include, but are not limited to, Ontario Education Collaborative Marketspace, Supply Ontario, and other Cooperative Group(s).

WRDSB competitive opportunities are posted on the Electronic Bidding System, [bids&tenders/wrdsb](#).

The WRDSB only accept electronic Bid Submissions submitted through the Electronic Bidding System, [bids&tenders/wrdsb](#)

Bid opportunities may be posted as Public or by Invitation and are based on dollar thresholds outlined in Administration Procedure 4570 PROCUREMENT. Click [here](#) to access the WRDSB's Administrative Procedures, Section 4000 – Business Services.

1.5 Certificate of Recognition (COR) Certification (General Contractors)

- i. All bidders must possess and maintain a valid Certificate of Recognition (COR) issued by a recognized certifying partner at the time of bid submission.
- ii. Bidders shall provide proof of current COR Certification with their tender submission. Failure to provide acceptable documentation may render the bid non-compliant and subject to rejection.
- iii. The WRDSB reserves the right to verify the validity and status of COR Certification at any time during the procurement process and throughout the term of the contract.
- iv. If a bidder's COR Certification expires, is suspended, or is revoked during the contract period, the Board may, at its sole discretion, require immediate corrective action or terminate the contract without penalty

1.6 Communication and Question Protocol

Bidders and their representatives are NOT permitted to contact WRDSB Project Managers/Leads, agents of the WRDSB; any member of the WRDSB's governing body (such as Board of Trustees, or advisors); any employee, consultant, or agent of the WRDSB's Clients, other than the Designated Representative listed above. Any attempt by a Bidder to bypass or influence the procurement process may result in disqualification of the Bidder and the rejection of the Bidder's submission.

The WRDSB will not be responsible for any verbal statements, instructions, or representations. In case of difference between any verbal information and written document, the written document shall govern. Information obtained from any source, other than the Designated Representative, noted above in writing, shall not be relied upon.

The WRDSB shall not be bound by any verbal instruction or information provided by any WRDSB employee or consultant of the WRDSB. Only responses provided in an Addendum shall form part of this Procurement Document.

All requests for information, instructions, or clarifications shall be through the Bidding System by clicking on the "Submit a Question" button found within the bid detail of the specified Procurement. Addenda will be issued accordingly.

It is the responsibility of the Bidder to seek clarification of any matter that they consider unclear before submitting their application. The Board is not responsible for any misunderstanding of the Procurement documents on the part of the Bidder.

1.7 Anticipated Project Schedule

The following table represents the anticipated project timelines. This timeline is an estimate only and may be subject to change by the WRDSB at any time.

DESCRIPTION	DATE
Issue Date of Tender	Friday, April 10, 2026
Non-Mandatory Pre-Bid Site Examination	Date: Thursday, April 16, 2026 Time: 03:00 pm local time School/Site: Grand River Collegiate Institute Address: 175 Indian Rd, Kitchener, ON N2B 2S7 Meeting Area: Main Office
Deadline for Questions	Monday, April 27, 2026
Closing Date and Time	Monday, May 4, 2026 2:00:00 pm local time
Anticipated Contract Start / Work begins	Monday, June 29, 2026
Substantial Completion Date	Friday, August 21, 2026
Ready for Takeover	Friday, August 28, 2026
Deemed Complete Date	Friday, August 28, 2026

1.8 Site Pre-Bid Examination

Bidders are strongly encouraged to attend the non-mandatory pre-bid site meet and sign the attendance sheet. Date, time and location are provided above in the Anticipated Project Schedule. The WRDSB may not provide another opportunity to visit the site.

- i. Bidders shall attend site meetings at their own risk and hold the WRDSB harmless for any issues or damage arising out of their attendance at the site meeting.
- ii. The WRDSB will not consider any claims for additional payments during the execution of the Work for extra work or difficulties encountered resulting from conditions which were either visible or could be reasonably inferred from an

examination of the Place of the Work and the available project information prior to the submission of Bids

- iii. Absence from a non-mandatory site meeting will not disqualify any Bidder.
- iv. Bidders are solely responsible for making their own assessment of the site.
- v. Bidders are encouraged to bring their own measuring tape, camera, or other portable tools as required to the site meeting. Bidders are solely responsible for making their own assessment of the site.

1.9 Secondary Site Examinations

Bidders may request a secondary site examination visit through the Bidding System by clicking on the "Submit a Question" button found within the bid details page of that Procurement. Include the contact's name, phone number and email address of the person who will visit the site.

Bidders shall attend the secondary site examination visit at their own risk and hold the Board harmless for any issues or damage arising out of their attendance of the site meeting.

In the event the WRDSB holds a Mandatory Pre-Bid Site Examination meeting, Bidders not in attendance will not be provided an opportunity to a secondary site examination visit.

Bidders must adhere to all communication protocols, as described above in 1.5. Communication Protocol.

The Owner will not consider any claims for additional payments during the execution of the Work for extra work or difficulties encountered resulting from conditions which were either visible or could be reasonably inferred from an examination of the Place of the Work and the available project information prior to the submission of Bids.

Bidders are encouraged to bring their own measuring tape, camera, or other portable tools as required to the site meeting. Bidders are solely responsible for making their own assessment of the site.

1.10 Examination of Bid Documents and Work and Submitting Questions

Bidders are required to fully acquaint themselves with the Procurement documents; fully inform themselves of all conditions, limitations and requirements involved in the Procurement; and obtain all information that may be necessary to complete those requirements before submitting a Bid.

Submission of a Bid shall be considered conclusive evidence that the Bidder has satisfied itself as to the requirements of this Procurement.

In the event a Bidder discovers any errors, discrepancies, inconsistencies, or omissions or requires clarification within this Procurement, they are to submit their observations and/or questions through bids&tenders by clicking on the "Submit a Question" button found within the bid detail of the specified Procurement by the Deadline for Questions specified in this paragraph.

Bidders are strongly encouraged to ask clear and concise questions(s) or statements citing the relevant section of the Procurement Document. The Board cannot guarantee a response to questions received by the Board after the Deadline for Questions.

The WRDSB has endeavored to provide complete, correct information and estimates to enable Bidders to accurately assess and determine the scope and complexity of the Work prior to submitting a Bid.

Bidders are solely responsible for determining if they require additional information or if anything appears incorrect or incomplete. The onus is on the Bidder to contact the Designated Representative prior to the Deadline for Responses indicated in this document, if they have any questions or queries whatsoever or find omissions from or discrepancies in this Procurement document, unnecessary restrictions in the terms of reference, or should they be in doubt as to the meaning of any part of this document.

Written responses or clarifications to issues of substance will be shared with all Bidders in the form of an Addendum.

1.11 Electronic Bid Submission Only / Electronic Bidding System

The Bidder must complete and submit their bid through the Bidding System only. All components of the submission and supporting documents must be in English only. Any other form of submittal will not be considered. It is the Bidder's responsibility to read the Procurement documents thoroughly including all attachments and addenda, if any, as these contain information that is highly pertinent to this Procurement and to clarify any details with the Designated Representative prior to their submission. To be considered, Bidders must respond to this Procurement.

To submit a bid, bidders must be registered with [bids&tenders](#). The sole onus is on the bidder to have the most current correct information set-up in bids&tenders e.g. plan taker contact information, categories, and agency etc.

All Bids shall be submitted through [bids&tenders](#) only. The onus is on the Bidder to ensure all requirements of this Procurement are submitted.

If a bidder encounters technical issues, the onus is on the bidder to have this resolved prior to the closing date and time by contacting support@bidsandtenders.ca

Bidder shall have a "Vendor account" in the Bidding System and shall ensure the account is created with the Bidders full legal company name and be registered as a "plan taker" for this Procurement. Only the plan takers will have access to download bid documents, receive addenda email notifications, download addenda, and submit their bid electronically through the Bidding System.

The onus is on the Bidder to ensure that the Bid is received in the Bidding System on or before Closing Time. The Closing Time shall be determined by the Bidding System's web clock. The timing of the Bid submission shall be based on when the Bidding System receives the Bid, not when a Bidder submits a Bid.

Bidders shall allow sufficient time to upload their Bid submission including all requirements as stated in this Procurement and to resolve any issues that may arise as

Bid transmission can be delayed in an “internet traffic jam” due to file transfer size, transmission speed, and other electronic considerations

All prices including provisional pricing, if requested, shall be submitted in the Schedule of Prices forms available through the Bidding System.

The Owner reserves the right to accept or reject any or all provisional bid prices submitted. Failure to submit provisional prices where required may result in the Bid being declared non-compliant.

Bids submitted by fax or paper copy, or any other format will not be accepted.

The Bidding System will not accept Bids after the Closing Time as determined by the Bidding System’s web clock.

The WRDSB hereby consents to the use of an Electronic Signature for the signing of all documents requested hereunder. Acceptable forms of signatures include, but are not limited to, the typing of the Bidder’s authorized signing officer’s name or the inclusion of an image of the Bidder’s authorized signing officer’s signature, so long as the electronic signature is sufficient to identify the Bidder’s authorized signing officer. The Bidder’s authorized signing officer agrees that whatever form of electronic signature is provided constitutes a signature for the purpose of executing all documents requested hereunder.

Upon submitting a Bid, the Bidding System will send a confirmation email to the Bidder advising that the Bid was submitted successfully. If a Bidder does not receive a confirmation email despite submitting a Bid, the Bidder should contact technical support of the service provider hosting the Bidding System via email: support@bidsandtenders.ca

There will be no public opening for this Bid.

If a Bid is a joint submission of two (2) or more firms, a single Bid is to be coordinated and submitted by the lead Bidder with the required information. If two or more parties submitted a joint response to this Procurement, they shall decide between them who is to be the Bidder, without any involvement of the WRDSB.

Your online Bid submission shall be taken as your statement that you understand the requirements and agree to comply with the requirements as well as terms and conditions stated in this Procurement document, including WRDSB’s Standard Terms and Conditions. Your Bid submission through the Bidding System confirms that you have checked and confirmed your pricing and by submitting the Bid online, you agree that you have not omitted any items from your Bid.

For construction projects with Bids above \$200,000 the Successful Bidder will be required to execute a “Canadian Standard Form of Construction Contract to a Stipulated Sum” (CCDC 2 - 2020 including amendments thereto as set out in this Procurement.

1.12 Bid Prices

The amounts stipulated on the Schedule of Prices are intended to cover the cost of the complete Work as described in this Procurement Document.

All prices shall be in Canadian Funds, Free On Board (FOB) Destination, Freight Prepaid (WRDSB sites/locations).

Exclusive of the HST, or other similar taxes.

Unit pricing shall be exclusive of Harmonized Sales Tax (HST) but shall include all applicable costs including but not limited to overhead, material, labour, travel, fuel, fuel surcharge, equipment, disbursements, expenses, customs, charges, freight, shipping and handling costs, and all other charges of every kind attributable to the services, equipment or goods provided.

The person submitting the Bid on behalf of the Bidder must have authority to bind the Bidder.

Quantities may be estimated and subject to change, and therefore the WRDSB, at its discretion, may purchase more or less of the commodity based on the unit price bid.

All information required on the forms shall be completed in full including references and subcontractors that it proposes to use for Work described. Changes made to the list of subcontractors after the closing of the Bid must have prior written approval of the WRDSB's Project Representative.

All price(s) submitted shall be a reasonable price for each item as determined by the WRDSB and under no condition will an unbalanced Bid be considered. Submissions containing prices which appear to be so unbalanced as to likely affect the interests of the WRDSB adversely will be clarified and may be rejected.

Unit prices and/or optional pricing, if any will set the foundation for any approved increases or decreases in Work. The unit prices must remain fixed and firm for the term of the Contract, unless otherwise specified in this Procurement document.

Provisional or Optional Pricing may or may not be required for completion of the Work called for under the Contract. The WRDSB will decide necessity of these items and quantities thereon based on the unit prices(s) included in their Bid. If Provisional or Optional items are not purchased, or quantities are less than estimated, no adjustment or compensation will be awarded to the Bidder by the WRDSB. Optional pricing is not used for comparison of Bids for award purposes.

1.12.1 Bonding: for awards over \$200,000.00 unless otherwise instructed is required – Refer to Standard Terms and Conditions, Clause #4 Bonding Requirements.

1.13 References

- 1.13.1 References are NOT required. This Section does not apply to this Project
- 1.13.2 References must be for Work completed within the last five (5) years.
- 1.13.3 CLICK TO CHOOSE.
- 1.13.4 References for residential, domestic work or unrelated work are not defined as similar scope, size nor complexity and are not acceptable.
- 1.13.5 Bidders cannot use references that pertain to another Supplier or Contractors' work.

- 1.13.6 The WRDSB reserves the right to contact customers using any of the following but not limited to references form, reference letters, customers other than those provided by any Bidder, and CCDC-11 Contractor's Qualification Statement to verify information provided and assess overall client experience.
- 1.13.7 Bidders should ensure that their references are prepared to provide a response if contacted by the WRDSB. If the WRDSB is unable to obtain satisfactory references, or if the reference(s) do not respond after WRDSB's best efforts, or if the reference(s) choose not to comment, the reference(s) will be deemed unsatisfactory, and the WRDSB may ask the Bidder for additional references.
- 1.13.8 Unsatisfactory references may result in the Bidder's submission being rejected.
- 1.13.9 The WRDSB, in its sole discretion, may confirm the Bidder's experience and/or ability to provide the Services required after checking references, and the provision of the references by the Supplier is deemed to be consent to such confirmation/contact with the references.

1.14 Addenda

All Addenda issued through the Bidding System shall form part of the Procurement Document.

The WRDSB shall not be bound by any verbal instruction or information provided by any WRDSB employee or consultant of the WRDSB. Only responses provided in an Addendum shall form part of this Procurement Document.

Prior to bid closing any discrepancies, omissions, questions, or clarifications regarding the procurement documents must be sent immediately through the Bidding System by clicking on the "Submit a Question" button found within the bid details page of that opportunity no later than the deadline noted in the Anticipated Project Schedule. Those that are deemed pertinent to the Procurement Document will be addressed in the form of an Addendum.

It is understood and acknowledged that while the Procurement document includes specific requirements, a complete review and recommendation is required. Minor items or details not herein specified but obviously required for the Work shall be provided as if specified in conformance with modern practices. Any omissions or errors or misrepresentation of these requirements and specifications within the Procurement document shall not relieve the Bidder of the responsibility of providing the services or products as aforesaid.

Bidders shall acknowledge the receipt of all Addenda in the Bidding System prior to the submission of a Bid. Where Addenda has been issued, the system will not allow the Bidder to submit a Bid prior to acknowledging said Addenda.

Where an Addendum is issued after a Bid has been submitted, the Bidding System will

automatically withdraw the submitted Bid. The Bid status will change to incomplete and will not be accepted by the WRDSB as a submitted Bid. It is the responsibility of the Bidder to make any required adjustments to their submission, acknowledge all Addenda and ensure the Bid has been received by the Bidding System. Bidders should check the Bidding System for Addenda up until the Bid Closing Date and Time.

Addenda cannot be acknowledged after the Closing Date and Time.

1.15 Edit and Withdrawal of Bid Submission

A Bidder who has submitted a bid may edit or withdraw its bid at any point up to the Closing Date and Time.

Any edits to a bid submission will cause the submission to automatically be withdrawn. The bid submission must be re-submitted to be accepted.

The Bidder is solely responsible for ensuring that its re-submission is received prior to Closing Date and Time. The closing time shall be determined by the web clock within the Bidding System. After such time, requests to withdraw Bid will not be considered.

1.16 Irrevocable Period

Bids will be irrevocable by the Bidder, and open for acceptance by the WRDSB, for **60 (sixty) days** following the Closing Date.

1.17 Tie Bids

Where two (2) or more Bids have been received reflecting the same, lowest Bid price, the time stamp for date and time submission in the Bidding System will dictate the award (earliest submission shall prevail).

1.18 Bid Irregularities

Bids with one or more of the following may be declared informal and/or disqualified and/or non-compliant:

- i. Bids that do not comply strictly with all terms and conditions of the Procurement Document.
- ii. Bids that are incomplete, conditional, qualified, or obscure.
- iii. Bids that are based upon an unreasonable period for completion of the Work.
- iv. Bids received from Bidders involved in Claims with either of the WRDSB or banned or on probation with the WRDSB.
- v. Bids received from any Bidder deemed to be unskilled or inexperienced in the work contemplated, or those who have defaulted on, or failed to satisfactorily complete other similar work in the past.
- vi. Bids submitted by Bidders that are not prequalified, where applicable.

1.19 Bid Review

- i. All Bids received on or before the Closing Time will be reviewed for compliance based on this Procurement document. Non-compliant Bids will be rejected. Bids not meeting any of the mandatory requirements included in this Procurement document will be disqualified. Bidders may be contacted to clarify their submissions.
- ii. Should there be any error in extensions, additions or computations, the WRDSB shall be entitled to correct such errors based upon the unit prices supplied, and the corrected total shall be considered as representing the intention of the Bidder and shall be used as the basis for comparison of Bids.
- iii. It is the Bidder's responsibility to satisfy the WRDSB that they can comply with the requirements contained within this Procurement document and that they possess the necessary inventory, equipment, facilities, resources, and staff to perform the work specified in this Procurement document. Bidders may be required to submit evidence of above in a form acceptable to the WRDSB. Substitution of materials, equipment, or methods different from those outlined in the terms of reference will not be accepted unless provided for within this Procurement document or with the written approval of the WRDSB.
- iv. The WRDSB also reserves the right to examine Bidder's facilities, equipment and visit the subcontractors or subconsultants proposed and/or Bidder's existing and past clients. The award decision may be revised based on the above.
- v. The WRDSB will not be responsible for travel costs if travel is required. No additional charges will be accepted by the WRDSB for any cost incurred by the Bidder or any other party in participating in the Bid evaluations.
- vi. The WRDSB may, in its sole discretion, check references, conduct credit checks, review the litigation history and history of professional liability or other insurance claims, and obtain any other type of information that might aid the WRDSB in its selection. The WRDSB reserves the right to consider all, or any information received from all available sources, whether internally or externally obtained. The WRDSB may disqualify any Bid from further consideration based on results of reference or credit checks or review of litigation or claim history. The foregoing may include the WRDSB's own experiences with the respective Bidder(s) or any of the subcontractors and subconsultants proposed in their Bid.

1.20 Intent to Award

Bidders are advised not to make any business decisions, assignments, or any sub-contract for the execution of the Work, before receiving a Purchase Order from the WRDSB.

There shall be no obligation on the WRDSB because of seeking Bids or conducting the procurement process and the WRDSB reserves the right to pursue other Bidders, cancel the Procurement, issue a revised request, or to pursue any other course of action which would aid in meeting their needs.

If instructed, within **twenty-four (24) hours**, excluding hours occurring during a Saturday, Sunday, or a legal holiday, from the issuance date an intent to award from the WRDSB, the Bidder (the “Recommended Bidder”) shall provide a list of all subcontractors/subconsultants that it proposes to use for all Work described in this Procurement including the Company Name, Subtrade Category and if applicable, related Divisions.

1.20.1 Within **seven (7) calendar days**, from the issuance date of an intent to award notice or requested by the WRDSB, the Bidder (the “Recommended Bidder”) shall provide the following mandatory requirements:

- i. Insurance certificate with coverage specified in the Procurement Document.
- ii. WSIB clearance certificate valid on the date of award or an exemption letter (if applicable and requested).
- iii. Non-Disclosure Agreement (NDA) duly signed by the authorized signatory (to be renewed annually). The WRDSB will provide this form.
- iv. Bonding Requirements, if applicable, as specified in the Procurement Document.
- v. An executed WRDSB issued Form of Agreement, if applicable, and duly signed by the authorized signatory.
- vi. Any other submittal specified in the Procurement Document or in the intent to award, as a requirement of award.
- vii. For construction projects above \$200,000 the Successful Bidder will be required to execute a “Canadian Standard Form of Construction Contract to a Stipulated Sum” (CCDC 2 – 2020) including amendments thereto as set out in this Procurement.

1.20.2 The documents listed below will be incorporated as deemed necessary by the WRDSB, into the Contract with the Bidder. If there is a discrepancy between the wording of one document and the wording of any other document that appears on the list, the wording of the document that first appears on the list shall take precedence:

- i. WRDSB approved change order(s) or Contract / Agreement / CCDC 2 - 2020 amendment(s)
- ii. Purchase Order(s), Contract(s) Agreement(s) / CCDC 2 -2020 executed with the Bidder including exhibits
- iii. Procurement document issued by the WRDSB, including addenda, if applicable
- iv. Bid submitted by the Bidder

1.21 Post- Closing/Pre-Award Meeting

The WRDSB may request a meeting with Bidders after the bid closing dates.

1.22 Award

Unless otherwise stated, the contract will be awarded to the lowest compliant bidder on the base bid, who meets the requirements, the scope of work outlined in this Procurement, and satisfactory references and experience. The WRDSB reserves the right to decrease quantities and/or the Scope of Work or not award this Project, due to insufficient budget.

1.23 Post-Award Meeting (Kick off Meeting)

A post-award meeting may be held consisting of the successful Contractor, and their key personnel assigned to the contract, the WRDSB's Project Manager/Lead and if applicable the Consultant, to discuss the program and exchange information before the contract commences. This meeting will be at the sole expense of the Bidder and shall be considered part of the contract. If applicable, the meeting date will be scheduled after the Award.

1.24 Post Award

In addition to all the WRDSB's other remedies, if a recommended Bidder fails to satisfy the requirements and/or execute the Form of Agreement or any other applicable conditions within seven (7) calendar days of notice of selection, the WRDSB may, in their sole and absolute discretion and without incurring any liability, rescind the selection of that Bidder.

The Bidder may protest within the five (5) day Notice of Intent to Award, after that, the protest will not be reviewed or accepted.

1.25 Award Posting Notification

For procurements valued at \$121,200 or more, and in accordance with the Broader Public Sector Procurement Directive, once the WRDSB is satisfied that all requirements are met, the project award notification will be posted in the same manner as the procurement documents were posted. The notification will be posted after the purchase order and/or agreement between the successful bidder and the WRDSB has been issued/executed. The award notification will list the name of the successful bidder, agreement start and end dates, and any extension options.

END OF SECTION

00 21 14– General Contractors, Subcontractors, Prequalified Rosters

1.1 General Contractors

- 1.1.1 Only invited prequalified General Contractors, by award through a competitive prequalification process, 7430-RFPQ, may submit a bid for this opportunity.
- 1.1.2 Invitations are based on awarded Project Size Categories. Only approved GCs (on the Roster) may bid on the project size categories based on their award.
- 1.1.3 A Site Supervisor and Project Manager, assigned to manage and supervise the Work, must be named in the Bidder's Contact Information Specification section through the electronic Bidding System only and include resumes. Personnel will be subject to approval by the WRDSB and cannot be changed without prior written approval from the WRDSB.
- 1.1.4 Refer to COR Certification Requirements, Clause 1.5.

1.2 Subcontractors/Subconsultants

- 1.2.1 Refer to specifications for products and suppliers that will be required.
- 1.2.2 The subcontractor/subconsultant list is not required at time of bid submission.
- 1.2.3 The subcontractor/subconsultant list is mandatory after the bid closing date from the Recommended Bidder within twenty-four (24) hours of receiving a request or intent to award from the WRDSB.
- 1.2.4 In the event the WRDSB has a Prequalified Roster List for a Trade Category required for this project, the General Contractors will select from the list below in *3.0 WRDSB Prequalified Roster Lists*. General Contractor's subcontracting other than the companies listed below or identified by Addendum will have their Bid ruled informal.
- 1.2.5 The Bidder (the "Recommended Bidder") shall provide a list of subcontractor/subconsultant that it proposes to use for all Work described in this Procurement including the specification sections, as per the following:
 - i. Bidders shall select experienced and qualified subcontractor/subconsultant or Suppliers in their field to perform or supply an item of Work indicated in this Procurement.
 - ii. The Bidder shall be fully aware of the capability of each subcontractor/subconsultant and/or Supplier included in its bid, including but not limited to technical ability, financial stability, and ability to maintain the proposed construction schedule.
 - iii. The WRDSB reserves the right to reject any proposed subcontractor/subconsultant or supplier, based on the following but not limited to unsatisfactory past performance, suspended/removed from doing business with the WRDSB and/or outstanding/unresolved corrective action notice issued by the Owner to the subcontractor/subconsultant within the last three (3) years.

- iv. The WRDSB reserves the right to obtain information from the Bidder and from third parties respecting the qualifications and experience of the Bidder's nominated list of subcontractor/subconsultant for such item of the Work.
- v. The WRDSB reserves the right to examine Bidder's facilities, equipment and visit the subcontractor/subconsultant's proposed.
- vi. The substitution of any subcontractor/subconsultant and/or suppliers after the list is submitted will not be accepted unless a valid reason is given in writing to and approved by the Owner, whose approval may be arbitrarily withheld.
- vii. Where a bidder lists "own forces" in place of a subcontractor/subconsultant, the bidder shall conduct such item of the Work with its own forces.
- viii. Where "own forces" have been listed by a bidder, the WRDSB reserves the right to obtain information from the bidder and from third parties respecting the qualifications and experience of the bidder's "own forces" for such item of the Work.

1.3 WRDSB Prequalified Roster Lists

The following subcontractors have been prequalified by the WRDSB through a competitive process. If the trade categories listed below are required for this Project, the General Contractor must select from the Prequalified Roster(s) below.

Example: Roofing Contractors

- Atlas Apex Roofing Inc
- Eileen Roofing Inc
- Flynn Canada Inc
- Lafleche Roofing (1992) Ltd
- Nedlaw Roofing Ltd
- Nortex Roofing Ltd
- Provincial Industrial Roofing & Sheet Metal Co. Ltd
- Semple Gooder Roofing Corp
- Trio Roofing Systems Inc.

END OF SECTION

00 21 15 – Scope of Work

The scope of work consists of a complete renovation of Family Studies room 1-220. The room is to be equipped with 4 new kitchen stations, counterspace and upper cabinets for storage, desk space for theory lectures and new whiteboards, a central teaching station in which will consist of a ceiling-mounted camera and monitor to display demonstrations. This station will consist of a new NFPA exhaust hood. The existing equipment and appliances will be replaced, along with replacement of flooring to new sheet flooring, and new acoustic ceiling tile and new light fixtures.

Family Studies room 1-221 will only consist of ceiling and lighting replacement and above-ceiling rough-ins will be completed in the current scope of work, in preparation for a future renovation.

The renovation of the Rosemount wing includes modifications to the exiting exit doors that lead to the high school by adding a secured access. The addition of a new exit door is required to provide a second designated exit. This new door will lead to an outdoor fenced seating area. The existing sensory room will be required to decrease in size to accommodate the new corridor. All interior finishes will match the existing.

END OF SECTION

00 31 34 – Subsurface Investigation Report

1.0 General

1.1. Related Sections

- .1 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2. SUBSURFACE INVESTIGATION REPORT – NOT APPLICABLE

- .1 An investigation report with respect to the applicable building site and important immediate affected surroundings, is titled as follows:
 - .1 Title:
 - .2 Dated:
 - .3 Prepared By:
- .2 A copy of this detailed investigation report is included as an appendix to this section.
- .3 The subsurface investigation report records properties of the soils, subgrade conditions, and offers recommendations for the design of foundations.
- .4 The report was prepared primarily for the use of the Consultants.
- .5 The recommendations given shall not be construed as a requirement of this Contract unless also contained in the Contract Documents.
- .6 The report, by its nature, cannot reveal all conditions that exist or can or might occur on the subject site. Should subsurface conditions be found or be a concern thereto, or to vary substantially from the investigation report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to the Owner.

END OF SECTION

Appendix 00 31 34A – Soil Report – NOT APPLICABLE

Instructions:

- a. The WRDSB Project Asset & Warranty Card shall be filled out and completed for any project or work that calls for the replacement or new installation of any asset that has a warranty and requires ongoing preventative maintenance, as well any asset that is being removed.
- b. The information for the WRDSB Project Asset & Warranty Card shall be collected and coordinated by the General Contractor responsible for the overall project. The WRDSB Project Asset & Warranty Card shall be filled out and submitted to the Board electronically to FAC_maintenance@wrdsb.ca and carbon copy the project coordinator at the point in time where the project is deemed "Substantially Complete" or at the start of the Warranty Period for said asset. For any project without a General Contractor, the Contractor or Trade responsible for the installation and/or removal of the asset shall complete the WRDSB Project Asset & Warranty Card and submit it to the Board in the same manner as mentioned above.
- c. All items shall include the asset identifier, asset description, location, manufacturer, model, serial number, and warranty end date (refer to example at bottom of page).
- d. NO Warranty Period shall start without the written permission of the Board prior to the point of Substantial Completion of the project.
- e. The Contractor that is responsible for the coordination and completion of the WRDSB Project Asset & Warranty Card shall ensure that the contractor or trade responsible for the installation of the item understands that the contractor or trade is responsible for the preventative and general maintenance of that item for the minimum 2 year warranty period as noted on the WRDSB Project Asset & Warranty Card.
- f. All items installed under this contract that require ongoing preventative maintenance (PM) shall be included on the WRDSB Project Asset & Warranty Card. The following list contains examples to be included but not limited to;
- | | | |
|----------------------------------|-------------------------------|--------------------------------|
| Air Compressor | Chiller | Grease Trap |
| Air Handler- ERV, Heat Pump, RTU | Cooling Tower | Gym Equipment |
| AC Split -Indoor/Outdoor Unit | Elevator/Lift | Hoods- Kitchen/Fume |
| Automatic Doors | Eyewash Station-location only | Operable Partitions |
| Backflow Preventer | Fire Panel | Sprinkler System -area covered |
| Boiler | | Techn Equipment |
- g. All maintenance during the warranty period shall be the responsibility of the contractor. This shall include, but not be limited to: air handling unit filter changes (3x min per year), or as per manufacturers recommendations; servicing testable backflow preventors, including fees; and any and all required maintenance.

Sample:

[illegible]**WRDSB Project Asset & Warranty Card**

Project Name: _____

School / Location:

Date: _____

[illegible]

00 56 13 – Definitions Stipulated Price

1.1. Definitions Declaration

- .1 CCDC 2-2020 Edition, Stipulated Price Contract as may be amended, forms the basis of Definitions between the Owner and Contractor.
- .2 These Definitions are bound to the CCDC 2 Definitions and CCDC 2 General Conditions.

1.2. Supplementary Words and Terms to CCDC 2-2020

- .1 The following words and terms are additional to the CCDC 2 Definitions.
- .2 Addendum: A document that amends the Bid Documents during the Bidding Period and becomes part of the Contract Documents when a Contract is executed. (Plural: Addenda).
- .3 Agreement: The signed and sealed legal instrument binding parties in a Contract, describing in strict terms their mutual arrangement, roles and responsibilities, commencement, and completion responsibilities.
- .4 Alternative Price: The amount stipulated by a Bidder for an Alternative and stated as an addition, a deduction, or no change to the Bid Price.
- .5 Authorities: Those having jurisdiction under law over Work or Parts thereof.
- .6 Bid: To offer as a Bid stating for what price a Contractor will assume a Contract.
- .7 Bid Documents: A set of documents consisting of the Instructions to Bidders, Bid Form, Contract Documents, and other information issued for the benefit of Bidders to prepare and submit a Bid.
- .8 Bid Form: The specific and detailed form used to collect information about a Bid.
- .9 Bidding: The process of preparing and submitting a Bid.
- .10 Construction Documents: The Drawings and Project Manual. When combined with a Contract and Contract conditions, these documents form the Contract Documents.
- .11 Contingency Allowance: An additional monetary amount added to a Project cost estimate and designated to cover unpredictable or unforeseen items of Work. The amount is usually based on some percentage of the estimated cost and expended and adjusted by Change Order. It is not intended to cover additions to the scope of Work.
- .12 General Conditions: That part of the Contract Documents which sets forth many of the rights, responsibilities and relationships of the parties involved in a Contract.
- .13 Exposed: Visible at completion of Work, in usable areas as well as interior of closets, cabinets, drawers, storage and service rooms, stairwells and exterior surfaces.

- .14 Instructions To Bidders: Instructions contained in the Bid Documents to convey an Owner's expectations and criteria associated with submitting a Bid.
- .15 Ready for Takeover: *Ready-for-Takeover* shall have been attained when the conditions set out in GC12.1, SC 55.1, 12.1.1
- .16 Section: A portion of a Project Specification covering one or more segments of the total Work or requirements. Sections are included in a Project manual as required to meet Project requirements.
- .17 Standard: A document describing a grade or a level of quality, which has been established by a recognized agency or organization, utilizing an internal voting process.
- .18 Separate Price: A separate price for work to be added to the base price if selected by the Owner. This price type is not a part of the base bid price.
- .19 Stipulated Price: An amount set forth in a Stipulated Price Contract as the total payment for the performance of the Work. Sometimes referred to as a stipulated sum or a lump sum stipulated price.
- .20 Tender: Refer to definition of Bid.
- .21 Unit Price: The amount payable for a single unit of Work as stated in a Schedule of Prices.
- .22 Install: To remove from site storage, move or transport to intended location, install in position, connect to utilities, repair site caused damage, and make ready for use.
- .23 Supply: To acquire or purchase, ship or transport to the site, unload, remove packaging to permit inspection for damage, re-package, replace damaged items, and safely store on-site.
- .24 Provide: To Supply and Install
- .25 Wherever words 'approved', 'selected', 'satisfactory', 'directed', 'permitted', 'inspected', 'instructed', 'required', 'submit', 'ordered', 'reviewed', 'reported to', or similar words or phrases are used in Contract Documents, it shall be understood, unless context provides otherwise, that words 'by Consultant' or 'to Consultants' follow.
- .26 Words 'by others' when used in Specifications or on Drawings shall not mean by someone other than Contractor. Only means by which something shown or specified shall be indicated as not being in Contract is by initials 'NIC' or words 'not in Contract', 'by Owner', or 'by Other Contractor'.

END OF SECTION

00 72 13 – WRDSB Standard Terms and Condition

1. **Applicable Terms and Conditions**

None of the standard or other terms, conditions, or policies of the Bidder, whether published or otherwise shall be of any effect unless accepted by the WRDSB in writing. This includes, without limitations, terms in publications, website, sales invoice, delivery document as well as those commonly applied by the Bidder. WRDSB's acceptance of goods, equipment or service, acknowledgement thereon or paying invoices shall not imply acceptance of such terms, conditions, or provisions.

2. **Bankruptcy**

If, during the term of the Contract, the Supplier makes an assignment for the benefit of creditors, or becomes bankrupt or insolvent, or makes a proposal to its creditors, the Contract with the Supplier shall immediately be terminated, and the WRDSB shall be entitled to enter into an agreement with another party without the consent of the Supplier.

3. **Basis of Award (Price factor)**

Bidders shall be deemed to have included all costs related to the Work in the Total Price as provided in their Bid, except for items clearly identified as provisional in the Procurement document. In no case shall the invoicing for the entire Work performed exceed the Total Price unless additional Work is ordered by the WRDSB in writing. The unit prices as well as provisional pricing shall be used to invoice the additional or provisional work, as required by the WRDSB. For the purpose of award, the Total Price will be considered as representing the intention of the Bidders and will be used as the basis for comparison of Bids for the price factor.

4. **Bonding Requirements**

Bonding is only required if the project is equal to or greater than \$200,000.00.

Note: The Bidding System has flagged these fields as mandatory. If your bid is less than \$200,000.00, you may upload a pdf document stating: Not Applicable.

i. **Bid Amount**

Bonding requirements are based on the total base bid amount INCLUSIVE of ALL applicable taxes.

ii. **Bid Deposit Bond & Agreement to Bond**

Bid submissions must be accompanied by a bid deposit in the form of a digital Bid Bond in an electronically verifiable and enforceable (e-Bond) format in the amount of 10% of the total base bid (inclusive of HST) made payable to the Waterloo Region District School Board as surety that, if the Bid is accepted, a Contract will be entered into for the proper performance of the work. For more information, contact your surety company or visit the Surety Association of Canada website.

Bid Submissions must be accompanied by an Agreement to Bond in the form of a digital Bond in an electronically verifiable and enforceable (e-Bond), completed and executed by the Bidder's Surety, assuring the successful Supplier shall provide for a Performance Bond for 50% of the total Contract Price, and a Labour and Material Payment Bond for 50% of the total Contract Price.

Bidders shall upload their digital Bid Deposit Bond and Agreement to Bond separately to the Bidding System, in the bid submission files labeled "Bid Deposit Bond" & "Agreement to Bond". If both Bonds are within one (1) document, upload it in both files. All instructions and details for accessing authentication shall be included with the digital Bonds uploaded in the Bidding System. Do not include and/or upload Performance Bond and Labour and Materials Bond in this section.

Bids that do not contain the bid deposit(s) in the required amount will be declared non-compliant and will be rejected. A scanned PDF copy of bonds or original certified cheque, bank draft, money order, etc. are not acceptable as Bid deposit and will result in your Bid being rejected.

The bid deposit of the Bidder whose submission is accepted shall be forfeited by the Bidder should the Bidder fail to execute a Contract or provide the necessary documents as required within this Procurement document (including but not necessarily limited to: signed agreement, satisfactory security, insurance certificate, appropriate Workplace Safety and Insurance Board letter of clearance certificate) within the time stipulated as a written notice from the WRDSB.

For bid amounts where Bonding is not requested, the Awarded Bidder agrees to pay to the WRDSB the difference in costs between the bid submitted and the final contract should the Awarded Bidder fail to either execute or deliver the contract documents in accordance with the Procurement within seven (7) calendar days of written notification of the award of the contract.

iii. Performance and Labour & Materials Bonds

For bid amounts where bonding is required, inclusive of all taxes, the Supplier shall provide a digital Bid Performance and Labour and Materials Bond in an electronically verifiable and enforceable (e-Bond) format in the amount(s) of not less than 50% Performance Bond and a 50% Labour and Materials Bond of the total Contract Price made payable to the Waterloo Region District School Board as surety that, if the Bid is accepted, a Contract will be entered into for the proper performance of the work and extends protection to Subcontractors, Suppliers, and any other persons supplying labour or materials to the Project. For more information, contact your surety company or visit the Surety Association of Canada website.

If the Supplier fails to provide a performance bond and/or labour and materials bond when requested, the WRDSB may declare the bid deposit forfeited, and the Bidder will be held responsible for any increased costs or damages incurred by the WRDSB. Any Bidder who fails to provide all required documents within the timelines provided or otherwise fails to enter into an agreement with the WRDSB upon notice of being the Supplier may be subject to future bidding constraints by the WRDSB.

Performance bond shall guarantee all conditions as set out in the contract, including proper execution of the work and for all matters for which the Supplier is responsible for throughout the two (2) year period of maintenance and warranty.

Any costs associated with performance bond are the responsibility and cost of the Bidder.

Bonds must be submitted through the Bidding System within seven (7) calendar days of receiving the Intent to Award.

5. Business Code of Conduct for Board Employees

The WRDSB will not knowingly purchase goods and/or services from Suppliers who operate in contravention of local and international laws. If a product and/or service supplied to the WRDSB is discovered to be in contravention, the WRDSB reserves the right to rectify the issue with the Supplier, including the cancellation of the contract.

The WRDSB expects that all employees and Suppliers act within the parameters of the in Administration Procedure 4360 PRINCIPLES OF BUSINESS CONDUCT FOR BOARD EMPLOYEES. Click [here](#) to access the WRDSB's Administrative Procedures, Section 4000 – Business Services.

6. Code of Conduct for Suppliers

These Guidelines cover any contractor, supplier, consultant, business, firm, company or individual doing work, providing a service or delivering goods on any Waterloo Region District School Board property, as well as the Supplier's employees, subcontractors, agents, consultants, and others on site in connection with the Supplier's work or at the Supplier's express or implied invitation.

- i. Courtesy and Respect: all Suppliers and their employees must conduct themselves in a manner that is lawful, courteous, respectful, businesslike, and free of bias to the WRDSB, its officer, employees, students, guests, or visitors.
- ii. Language and Behavior: Suppliers and their employees cannot engage in behavior that is rude, threatening, or offensive. Use of profane or insulting language is prohibited. Harassment of any type, including sexual harassment is strictly

- prohibited. Abusive, derogatory, obscene or improper language, gestures, remarks, whistling, cat calls or other disrespectful behavior cannot be tolerated. Rough housing, fighting, fisticuffs, physical threats, destruction of property, vandalism, littering, or physical abuse of anyone on WRDSB property are not permitted under any circumstance.
- iii. No Weapons, Alcohol, or Drugs: The use, possession, distribution, or sale of any weapon, alcohol, illegal drug, or controlled dangerous substance by any Supplier or Supplier's employee is prohibited. Offenders will be removed from WRDSB property and/or reported to the local Police Department.
 - iv. Smoking: Suppliers and their employees are not permitted to smoke on WRDSB property, in or near any buildings.
 - v. Fraternization: Suppliers and their employees may not fraternize or socialize with WRDSB students or employees.
 - vi. Appearance: Suppliers and their employees, where applicable, are required to wear appropriate Personal Protective Equipment (PPE), work wear, hard hats and safety footwear high-visibility clothing, while on WRDSB property. Articles of clothing must be neat and tidy in appearance, and cannot display offensive or inappropriate language, symbols, or graphics. WRDSB has the right to decide if such clothing is inappropriate.
 - vii. Identification: contracted suppliers and their employees are required to wear branded attire of the company they work for when on WRDSB property.
 - viii. Vehicles and Driving on WRDSB Property: Vehicles must clearly indicate the Supplier's company name, identifier number and telephone number. It must be readable from 8 meters (25 feet) away. Vehicles including movable Equipment/Machinery must not enter, leave or drive on WRDSB premises during nutritional breaks, before and after school hours, or anytime there are students or staff outside of the building.
 - ix. Reporting: The Supplier is required to report any matter involving a violation of these rules of conduct, any matter involving health or safety, including any altercations, to WRDSB Facilities staff.

The Supplier is responsible for its employees, agents, consultants and guests. If prohibited conduct does occur, the Supplier will take all necessary steps to stop and prevent any future occurrence. Any breach of these conditions will result in the removal of the person responsible from the school premises and prohibited actions could result in the termination of any contract or agreement with WRDSB.

7. Compliance with Laws, Acts and Regulations

Suppliers shall abide by all applicable municipal, provincial and federal laws, as well as WRDSB Policies. Some of the applicable laws are highlighted below for information purposes only. In case of any discrepancy between this Procurement Document and the

provision of applicable laws, the latter shall prevail. This list is not intended to be a comprehensive summary of relevant laws or be a complete list of applicable regulations or interpretation of the provisions of any laws

- i. Accessibility for Ontarians with Disabilities Act (AODA)
- ii. Architect Act
- iii. Bill S-211 Fighting Against Forced Labour and Child Labour in Supply Chains Act
- iv. Broader Public Sector Accountability Act, 2010
- v. Building Ontario Businesses Initiative (BOBI) Act, 2022
- vi. Canada Revenue Agency (CRA) regulations
- vii. Confidentiality Acts (MFIPPA, PIPEDA etc.)
- viii. Construction Act
- ix. Education Act
- x. Occupational Health and Safety Act
 - a. Ontario Regulation 157/25, Section 27.1.
This regulation requires Constructors to have a defibrillator (AED) on construction projects with 20 or more regularly employed workers (effective January 1, 2026), and ensure a worker trained in CPR/AED operation is present at all times.
- xi. Supply Ontario: Supply Chain Management Act (Government, Broader Public Sector and Health Sector Entities), 2019, S.O. 2019, c. 15, Sched. 37
- xii. Trade Agreements (CETA/CFTA etc.)
- xiii. Workplace Safety and Insurance Act (WSIB)
- xiv. [WRDBS Procurement Services Policies website](#)
- xv. [WRDSB Policies and Procedures](#)

Non-compliance with provincial and/or federal laws, or WRDSB Policies may result in rejection of the Bidder's Bid submission and/or termination of Contract.

Bidders should make themselves aware of provisions in all applicable provincial and federal laws as well as WRDSB policies and ensure full compliance. Non-compliance may result in rejection of Bid and/or termination of Contract.

The Supplier(s) will be required to comply with all applicable federal, provincial laws as well as WRDSB policies in performing its obligations under the Contract including, without limitation, the Occupational Health and Safety Act, as amended, and the Workplace Safety and Insurance Act, 1997, as amended, and Accessibility for Ontarians With Disabilities Act, 2005, S.O. 2005, c.11, Accessibility Standards for Customer Services O. Reg. 429/07 requirements, under the Accessibility for Ontarians With Disabilities Act, 2005, as amended, or any successor legislation applicable, and to provide to the WRDSB, upon request, periodic reports and evidences confirming such compliance.

By supplying the goods or equipment and/or providing services, the Supplier warrants that the goods or equipment supplied, and services provided to the WRDSB conforms in all respects to the standards and codes set forth by federal and provincial agencies. Failure to comply with this condition will be considered a breach of this Contract.

The obligations of the parties and resolutions of any disputes shall be governed by and construed in accordance with the laws of the Province of Ontario and the federal laws of Canada, including the Construction Act, as to interpretation and performance, and shall be treated, in all respects, as an Ontario contract. The parties shall attorn to the exclusive jurisdiction of the courts of the Province of Ontario.

8. Confidential Information, MFIPPA, and PIPEDA

All information and documentation provided by the WRDSB or to the WRDSB in connection with this Procurement, before or after the issuance of this Procurement is the sole property of the WRDSB and shall be treated as confidential, subject to the provisions of the Municipal Freedom of Information and Protection of Privacy Act (MFIPPA).

Bidders shall identify any confidential information in their Bid Submission. The WRDSB will make reasonable efforts to safeguard confidential information, subject to its disclosure requirements under MFIPPA or any other disclosure requirements imposed by law or by order of a court or competent tribunal. Bidders are advised that their Bid submissions may be disclosed, on a confidential basis, to advisers retained by the WRDSB to advise or assist with the Bid process, including the evaluation of Bid submissions.

Bidders should be aware that when submitting a Bid, the name, title, and contact information will be made public upon request. Under MFIPPA, and as a record of the WRDSB, the Bid prices submitted and agreed to under contract with the WRDSB can also be made available through a Freedom of Information request. Bidders will be notified regarding requests for any other information submitted in a Bid; information may be disclosed to a requester in whole or part unless otherwise considered exempt from disclosure under MFIPPA.

The Supplier represents and warrants that if it is or becomes subject to any private sector privacy legislation during the Term it will be solely responsible for compliance with such legislation. Without limitation, the Supplier represents and warrants that if it is subject to the *Personal Information Protection and Electronic Documents Act*, S.C. 2000, c.5, including any further amendments thereto (PIPEDA):

- i. it and all the Supplier's Subcontractors shall ensure the PIPEDA compliance of all PIPEDA Protected Information it collects directly from individuals or indirectly from the WRDSB, uses or discloses while performing their obligations under this Agreement; and,
- ii. without limitation, it shall ensure the PIPEDA compliance of all PIPEDA Protected Information it transfers or discloses to the WRDSB.

9. Confirmation to Proceed

No work shall commence until the WRDSB has issued a purchase order and/or contract, if applicable to the Supplier. Goods/Service or Work as described shall not commence

until all the required documents have been submitted to Procurement Services and the Form of Agreement and/or the CCDC 2 - 2020, if applicable, are executed by the Supplier and the WRDSB. For payment purposes, a Purchase Order shall be generated and issued to the Supplier. The Purchase Order number must appear on all invoices to ensure prompt payment.

10. Conflict of Interest

By submitting a Bid, the Bidder confirms that they have no conflict of interest with respect to other work and/or other clients. The Bidder shall ensure that all subcontractors, subconsultants and suppliers also have no conflict with respect to other work and/or other clients.

The Supplier, subcontractors and sub-suppliers and any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall not engage in any activity or provide any services where such activity or the provision of such services creates a conflict of interest (actually or potentially, in the sole opinion of the Owner) with the provision of the Work pursuant to the Contract. The Supplier acknowledges and agrees that a conflict of interest, as described in this section includes, but is not limited to, the use of Confidential Information where the Owner has not specifically authorized such use.

The Supplier shall disclose to the Owner, in writing, without delay, any actual or potential situation that may be reasonably interpreted as either a conflict of interest or a potential conflict of interest, including the retention of any Subcontractor or Supplier that is directly or indirectly affiliated with or related to the Supplier.

The Supplier covenants and agrees that it will not hire or retain the services of any employee or previous employee of the Owner where to do so constitutes a breach by such employee or previous employee of the Owner's conflict of interest policy, as it may be amended from time to time, until after completion of the Work/Services under the Contract.

It is of the essence of the Contract that the Owner shall not have direct or indirect liability to any Subcontractor or Supplier, and that the Owner relies on the maintenance of an arm's-length relationship between the Supplier and its Subcontractors and Sub-suppliers. Consistent with this fundamental term of the Contract, the Supplier will not enter into any agreement or understanding with any Subcontractor or Supplier, whether as part of any contract or any written or oral collateral agreement, pursuant to which the parties thereto agree to cooperate in the presentation of a claim for payment against the Owner, directly or through the Supplier, where such claim is, in whole or in part, in respect of a disputed claim by the Subcontractor or Supplier against the Supplier, where the payment to the Subcontractor or Supplier by the Supplier is agreed to be conditional or contingent on the ability to recover those amounts or a portion thereof from the Owner, failing which the Supplier shall be saved harmless from all or a portion of those claims. The Supplier

acknowledges that any such agreement would undermine the required arm's-length relationship and constitute a conflict of interest. For greater certainty, the Supplier shall only be entitled to advance claims against the Owner for amounts pertaining to Subcontractor or Supplier claims where the Supplier has actually paid or unconditionally acknowledged liability for those claims or where those claims are the subject of litigation or binding arbitration between the Subcontractor or Supplier and the Supplier has been found liable for those claims.

A breach by the Supplier, any of the Subcontractors, Sub-suppliers or any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall entitle the Owner to terminate the Contract, in addition to any other rights and remedies that the Owner has in the Contract, in law, or in equity."

11. Construction Act Guidelines

For Work that is governed by the provisions of the Construction Act, the Construction Act shall apply where applicable including in respect to release of 10% holdback, 2% deficiency holdback, adjudication, and the provision of security.

12. Criminal Background Checks and Collection of Personal Information

1. Compliance with Legislation

The Service Provider acknowledges that the Waterloo Region District School Board ("WRDSB") is required to comply with Ontario Regulation 521/01, *Collection of Personal Information under the Education Act*, with respect to criminal background checks and offence declarations. The Service Provider agrees to comply with all related obligations set out in this Regulation.

2. Right of Inspection

Upon forty-eight (48) hours' prior written notice, WRDSB shall be entitled to attend at the Service Provider's head office for the purpose of reviewing criminal background checks for any individuals providing services under this Agreement. Such checks must include offences under the *Criminal Code of Canada*, the *Controlled Drugs and Substances Act*, and any other offences disclosed through the automated Criminal Records Retrieval System.

3. Required Police Record Checks

(a) Individuals in Positions of Trust or Authority

A position of trust or authority refers to a relationship where an adult has power, influence, or control over a child or vulnerable person, creating a duty of care or dependency. Any employee, contractor, or other individual engaged by the Service Provider who is in a position of trust or authority with respect to WRDSB students must provide a valid **Vulnerable Sector Check (VSC)** that:

- was completed within the previous five (5) years; or

- is updated immediately if the individual is charged with or convicted of any offence under the *Criminal Code of Canada*.

(b) Individuals Not in Positions of Trust or Authority

Individuals who are not in a position of trust or authority with respect to students must provide a valid **Criminal Record and Judicial Matters Check (CRJMC)** that:

- was completed within the previous five (5) years; **or**
- is updated immediately if the individual is charged with or convicted of any offence under the *Criminal Code of Canada*.

4. Annual Offence Declarations

The Service Provider shall ensure that every individual working on its behalf who may come into direct contact with WRDSB staff or students on a regular basis completes an **annual Offence Declaration**, except in any calendar year in which a new police record check has been provided.

5. Failure to Comply

Failure by the Service Provider to comply with any requirement in this section shall constitute a **material breach** of this Agreement and may result in immediate suspension of services and/or termination of the contract by WRDSB, at its sole discretion. Termination of contracts may result from non-compliance with this requirement.

13. Damage Responsibility of Supplier

The Supplier, their agents and all workers and persons employed by them or under their control, shall use due care that no person or property is injured and that no rights are infringed in the prosecution of the work, and the Supplier shall be solely responsible for all damages by whomsoever claimable in respect of any injury to persons or to lands, buildings, structures, utilities, survey markers, fences, livestock, trees, crops, roads, ways, ditches, drains and in watercourses, whether natural or artificial, or property or whatever description and in respect of any infringement of any right, privilege or easement whatever occasioned in the carrying on of the work or any part thereof, or by any neglect, misfeasance or nonfeasance on the Supplier's part or on the part of any of his agents, workers and persons employed by them or under their control shall bear the full cost thereof and shall at his own expense make such temporary provisions as may be necessary to ensure the avoidance of any such damage, injury or infringement.

The Supplier shall indemnify and save harmless the WRDSB from and against all claims, demands, loss, costs, damages, actions suits or other proceedings by whomsoever made, brought, or prosecuted in any manner based upon, occasioned by, or attributed to any such damage, injury, or infringement.

Notwithstanding the indemnity provisions contained in this section, where in the opinion of the WRDSB Representative the Supplier has failed to rectify any damage, injury or

infringement or has failed to adequately compensate any person for any damage, injury or infringement for which the Supplier is responsible under the Contract, the WRDSB, following notice in writing to the Supplier of his intention so to do, may withhold payment of any monies due to the Supplier under this or any other Contract until the Supplier has rectified such damage, injury or infringement or has paid adequate compensation for such damage, injury or infringement.

14. Damage Reporting

If a utility structure or device, utility cable/conduit, or utility related infrastructure is damaged, the Supplier shall notify the WRDSB representative the same working day of any service disruption or damage and the Supplier will immediately notify the utility company to initiate repair. The Supplier will additionally make every reasonable effort to advise impacted resident(s) of a service disruption.

It is understood that all damage caused by workers engaged in the work under these specifications will be repaired by the Supplier and at the Supplier's sole expense. Damaged turf areas will be levelled and seeded, all horticultural planting damaged beyond repair will be replaced and any damage to structures, utilities, signs, light fixtures, landscape furniture, irrigation systems etc. will be repaired or replaced. Repair work will be carried out by skilled workers acceptable to the WRDSB representative. All repairs and replacements will be approved by a WRDSB representative prior to final payment.

15. Debriefing Requests

For procurements valued at \$121,200 or more, and in accordance with the Broader Public Sector Procurement Directive, unsuccessful Bidders are entitled to a debriefing to receive feedback with respect to their Bid submission. To obtain a debriefing, Bidders shall contact the Single Point of Contact listed in this Procurement Document in writing with their request within sixty (60) calendar days of the award notification.

16. Default

If the Supplier fails to properly, promptly, and fully carry out the Work required by these documents, the WRDSB reserves the right to notify the Supplier to discontinue all Work under this Contract, to advertise for new Bids or carry out the Work in any way as the WRDSB may, in their sole discretion, deem best.

The Supplier further agrees to indemnify and save harmless the Indemnified Parties from all loss, damage, liability, cost, charge, or expense whatsoever which it, they or any of them may suffer, incur or be put to by reason of such default or failure.

17. Delay Claims

The Supplier shall be responsible for all deliverables including lead times. The bidder shall include in their bid price any costs associated with an extended schedule beyond the stated substantial completion date due to delayed deliveries of items. Cost is to be inclusive of any afterhours work required due to the school being occupied by staff and students during the school year until completion.

The WRDSB will not accept or consider any "delay claim" requests for delayed deliverables outlined in the tender documents.

18. Delivery and Transportation Charges

Unless otherwise specified under the Special Provisions and/or Scope of Work and Deliverables sections of this document, prices documented shall be net prices including transportation and delivery charges fully paid by the Supplier and Free On Board (FOB) Destination, Freight Prepaid (any/all WRDSB locations).

19. Designated Substances

The Occupational Health and Safety Act of Ontario (OHSA) allow for certain toxic substances to be especially designated. The OHSA defines a designated substance as “a biological, chemical, or physical agent or combination thereof prescribed as a designated substance to which the exposure of a worker is prohibited, regulated, restricted, limited, or controlled”. Ontario Regulation 490/09 - Designated Substances (O.Reg. 490/09), made under the Occupational Health and Safety Act outlines required steps to control exposure of workers to designated substances. Under O. Reg. 490/09 there are eleven (11) designated substances: acrylonitrile, arsenic, asbestos, benzene, coke oven emissions, ethylene oxide, isocyanates, lead, mercury, silica and vinyl chloride. This regulation applies to every employer and worker at a workplace where the designated substances are present, produced, processed, used, handled or stored and at which a worker is likely to be exposed to the designated substance.

i. Asbestos

Asbestos-containing material (ACMs) were identified during the completion of the Asbestos Audit Update Report (AAU), prepared by WRDSB retained consultants. Each facility was surveyed, and if applicable, an AAU Report is available, refer to attached, Appendix 01 35 34A. If these materials, including those deemed or suspected, will be disturbed, or will likely be disturbed, during building maintenance, renovations, construction, or demolition activities, they must be handled and disposed of in accordance with the procedures prescribed by O. Reg. 278/05.

Should the Supplier encounter asbestos, not noted in the above AAU Report, which would be disturbed during the course of the Work they should stop the work in that immediate area and report the same to the WRDSB Contact.

All asbestos work must be conducted by Suppliers approved by the WRDSB, who are trained in the type of asbestos operations required and should be overseen by a qualified third-party Health, Safety and Environmental professional. To conduct Type 3 asbestos operations, Suppliers must be certified as Asbestos Abatement Workers AAW (Trade code 253W) and Asbestos Abatement Supervisors AAS (Trade code 253S) by The Ministry of Training, Colleges and Universities as prescribed by Section 20 of O. Reg. 278/05.

Unless otherwise specifically covered by Cash Allowance or Contingency Allowance for known asbestos materials, include in this contract for the removal under abatement, in compliance with O. Reg. 278/05, of all known asbestos containing materials, as identified in the audit, within 0.6 meter (2'-0") of all new services, materials, and equipment, and/or as required to complete the work. No claims for extra cost will be accepted for areas known to contain asbestos containing materials.

ii. Lead

Lead was historically used in mortar pigments, ceramic glazing; plumbing solder, electrical equipment and electronics solder, in pipe gaskets as packing in cast iron bell and spigot joints of sanitary drains, flexible plumbing connections, flashing panels, acoustical dampeners, phone cable casing and some architectural applications. The assessment of lead for this assignment was limited to paint on interior and exterior surfaces which may be disturbed during the Work.

Preliminary paint, coatings or materials were collected within the work area to determine if lead-containing paints, including lead-based paints, are present. The analytical results, if applicable, including the location marked on the floor plans are available, refer to attached, Appendix 01 35 34B.

Should the Supplier encounter paint and coatings, not sampled, that would be disturbed during the course of the Work, they should stop the work in that immediate area and report the same to the WRDSB Contact.

Unless otherwise specifically covered by Cash Allowance or Contingency Allowance for known lead-containing paint and coatings, include in this contract for the removal or disturbance of lead-containing materials, must be completed in compliance with "Lead on Construction Projects" guideline (April 2011). No claims for extra cost will be accepted for lead-containing paint or coatings in identified areas.

The classification of typical lead-containing construction tasks is based on presumed airborne concentrations obtained from the U.S. Occupational Safety and Health Administration (OSHA), the Ontario Ministry of Labour, and published research studies. The classification of Type 1, Type 2, or Type 3 operations are grouped based on the following concentrations of airborne lead

Supplier shall inform all workers of the presence of paint finishes that are lead containing. Disturbance of lead-containing materials, paints or surface coatings shall be conducted in accordance with the procedures outlined in the Environmental Abatement Council of Canada (EACC) "Lead Guideline" (October 2014) and/or the Ministry of Labour (MOL) "Lead on Construction Projects" guideline (April 2011). The extent of procedures required depends on the type of work to be conducted. Waste to be handled and disposed of in accordance with O.Reg. 347.

iii. Mercury

Mercury is typically used in building service applications such as thermometers, barometers, thermostats, gauges, electrical switches, and lighting products including fluorescent light bulbs and a variety of High Intensity Discharge (HID) lamps as mercury vapour, metal halide and high pressure sodium lamps. Lamps and other devices that require demolition are to be handled with care and kept intact to avoid potential exposure. Any mercury-containing lamps or other equipment that are demolished are to be recycled. Waste to be handled and disposed of in accordance with O.Reg. 347.

iv. Silica

Silica is present in rock, stone, soil, and sand. Masonry products such as concrete block, brick, and mortar, as well as concrete and associated products contain silica. Due to its ubiquitous nature, silica was historically used in a wide variety of building materials and is still used today in new construction.

All work involving the demolition silica-containing materials shall follow the procedures outlined in the MOL “Silica on Construction Projects” guideline. Type 1 operations may be necessary based on the type of work conducted and the Supplier shall implement dust suppression methods and protect workers.

v. Other Designated Substance

In addition to asbestos and/or lead, silica, and mercury are present in all WRDSB facilities. New construction, renovation, or alterations require compliance by the Supplier with the applicable legislation. Other designated substances (i.e., acrylonitrile, arsenic, benzene, coke oven emissions, isocyanates, ethyl oxide, and vinyl chloride) are not encountered in WRDSB facilities as significant constituents or in a form that would represent an exposure concern.

20. Dispute Resolution

All disputes arising out of or in connection with this Contract, or in respect of any legal relationship associated with or derived from this Contract, other than with respect to the WRDSB's right to terminate this Contract, shall first be mediated pursuant to the [National Mediation Rules of the ADR Institute of Canada, Inc.](#) Despite this agreement to mediate, the Supplier or the WRDSB may apply to a court of competent jurisdiction or other competent authority for interim measures of protection at any time. All disputes remaining unsettled after mediation shall be arbitrated and finally resolved before a single arbitrator pursuant to the National Arbitration Rules of the ADR Institute of Canada, Inc. The place of mediation and arbitration shall be Toronto, Ontario, Canada. The language of the mediation shall be English.

21. Duty to Disclose Change of Control

If the Supplier undergoes a change in control, the Supplier shall immediately disclose such change in control to the Designated Representative and shall comply with any terms and conditions subsequently prescribed by the WRDSB resulting from the disclosure.

22. Electrical Safety Requirements

All electrical equipment and components must be C.S.A., or Electrical Safety Association (E.S.A.) certified. A certification sticker must be affixed to the equipment in a visible location.

23. Emergency and Maintenance

The care of the Works until completed, delivered to and accepted by the WRDSB, rests solely with the Supplier who shall assume all risk of damage to the work.

For emergency and maintenance measures, the name, address, and telephone number of a responsible official of the contracting firm shall be given to the WRDSB's contact person in charge of the project, if requested. This official shall always be available and have the necessary authority to mobilize workers and machinery and to take any action as directed by the WRDSB in the event emergency or maintenance measures are required, although the emergency or requirement of maintenance may have been caused by the Supplier's negligence, Act of God, or any cause whatsoever.

Should the Supplier be unable to carry out the required immediate remedial measures, the WRDSB may carry out the necessary repairs and the costs for this work shall be deducted from payments due to the Supplier.

24. Equivalents and Alternatives

24.1 Equivalents or Brands Names

24.1.1 Any reference to a brand name or a particular manufacturer shall be understood to have been made solely for the purpose of establishing and describing required performance and quality levels of the product to be supplied, unless specified otherwise.

- 24.1.2 No reference to the brand name of a particular manufacturer shall be construed to restrict Bidders to that manufacturer. Bidders are invited to Bid equivalent and comparable equipment or items of any manufacturer, pending approval from the WRDSB in the form of an Addendum. It is the Bidder's responsibility to demonstrate that the item meets the specifications.
- 24.1.3 Bidders shall request through the Bidding System by clicking on the "Submit a Question" button found within the bid details page of that Procurement that a proposed product be considered an approved equivalent prior to the Deadline for Questions in the Anticipated Project Schedule. Upon receipt of a request, the WRDSB will respond by providing further instructions where you may submit documentation.
- 24.1.4 The response must include enough detail to determine equivalency by comparing the WRDSB's specifications to the equivalent product. It will not be the WRDSB's responsibility to make this comparison.
- 24.1.5 The WRDSB/ Consultant may, depending on the nature of the product request site visits within a reasonable distance (preferable within 100 km of the WRDSB) showing product and installation based on a certain age, minimum 18 months in use, room use, room size, etc. based on same or similar purpose as described in this Procurement.
- 24.1.6 The WRDSB/Consultant will endeavor to complete a review and decide prior to the Closing Date, and, if required, the WRDSB reserves the right to extend the Closing Date to complete its review. However, in the event additional time is required beyond a suitable extension to the Closing Date, the request will be pending until the product is thoroughly vetted, therefore, it may not be approved for this Procurement.
- 24.1.7 If the WRDSB is willing to consider the product with its differences, it will be communicated in the form of an Addendum prior to the Closing Date.
- 24.1.8 The cost of any testing requirements to establish acceptable equivalent or comparable products will be borne by the Bidder, unless otherwise stated by the WRDSB.

24.2 Alternatives and Substitutions

- 24.2.1 After Contract Award, the Contractor may submit an alternate material or piece of equipment to the Consultant and Owner for review. An Alternate will only be evaluated and considered acceptable if it meets the intent of the original design and specifications, and where there is a credit or no additional cost to the Owner. The Specification Sections contain pertinent performance criteria, quality, function and requirements for materials and methods to achieve work described.
- 24.2.2 Material or equipment of equal or better performance and quality may be offered in substitution for those specified. Requests for review of substitute items of material and equipment will not be accepted by the Consultant from anyone other than the Contractor. All requests for substitution must be accompanied by a detailed listing of the expected cost savings to the Owner.

24.2.3 Substitutions will not be considered when they are indicated or implied on Shop Drawings or product data submittals without a separate written request.

24.2.4 Requests for substitution shall include any request for changes from the Contractor that require significant design changes, redesign, or significant design reviews.

A request for substitution constitutes a representation that the Contractor:

- i. Has investigated the proposed product and determined that it meets or exceeds the quality level of the specified product.
- ii. Will provide the same warranty for the substitution as for the specified product.
- iii. Will coordinate the installation and amend other Work which may be required for the Work to be complete at the Contractor's expense and at no additional cost to the Owner.
- iv. Waives claims for additional costs or time extension which may subsequently become apparent.
- v. Will reimburse the Owner for review or redesign services.

24.2.5 Request for substitution to be made by written application to the Consultant and is to include sufficient data to enable the Consultant to assess the acceptability of requirements, including the following:

- i. All submittal information required for the specified equipment, including all deviations from the specified requirements and/or necessitated by the requested substitution.
- ii. Materials of construction, including material specifications and references.
- iii. Dimensional drawings, showing required access and clearances, including any changes to the work required to accommodate the proposed substitution.
- iv. Drawings and details showing changes if the offered substitution necessitates changes to or coordination with other portions of the Work. Perform these changes as part of the substitution of material or equipment at no additional cost.
- v. Certification that the proposed substitute will adequately perform the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified with the same or better warranty.
- vi. Information and performance characteristics for all system components and ancillary devices to be furnished as part of the proposed substitution.
- vii. Certification that acceptance of the proposed substitute will not prejudice achievement of Substantial Performance.
- viii. Itemization of all costs including any licenses fee or royalty that will result directly or indirectly from the acceptance of the proposed substitution.

- Include redesign and cost of claims of any other contract affected by the resulting change.
 - ix. Guaranteed credit or cost reduction offered if the proposed substitution is accepted and a waiver of claims for additional expenses which may subsequently become apparent.
 - x. Recommended maintenance requirements and availability of spare parts and service.
 - xi. Written confirmation from subcontractors and suppliers on cost, schedule, and technical requirements if requested by the Consultant.
- 24.2.6 Consultant will evaluate each proposed substitution. Consultant will be the sole judge of acceptability, and no substitute will be ordered, installed, or utilized without the Consultant's prior written acceptance by either a Change Order or a reviewed shop drawing. The burden of proof is on the Contractor.
- 24.2.7 Pay the Consultant's cost for evaluating the requested substitution even though the request may be denied, or for additional redesign work required because of any substitution. Costs will be charged on a time and expense basis and will be deducted from progress payments due to the Contractor.

25. Evidence of Quality

It is the Bidder's responsibility to prove their product/service quality meets the WRDSB's requirements and Bidders may be required to submit evidence in a form acceptable to the WRDSB. Substitution of materials, equipment or methods different from those outlined in the specifications / terms of reference will not be accepted unless provided for within the Procurement document or without the written approval of the WRDSB.

26. Force Majeure

If either party is delayed in the performance of their obligations under this Contract by Force Majeure, then the Contract Time shall be extended for such reasonable time as the Owner, and the Supplier shall agree. The extension of time shall not be less than the time lost because of the event causing the delay, unless the parties agree to a shorter extension. Neither party shall be entitled to payment for costs incurred by such delays. Upon reaching agreement on the extension of the Contract Time attributable to the Force Majeure event, the Owner and the Supplier shall execute a Change Order indicating the length of the extension to the Contract Time and confirming that there are no costs payable by the either party for the extension of Contract Time. However, if at the time an event of Force Majeure arises a party is in default of its obligations under the Contract and has received a notice of default shall not excuse a party from its obligation to cure the default(s). For greater certainty, the defaulting party, to the extent possible, must continue to address and cure the default notwithstanding an event of Force Majeure."

Any cause, unknown at the effective date of the Contract and beyond either party's control, other than financial difficulties, bankruptcy or insolvency, which prevents the performance by a party, or both, of any of their respective obligations under the Contract and the event of Force Majeure did not arise from a party's default and could not be

avoided or mitigated by the exercise of reasonable effort or foresight. Force Majeure includes Labour Disputes; fire; unusual delay by common carriers or unavoidable casualties; delays in obtaining third-party licenses, permits, agreements, or approvals (excluding approvals of any Subcontractors or Suppliers of any tier); civil disturbance; emergency acts, orders, legislation, regulations or directives or revoking of funding from any government or other public authority; acts of a public enemy; war; riot; sabotage; blockage; embargo; lightning; earthquake; adverse weather conditions but only if substantially beyond the weather norms of the Place of the Work; acts of God; or declared epidemic or pandemic outbreak or other public health emergency (e.g. SARS, COVID-19)

If in the reasonable opinion of either party to this Contract that performance of the Contract is made impossible by force majeure, then either party shall notify the other in writing and the WRDSB shall either terminate the Contract forthwith without any future payments being made or authorize the Bidder to continue performance of the Contract with such adjustments as may be required by the existence of the force majeure and agreed upon by both parties.

27. Hold Back or Set Off

The WRDSB may hold back payment or set off against payment if, in the opinion of the WRDSB, the Supplier has failed to comply with any requirements of the Contract.

28. Hot Work Procedure

Take all precautions to Work safely and to provide the necessary protection to persons and property from Hot Work. This includes, but is not limited to Brazing, Cutting, Grinding, Soldering, Thawing Pipe, Torch Applied Roofing and Welding. With all such activity these steps are to be followed:

- i. Whenever possible, complete Hot Work in a welding shop or out of doors at the school.
- ii. Flammable liquids, dust lint and oily deposits to be removed from within 50-ft (15m) of Work. Remove other combustibles where possible. Otherwise protect with fire-resistive tarpaulins or metal shields.
- iii. Explosive atmosphere in area eliminated. Floors swept clean. Combustible floors wet down, covered with damp sand or fire-resistive tarpaulins.
- iv. All wall and floor openings covered. Fire-resistive tarpaulins suspended beneath Work.
- v. For on-site Work (indoor and out of doors), advise the Head Custodian, Principal, Consultant (if assigned) and Project Coordinator/Lead prior to Work being performed, and of related dangers.
- vi. Where the Fire Alarm system is required to be set to stand-by to discourage false alarms from smoke detectors provide a firewatch throughout the building or structure being worked on. NEVER put the fire alarm system in stand-by mode when the building is occupied by staff or students.

- vii. In the event of a fire because of the Hot Work, notify the fire department immediately. Report incident to the head custodian, the Consultant, if assigned, and Project Coordinator immediately, whether extinguished or not. Provide a fire incident report to the WRDSB.
- viii. Barriers must be set up to protect staff and students (i.e. pylons, shields, and caution tape) from exposure to arc flash and smoke migration.
- ix. Have all necessary doors, windows and/or drapes closed. Confer with the Head Custodian to shut down all fan systems in the area to reduce or eliminate smoke distribution.
- x. Provide and keep fire extinguishers handy and in good Working condition. Temporarily cover all smoke detectors in the area during time of Work.
- xi. Provide a fire watch/spot check for several hours after Work is completed. Uncover smoke detectors.
- xii. On new construction, the requirements of the Hot Wok permit may be waived, until such time as either Substantial Completion or Occupancy is granted, whichever comes first.
- xiii. On additions to existing buildings, the requirements for Hot Work permits shall remain in place.

28.2 Hot Work Permit

- i. Each permit is valid for seven (7) days only and must be renewed prior to its expiration date
- ii. The contractor must obtain Hot Work Permits from the WRDSB's representative prior to the start of work.
- iii. The contractor must complete the form as required and must keep the form on site.
- iv. Return each completed form to the WRDSB's representative on the date of expiration.
- v. The most current version of the Permit and its requirements shall be used for the purposes of the Work.

29. Incurred Costs

The WRDSB will not be liable, nor reimburse any Bidder for costs incurred in the preparation of the Bid, or any other services that may be requested as part of the procurement process.

30. Indemnification

The Bidder will indemnify and save harmless and defend the WRDSB, and their respective elected officials, officers, employees, agents and their respective successors and assigns, from and against all actions claims and demands whatsoever which may be brought against or made upon any of the Indemnified Parties and against all losses, liability,

judgments, claims, costs, demands or expenses which the Indemnified Parties may sustain, suffer, or be put to resulting from or arising out of the Bidder's failure to exercise reasonable care, skill or diligence in the performance or rendering of any Work or service required hereunder to be performed or rendered by the Bidder, its agents, servants, employees or Subcontractors, or any of them as well as for the infringement of or use of any intellectual property rights including any copyright or patent arising out of the reproduction or use in any manner of any plans, designs, drawings, specifications, information, negatives, data, material, sketches, notes, documents, memoranda, or computer software furnished by the Bidder in the performance of this Contract.

31. Inspection of Supplier's Work and Equipment.

- ii. The WRDSB reserves the right to inspect and/or have demonstration of the products/equipment/services offered prior to award of this Procurement.
- iii. The WRDSB reserves the right to have all work, including maintenance and repair work reviewed by a third-party Contractor, Agency, or Consultant to confirm that work within this Contract is being completed satisfactorily.

32. Insurance Requirements

If selected, it is the responsibility of the Supplier and its Insurance Broker to review all potential operations and exposures to determine if the coverage and limits noted below are sufficient to address all insurance related exposures presented by the specification of the Project, Work, or Supply. The Supplier shall ensure its undertaking, business, and equipment under the following coverage to protect and indemnify and save harmless the WRDSB.

Throughout the term of this Contract (including any renewal thereof), the Supplier shall obtain, upload through bids&tenders and maintain at its own expense, including the cost of any applicable deductible or self-insured retention, the following policies of insurance:

- i. **Commercial General Liability Insurance** shall be in the name of the Supplier, and shall name the **Waterloo Region District School Board** and any other person or party identified in the contract documents, as an **additional insured**, with limits of not less than \$5 Million inclusive per occurrence for bodily injury, death, and damage to property, including loss of use thereof, for itself and each of its employees, *Subcontractors* and/or agents. To achieve the desired limit, umbrella, or excess liability insurance may be used. The policy shall be endorsed to provide the *Owner* with not less than 30 days' notice, in writing, in advance of any cancellation and of change or amendment restricting coverage.
- ii. **Automobile Liability Insurance** in respect of licensed vehicles with limits of not less than \$2 Million inclusive per occurrence for bodily injury, death and damage to property, covering all licensed vehicles owned or leased by the Supplier, and endorsed to provide the Owner with not less than 30 days' notice, in writing, in advance of any cancellation, change or amendment restricting coverage. Where the

policy has been issued pursuant to a government-operated automobile insurance system, the Supplier shall provide the Owner with confirmation of automobile insurance coverage for all automobiles registered in the name of the Contractor.

- iii. **Contractor's Equipment Insurance:** If applicable/requested, Broad Form Contractor's Equipment Insurance: The General Contractor shall provide and maintain during the term of the Agreement coverage for construction machinery and equipment used by the Contractor for the performance of the work. Such insurance shall be in a form acceptable to the WRDSB and shall not allow subrogation claims by the Insurer against the WRDSB.
- iv. **All Risk Installation Floater:** If applicable/requested, the General Contractor shall provide and maintain during the term of the Agreement an All Risk Installation Floater Insurance policy covering the installation of any machinery and equipment associated with the construction project. Coverage shall be in an amount equal to the value of the machinery and/or equipment and shall include coverage while it is in transit too, while stored at a temporary location, and awaiting installation at the work site.
- v. **Professional Liability Insurance (Errors and Omissions):** If applicable/requested, Contractors and/or Consultants shall ensure its professional consultants, architects, landscape architects, planners, engineers, including IT providing a professional service in connection with the contract, maintain until three (3) years after the Agreement, Professional Liability Insurance to a limit not less than \$1 Million per claim providing coverage for acts, errors and omissions arising from their professional services performed under this Agreement including but not limited to . design errors, project management mistakes, failure to perform etc. The policy SIR/deductible shall not exceed \$100,000 per claim and if the policy has an aggregate limit, the amount of the aggregate shall be double the required per claim limit. Certificates evidencing such coverage shall be supplied to the WRDSB prior to the completion of the project and in accordance with the provisions stated above.
- vi. **Pollution Liability:** If applicable, (i.e., for projects with environmental liability concerns) the General Contractor shall take out and keep in force Contractor's Pollution Liability (CPL) coverage to ensure that its work does not exacerbate any pre-existing environmental conditions during construction. Coverage shall be in an amount of not less than \$5 Million per claim or per occurrence, or such greater amount as the WRDSB may from time to time require, naming the WRDSB as an additional insured, whose coverage shall be maintained in force for 1 year following the termination of the Contract. The policy SIR/deductible shall not exceed \$100,000 per claim and if the policy has an aggregate limit, the amount of the aggregate shall be double the required per occurrence limit.
- vii. **Cyber Insurance:** If applicable/requested: In addition to the insurance required under the Agreement, the Contractor shall procure and maintain cyber and network

privacy insurance at its sole cost and expense with an aggregate limit of not less than \$1 million per occurrence.

The insurance policy shall include coverage for any and all liabilities, damages, claims, losses, costs, and expenses of any kind that may be incurred by or asserted resulting from or related to: (1) any act, error, omission, or negligence related to the Proponent's technology and/or professional services; (2) intellectual property infringement arising out of software and/or content; (3) breaches of security and/or data; (4) violation or infringement of any right to privacy, or any breach of federal, provincial or local security and/or privacy laws or regulations; and (5) theft, damage, destruction, or corruption of any WRDSB data or any employee, or student of WRDSB, including without limitation, unauthorized access, unauthorized use, identity theft, theft of personally identifiable information or confidential corporate information, the transmission of a computer virus or other type of malicious code.

Evidence of coverage must be provided to the WRDSB within 7 days of the Intent to Award. The policy must be kept in force by the Proponent during the term of this Agreement and for three (3) years (either as a policy in force or Extended Reporting Endorsement) after this Agreement is terminated or after completion of the Project provided for herein, whichever is later. Proof of insurance may be requested during the agreement term and for three (3) years after. If the policy is to be cancelled or non-renewed for any reason, a 90-day notice of said cancellation or non-renewal must be provided to the WRDSB. The WRDSB has the right to request that the Proponent purchase an Extended Reporting Endorsement at the Proponent's sole expense.

- viii. **Provisions:** Prior to the commencement of work, the Supplier shall forward a Certificate of Insurance evidencing this insurance with the executed Agreement. The Certificate shall state that coverage will not be suspended, voided, canceled, reduced in coverage or in limits except after thirty (30) days (ten (10) days if cancellation is due to non-payment of premium) prior written notice by certified mail to the WRDSB.

It is also understood and agreed that in the event of a claim any deductible or self-insured retention under these policies of insurance shall be the sole responsibility of the General Contractor and that this coverage shall preclude subrogation claims against the WRDSB and any other person insured under the policy and be primary insurance in response to claims. Any insurance or self-insurance maintained by the WRDSB and any other person insured under the policy shall be considered excess of the Contractor's insurance and shall not contribute with it. The minimum amount of insurance required herein shall not modify, waive, or otherwise alter the Contractor's obligation to fully indemnify the WRDSB under this Agreement.

The WRDSB reserves the right to modify the insurance requirements as deemed suitable.

ix. Third Party Claims Process:

- a. The WRDSB's claims process for Third Party claims is to refer the claimant directly to the Supplier and to leave the resolution of the claim with the Supplier. This applies regardless of whether it is an insured loss.
- b. As WRDSB has a responsibility to the taxpayers, we must ensure that claimants are dealt with in a fair and efficient manner. Claims reported to the Supplier, either directly by a third party or through the WRDSB shall be promptly investigated by the Supplier. The Supplier shall contact the third party claimant within 48 hours of receipt of notice of a claim. The Supplier shall initiate an investigation of the claim immediately upon notice, and advise the third party claimant in writing, with a copy to the WRDSB, of its position regarding the claim within 21 calendar days of the notice. The Supplier shall include in its response the reasons for its position.
- c. Should this position not resolve the claim and be accepted by the third party claimant, the Supplier shall immediately report the claim to its Insurer for further review. (Insurer for this purpose is defined as either the Claims Department of the Supplier's Insurance Company or the Claims Administrator at the Supplier's Insurance Broker.) The Supplier's Insurer upon receipt of this claim shall advise the third party claimant by letter, with a copy to the WRDSB, that it is now investigating the claim. When a final position on the claim has been determined, the Supplier's Insurer shall advise the third party claimant by letter, with a copy to the WRDSB. Failure to follow this procedure shall permit the WRDSB to investigate and resolve any such claims.
- d. Nothing herein shall limit the right of the WRDSB to investigate and resolve any such claims notwithstanding the response of the Supplier and/or its Insurer and to seek indemnification from the Supplier or to exercise any other rights under the Contract.
- e. The WRDSB may, without breaching this contract, retain from the funds owing to the Supplier an amount that, as between the WRDSB and the Supplier, is equal to the balance in the WRDSB's favour of all outstanding debts, claims or damages, whether related to this contract.

33. Invoicing and Payment Terms

- 33.1 Submit all invoices to finance-ap@wrdsb.ca for payment at the completion of the Work or after receipt of goods, unless otherwise stated. Not Applicable for Credit Card orders.
- 33.2 Fiscal Year End: All work scheduled within a single school year (Sept 1-Aug 31) must be completed and invoiced received by the WRDSB no later than August 31 of that same school year, unless budgets dictate that work must extend into the following school year and/or mutually agreed upon both parties.
- 33.3 New Account, in advance of invoicing, upon request, Suppliers will provide:

- i. necessary company information to set up a WRDSB account and
 - ii. banking information to receive payment by Electronic Funds Transfer (EFT).
- 33.4 Requests to change company information must be submitted in writing accompanied by a legal document/letter signed by a lawyer on the law firm's letterhead.
- 33.5 Invoices must contain the following information, where applicable, to be deemed complete:
 - i. Purchase Order Number
 - ii. Invoice Date
 - iii. Unique Invoice Number
 - iv. Supplier name and address
 - v. Quantity, Unit Price, Unit of Measure and Extended Price
 - vi. Description for each line item
 - vii. Date of Service Call, if applicable
 - viii. HST
 - ix. Payment Terms
 - x. Work Order Number, if applicable
 - xi. Name of WRDSB Project Lead, if known, and
- 33.6 Payment terms shall be net thirty days (30) days after receipt of invoice, unless otherwise agreed by the WRDSB in writing. An early payment discount, if offered, may be considered on a mutual agreement basis. Payment may be delayed if the invoice is incorrect or the goods, equipment and/or services are not acceptable to the WRDSB. The WRDSB will not pay any interest, penalty, or late fee for delayed payments. The WRDSB preferred payment method is Credit Card or EFT, however alternate payment methods may be approved. Suppliers are required to invoice promptly, without delay. For Work that falls under the Construction Act, refer to 34 Construction Act – Proper Invoice.

34. Construction Act – Proper Invoice

The WRDSB will pay such invoice within twenty-eight (28) calendar days of the WRDSB's receipt of such proper invoice if the work has been performed to the satisfaction of the WRDSB For Work that is governed by the provisions of the Construction Act and the Regulations thereto, the Supplier shall submit its invoices in the form of a Proper Invoice. For the purposes of this section, a "Proper Invoice" shall include the following:

- i. the Supplier's name, address, telephone number, and mailing address.
- ii. the date of the Proper Invoice and the period during which the services or materials for which payment is being made were supplied.
- iii. information identifying the authority, whether in the contract or otherwise, under which the services or materials were supplied.
- iv. a description, including quantity where appropriate, of the services or materials

- that were supplied during the payment period.
- v. the amount payable for the services or materials that were supplied during the payment period, with a clear identification of the portions of the amount that are holdbacks, and HST.
 - vi. the name, title, telephone number, and mailing address of the person to whom payment is to be sent.
 - vii. the payment terms as specified by the WRDSB in the Contract.
 - viii. the invoice number and if applicable, the revision number.
 - ix. the Supplier's HST number.
 - x. invoices and time sheets from all subtrades whose work is included in the Proper Invoice, if required in the Contract.
 - xi. backup documentation to support any cash allowances and extra work claimed in the Proper Invoice.
 - xii. a schedule of values indicating:
 - a. for lump sum contracts, the percentage of work completed per division with each division further subdivided to show the percentage of work completed for each subtrade,
 - b. for unit price contracts, the tender quantity, unit of measure, previous quantity, current quantity, to-date quantity,
 - c. an updated list of change orders, showing the percentage of work completed under each change order, and
 - d. an updated cash allowance list, showing the percentage of work completed in respect of each cash allowance, if required by the Contract.
 - xiii. a Statutory Declaration where required by the Contract attesting to the truth of the statements made therein.

35. Interpretive Value of Headings

The headings in this Procurement document or subsequent Agreements are for convenience of reference only and in no manner modify, interpret, or construe the Procurement document or subsequent Agreements.

36. Licenses and Permits

The Supplier will be responsible for applications and fees associated with all licenses and permits required by all governing bodies. The Supplier will attach a copy of all permits, and any other required documentation to the applicable assigned work order for WRDSB records.

37. Locates

All required utility locates must be obtained before any on-site work commences, be available for Supplier operator/employee review, and are the sole responsibility of the Supplier. Any damage to any utility installation arising from work performed by the Supplier or their employees shall be the Supplier's responsibility.

The Supplier will obtain all utility locates in advance of work and all cost(s) associated with obtaining the utility locates will be the Supplier's responsibility.

The Supplier shall possess the ability to supply and or share with the WRDSB Representative utility locates for the sole purpose of Quality Control inspections. This is to be done at no additional cost to the WRDSB.

38. Log Reports

If requested, the Supplier must submit a completed Log Report with invoices. The WRDSB may request more frequent log submissions if it is necessary.

39. Materials - Specifications

Only new materials in perfect condition will be accepted. Demonstrators, seconds, or defective materials are unacceptable. Any materials found not to be in a new condition or as specified will be returned to the Supplier at the Supplier's expense.

40. Material Safety Data Sheets (M.S.D.S.)

Where applicable, a materials safety data sheet (M.S.D.S.), must accompany all purchased goods, that fall under the requirements of the Occupational Health and Safety Act. The WRDSB will not accept any additional charges or surcharges related to the supply of M.S.D.S.

41. Mathematical Errors (Unit Prices Prevail)

Should there be any error in extensions, additions or computations, the WRDSB shall be entitled to correct such errors based upon the unit prices supplied, and the corrected total shall be considered as representing the intention of the Bidder and shall be used as the basis for comparison of bid submissions.

42. No Branding

The Supplier shall not place any sign at the site, public meetings, any public or private property or along curbside prior, during or after the Work without prior written permission of the WRDSB.

43. No Collusion

Bidders/Proponents including any of their agents are prohibited from engaging in any comparison of figures or arrangement with any other individual, corporation or person submitting a Bid/Proposal for the same Work and shall be fair in all respects and shall be without collusion or fraud.

44. No Lobbying

Any attempt by the Bidder or its agents to contact any of the following people, directly or indirectly, with respect to this procurement may lead to disqualification:

- i. any elected or appointed officer.
- ii. any staff of the WRDSB except the Designated Representative as identified in the Procurement Document; or
- iii. any other person connected in any way with the procurement.

45. No Smoking and Scent-Free Environment

The Province of Ontario has legislated under the Smoke Free Ontario Act that smoking is not permitted on any WRDSB owned properties. Furthermore, most WRDSB properties are “scent free”. Smoking will not be permitted on-site. Offenders will be asked to leave the site, and infractions could result in corrective action and or fine.

46. Non-Assignment

No assignment by the Supplier shall relieve the Supplier of any responsibility for the full performance of all its’ obligations under this contract.

The Supplier shall not change its corporate name without the prior written approval of the WRDSB.

47. Non-Disclosure Agreement (NDA)

The WRDSB requires all service providers to sign off on a non-disclosure agreement and for the service provider to complete the Software Privacy and Security Standards Document (if necessary) in accordance with WRDSB procedure AP4790. Prior to any sharing of WRDSB personal, sensitive, or confidential information, the Supplier will be subject to further privacy and security reviews as required. This agreement will be renewed on an annual basis.

48. Ownership of Work

For the purposes of this paragraph:

“Deliverables” means all material prepared by the Bidder forming the Work under this Contract including, without limitation, all electronic media, reports, documents, and instruments of service.

“Intellectual Property Rights” means any and all rights provided under: (a) patent law; (b) copyright law; (c) trade-mark law; (d) industrial design law; (e) any other statutory provision or common law principle applicable to this Contract, including trade secret law; and (f) any and all registrations and licenses in relation to the foregoing; and

“Personnel” means employees, representatives, agents, and Subcontractors.

The Bidder and the WRDSB acknowledge and agree that the development of the Deliverables and the provision of the Work may result in the creation or development of new intellectual property and may contain or utilize the existing intellectual property of the Bidder or of third parties. Accordingly, the Bidder and the WRDSB agree as follows.

- i. Except as set out in paragraph (b) below, the Bidder hereby assigns and agrees to assign to the WRDSB all right, title and interest, including all Intellectual Property Rights, in and to each Deliverable from the moment of creation, and will cause its Personnel to assign the same. The Bidder will cause its Personnel to waive all moral rights they may have in each Deliverable.
- ii. To the extent that a Deliverable contains or utilizes the intellectual property of the Bidder or a third party (“Retained Materials”), and the Bidder expressly identifies such Retained Materials, the Bidder and the applicable third party will, subject to

the following sentence, retain all their respective right, title and interest, including all Intellectual Property Rights, which each may have in such Retained Materials. To the extent that a Deliverable contains or utilizes Retained Materials, the Bidder hereby grants to each of the WRDSB a royalty-free, irrevocable, perpetual, world-wide, non-exclusive license to make, use, sell, modify, prepare derivative works, disclose, publish, sublicense, copy and communicate by electronic means such Retained Materials.

- iii. The Supplier agrees to always cooperate fully and will cause its Personnel to always cooperate fully, with respect to signing such documents and doing such acts and other things reasonably requested by the WRDSB to confirm the transfer of ownership rights in the Deliverables.

49. Patent, Copyright and Other Proprietary Rights

The Bidder (by responding) agrees that the Bid on acceptance by the Designated Representative, becomes the property of the WRDSB. The copyright for respective purchased concepts and/or materials will become the property of the WRDSB unless otherwise mutually agreed upon by the Bidder and the WRDSB.

All reports submitted by the successful bidder, including the "Asbestos Audit Update Report" dated [Month/Day/Year], and any related documentation, shall become the exclusive property of the Board upon submission, including all associated intellectual property rights, except for any pre-existing intellectual property of the contractor unless otherwise agreed in writing.

The consultant shall ensure the accuracy and legal compliance of all submitted materials, which may be verified or audited by the Board.

The Board and its authorized agents may use, reproduce, and disclose the report as necessary to fulfill obligations under applicable legislation, including the Occupational Health and Safety Act, Ontario Regulation 278/05, and relevant privacy laws such as but not limited to Freedom of Information and Protection of Privacy Act (FIPPA), the Municipal Freedom of Information and Protection of Privacy Act (MFIPPA).

All information shall be treated as confidential and shall not be disclosed by the consultant to third parties without prior written consent from the Board representative, unless required by law.

All Bids, other documents as well as correspondence are subject to the provisions of the Municipal Freedom of Information and Protection of Privacy Act (MFIPPA).

50. Performance

- i. Where the Supplier is in default in conducting any of its obligations under the contract, the WRDSB may issue a verbal warning outlining the deficiency in supply or other aspects of performance and requiring the Supplier to correct those deficiencies within such period as stated.

- ii. If the deficiency is not corrected within the time specified, or there is a further instance of deficient performance, the WRDSB may issue a written notice to the Supplier, identifying the deficiency in performance and setting a final date or period for its correction.
- iii. If corrective steps are not taken by the final date or within that time, the WRDSB may terminate the Contract and take corrective action.
- iv. Termination of any Contract can be immediate depending on the severity of the default.
- v. The Supplier shall have no right to perform the services contemplated under this agreement beyond the time when such services become unsatisfactory to the WRDSB; and in the event that Supplier shall be discharged before all the services contemplated hereunder have been completed, or the services are for any reason terminated, stopped or discontinued because of the inability of the Supplier to serve under this agreement they shall be paid only for that portion of the Work which shall have been satisfactorily completed at the time of termination.
- vi. Where deemed appropriate, a performance evaluation shall be completed by the WRDSB. The evaluation report shall be reviewed with Procurement Services, and a copy of the completed evaluation forwarded to the Supplier for their records. Dependent on the evaluation scoring, the WRDSB may request a corrective action plan and/or project size/value may be affected on future bid opportunities for your company.

51. Permits and Licenses

Unless stated otherwise, the Supplier shall apply for all required permits and licenses, supply all necessary notices required for the Work and pay all required fees. These costs shall be included in the Total Price. A copy of all permits, and any other required documentation shall be provided to the WRDSB upon request.

52. Proceedings Against the WRDSB

The Bidder represents and warrants that the Bidder is not a party to any legal suits, actions, litigation proceedings, arbitrations, alternative dispute resolutions, investigations, or claims (Hereinafter collectively referred to as "Claims") by or against or otherwise involving the WRDSB and the Bidder. The WRDSB may reject any Bid in the event of potential, current, pending, or threatened litigation, arbitration, alternative dispute resolution, or disputes involving the WRDSB and the Bidder.

53. Protection of WRDSB Assets

The Supplier (the Supplier / Subcontractor) shall be informed of and protect all WRDSB assets including existing structures and vehicles, to the satisfaction of the WRDSB. Any damage shall be reported to the WRDSB and subsequently repaired and/or replaced by the Supplier, at their expense, to the satisfaction of the WRDSB. The Supplier shall not

cause any inconvenience to WRDSB operations, staff, public or users of the WRDSB facilities, within reason. Communication between the successful Supplier and the school (or WRDSB representative if school contact is not available) must be timely and effective to ensure all stakeholders are considered / aware of work to be completed.

54. Records, Inspection, Audits

The WRDSB will have the right, upon reasonable notice, to full access to the accounts and records of the Supplier in respect of the goods, services and equipment provided by it under the Contract, for the purposes of inspection and/or audit. The Supplier shall make and retain such records during the term of the Contract and for a minimum of seven (7) years following its termination, cancellation, or expiry.

55. Reserved Rights of the WRDSB

The WRDSB reserve the right, in their respective sole and unfettered discretion, to:

- i. Reject any Bid received from a Bidder which is party to any potential, current, past or existing suits, actions, and litigation proceedings, arbitrations, alternative dispute resolutions, investigations, Bidder performance evaluations that are below expectations, significant or persistent deficiencies in performance of any substantive requirement or obligation under a prior agreement or agreements or claims by or against or otherwise involving either of the WRDSB and the Bidder.
- ii. waive formalities and accept Bids which substantially comply with the requirements of this tender.
- iii. accept any Bid in whole or in part.
- iv. accept, reject, or cancel any or all Optional or Provisional pricing.
- v. discuss with any Bidders different or additional terms to those contemplated in this Procurement Document or in any Bid submission.
- vi. make public the names of any or all Bidders.
- vii. accept or reject equivalent or alternative brand names.
- viii. check references other than those provided by any Bidder.
- ix. Verify with any Bidder or with a third party any information set out in a Bid.
- x. reject any, or any part of, any or all Bids, or cancel the bidding process at any stage and/or issue a new Bid call for the same or similar deliverables.
- xi. disqualify any Bidder:
 - a. whose Bid contains misrepresentations or any other, inaccurate, or misleading information, or any qualifications within its Bid,
 - b. who has engaged in conduct prohibited by the Procurement Document,
 - c. with inadequate credentials or due to unsatisfactory past performance,
- xii. reject Bid(s) from Bidder who has engaged in lobbying or has contravened any of the terms of the Procurement Document.
- xiii. reject a Bid based on:
 - a. information provided by references or credit check or other due diligence efforts,
 - b. the information provided by a Bidder pursuant to the WRDSB exercising its clarification rights under the procurement process, or

- c. other relevant information that arises during the procurement process.
- xiv. choose to reject a Bid if only a single Bid is received and cancel the bidding process or enter direct negotiations with the sole Bidder.
- xv. accept a Bid other than the lowest or highest scoring and/or to not accept any Bid for any reason whatsoever.
- xvi. award the contract as split-order, lump sum or individual-item basis, or such combination as shall best serve the interests of the WRDSB.
- xvii. negotiate in circumstances permitted for in the Bid document or by relevant policies, or directives, and include additional terms and conditions during the process of negotiations.
- xviii. no longer consider a Bidder if a satisfactory outcome is not reached as part of negotiation, as determined by the WRDSB in their sole discretion and move to the next highest ranked Bid in such event.
- xix. select a Bidder other than the Bidder whose Bid reflects the lowest cost to the WRDSB and/or award the Contract to any Bidder.
- xx. award any business/Work described in this Procurement to more than one (1) Bidder.
- xxi. not award the Contract if the costs of completing the Work exceed budget funding; or do not respond to all requirements or do not represent fair market value or where necessary internal approvals are not obtained, and
- xxii. if the WRDSB receives a bid from a Supplier with Rates that are abnormally lower than the Rates in other Bids, the WRDSB may verify with the Bidder that the Bidder satisfies the conditions for participation and can fulfill the Agreement.

These reserved rights are in addition to any other expressed rights or any other rights which may be implied in the circumstances. The WRDSB shall not be liable for any expenses, costs or losses suffered by any Bidder or any third party resulting from the WRDSB exercising any of its express or implied rights under this bidding process.

56. Responsibilities of the Supplier

Acceptance of a purchase order issued by the WRDSB and/or a signed agreement shall constitute a contract (the "Contract") between the WRDSB and the Supplier, which shall bind the Supplier on their part to furnish and deliver the goods, equipment and services at the prices given and in accordance with the conditions of the Procurement document.

The Supplier shall:

- i. perform the Contract in accordance with the specifications, terms and conditions under which it is awarded.
- ii. act in a professional manner always when dealing with WRDSB staff, with the public, and while working on site.
- iii. not, except with the consent of the WRDSB in writing, release information relating to any subsequent order for advertising, promotional or technical purposes or otherwise give it publicly in any fashion, nor shall the name of either of the WRDSB

- be used for, or in connection with, any advertising or promotional purpose of the Supplier.
- iv. treat information gained while working with the WRDSB confidentially and not use it for any other project and return it to the WRDSB if requested.
- v. submit to Finance – Accounts Payable, an invoice for payment at the completion of the Work, unless otherwise stated. All applicable taxes, including HST, are to be itemized separately on invoices. Include the purchase order number on each invoice; and
- vi. provide necessary information if they wish to receive payment by Electronic Funds Transfer (EFT).

57. Site and Work Examination

- i. Bidders will accept the site conditions, and the requirements of the Work, as is. No modifications to the Bid will be accepted after the Closing Time.
- ii. No claim for extras will be allowed for Work or difficulties encountered due to conditions of the site which were visible, knowable, or reasonably inferable, prior to the time of submission of Bid. Bidders shall accept sole responsibility for any error or neglect on their part in this regard.
- iii. Before submitting a Bid, each Bidder shall:
 - a. carefully examine this entire Procurement Document to determine the extent of the Work, and various provisions including the maps, drawings, reports and specifications.
 - b. immediately report all discrepancies between the various documents and site conditions.
 - c. provide the names of Subcontractors, subconsultants, and suppliers to whom the Bidder intends to sublet a portion or portions of the Work with complete information as to the requirements of the Work. This is to include maps, drawings, reports, specifications, and all requirements of the Procurement Document including any addenda.
- iv. In the event of discrepancies between the maps, drawings, reports, and the specifications regarding quantity or quantities of materials or items, and in the absence of Addenda in clarification of said discrepancies, the Bidder is to include for the larger quantity or quantities.
- v. No additional payments will be made for any costs incurred through failure of the Bidder to abide by provisions stipulated in all the articles and sub-articles of this item.
- vi. Any soils investigation, environmental, geotechnical, or other reports prepared or obtained with respect to the Place of the Work (collectively the “Reports”) are available from the Consultant. Where the Work involves existing buildings, structures, facilities, plant or equipment, any reports, data, or as-built drawings

concerning such buildings, structures, facilities, plant or equipment (collectively the "Data") are available from the Consultant. The Reports should not be considered a representation of the site conditions of the entire Place of the Work, and the Reports and Data are provided for general information and guidance purposes only. Neither the Owner nor the Consultant guarantees the accuracy or completeness of the Reports or the Data, nor does either assume any responsibility for any interpretations or conclusions that bidders may make or draw from the Reports or the Data.

- vii. Each Bidder is solely responsible, at its own cost and expense, to conduct its own independent research and due diligence, or to perform any other investigations considered necessary by the Bidder to satisfy itself as to all existing conditions. The Bidders' obligations set out in this paragraph apply irrespective of any Reports, Data or any information contained in the Bid Documents.
- viii. No allowances will be made for additional costs, and no claims will be entertained in connection with conditions which could reasonably have been ascertained by investigation or other due diligence undertaken prior to the Submission Deadline, and/or in connection with Work which is required and which is reasonably inferable from the Bid Documents, the Reports and/or Data as being necessary.

58. Site Existing Services, if applicable

The position of utility pole lines, underground conduits, and services, watermains, sewers and other underground and over ground utilities and structures are not necessarily known, and the accuracy of the position of such utilities and structures on any reference documents is not guaranteed. The WRDSB will not be responsible for damages or extra work caused or occasioned by the Supplier relying on this or any other information or records.

Before starting work, the Supplier shall familiarize themselves of the exact location of all such utilities and structures and shall assume all liability for damage to them. Where extra measures are required to support utility poles during construction either by the utility involved or the Supplier themselves, the costs involved shall be borne by the Supplier. The Supplier will be responsible for any fees that may be associated with these services.

59. Site Inspection and Control

A representative of the WRDSB (appointed by the WRDSB) reserves the right to enter the site at any time for the review & inspection. The presence of a said representative does not indicate satisfaction or compliance unless these comments are made by the representative and submitted to the Supplier in written form.

60. Site Investigation

Bidders shall not rely solely upon information furnished by the WRDSB but shall do their own investigation of the locations and quantity of the work to be completed under this contract.

The Bidder assumes all risk of conditions, existing or arising, in the course of the work,

which might or could make the work or any items therefore more expensive in character, or more onerous to fulfill, than was contemplated or known when the Bid was made, or the Contract signed.

61. Site Safety and Clean Up

For safety of students, staff, and community members alike, it is expected that cleanup operations will progress with the job.

Repair work will be conducted by skilled workers acceptable to the WRDSB Representative, under the liability of the Supplier.

The WRDSB Authorized Representative must approve all repairs and replacements prior to final payment.

62. Suspension of Bidders

At the sole discretion of the Manager of Procurement Services, any Bidder may be suspended from consideration for default of delivery, unsatisfactory performance, safety concerns, lobbying or contravention of the Procurement Document.

63. Sustainable Purchasing

The procurement needs of the WRDSB represent a significant level of responsibility to demonstrate leadership and support for greener business practices. Integrating environmental performance and impact into supply chain decisions is a commitment to improvement of the environment and the quality of life.

Green procurement shall be viewed in the context of achieving value for money for the total life-cycle costs. It requires the inclusion of environmental impact considerations into the procurement process, including planning, acquisition, use and disposal. Value for money should include the consideration of environmentally tangible and intangible factors when determining the total life-cycle costs and environmental impact.

64. Termination

If the Supplier fails to comply with any provision of this agreement or otherwise fails to fulfil its obligations hereunder in a competent manner satisfactory to the WRDSB, the WRDSB may give the Supplier notice in writing of such failure. If the Supplier has not remedied its failure within ten (10) working days of the said notice, the WRDSB shall be entitled to exercise any one or more of the following remedies:

- i. The WRDSB may terminate the contract without further notice and exercise its rights to the Contract security provided by the Supplier.
- ii. The WRDSB may withhold any payment due to the Supplier hereunder until the Supplier has remedied its failure.
- iii. The WRDSB may engage the services of another Bidder to remedy the Supplier's failure and obtain reimbursement therefore from the Supplier. The said reimbursement may be obtained either through deduction from any amounts

owing to the Supplier hereunder, or through any other legal means available to the WRDSB; or

- iv. The WRDSB may assert any other remedy available to it in law or equity.

Unless the WRDSB expressly agrees to the contrary, any failure of the WRDSB to exercise any of the foregoing remedies, or the granting of any extension or indulgences, shall not be prejudicial to any right of the WRDSB to subsequently obtain such remedies.

65. Termination for Convenience

The WRDSB may terminate the Contract, in whole or in part, whenever the WRDSB determine that such termination is in the best interests of the WRDSB without showing cause, upon providing written notice to the Supplier. The WRDSB shall pay all reasonable costs incurred by the Supplier/Contract up to the date of termination considering the Work performed and/or services were provided in accordance with the Contract and to the complete satisfaction of the WRDSB. Payment shall be in accordance with prices as per Contract. However, in no event shall the Supplier be paid an amount, which exceeds the Total Bid Price. The Supplier will not be reimbursed for any profits which may have been anticipated but which have not been earned up to the date of termination.

66. Termination for Lack of Funding

Should the WRDSB fail to appropriate funds to enable payments including multi-year agreements, the WRDSB may cancel the contract without termination charges, provided the Supplier receives thirty (30) days written notice of such termination from the WRDSB.

67. Tools and Equipment

All equipment and methods used to fulfill this contract shall be in accordance with best practices, guidelines, regulations, and standards with respect to safety and quality.

No equipment, tools or materials are to be stored or left overnight within WRDSB property.

At the time of bid, if requested, the bidders will indicate the type of equipment that will be used to fulfill the terms and conditions of this contract. Prior to the WRDSB entering into an agreement with the Supplier, or at any time during the contract, the WRDSB may, at its discretion, request an inspection of the equipment proposed for use.

It is the responsibility of the Supplier, in the event of a major mechanical equipment breakdown, to have available substitute equipment of similar capability. It shall be supplied and put into service to fulfill the requirements of this procurement. Failure to provide alternative equipment within expectations specified within this procurement may result in termination of the contract. It is the responsibility of the Supplier to ensure work continues and deadlines are met, despite any unforeseen interruption because of equipment failure.

It is the Supplier's responsibility to ensure that the equipment and the operator, are licensed in accordance with the Ministry of Transportation. The WRDSB may, at their

discretion, require the Supplier to provide proof that the equipment has passed a recent (within the last 12 months) government safety inspection and that the operators are suitably licensed prior to commencement of the contract. All vehicles, tools, equipment, and voltage rated gloves requiring dielectric testing shall have current certification and all applicable documentation.

The equipment must be in good working order, and the Supplier is responsible for all general and preventative maintenance, fuel, and repair and those costs shall be included in the bid. All preventative maintenance and repairs are to be conducted off peak hours. No other charges to the WRDSB shall apply.

68. Traffic/Pedestrian Safety

Vehicles, including Couriers and movable Equipment/Machinery must take all precautions to avoid entering or driving on WRDSB premises during nutritional breaks, before and after school hours, or anytime there are students or staff outside of the building.

69. Traffic Control and Site use

Supplier's activities shall be limited to areas for work and storage as directed by the WRDSB. Except where expressly permitted by the WRDSB, materials and/or equipment must not be stored within four metres of the travelled portion of any roadway. Notwithstanding the foregoing, the Supplier shall, at their own expense, remove any equipment or material, which, in the WRDSB's opinion, constitutes a traffic hazard.

The Supplier shall plan and schedule the routes of vehicles transporting all materials to, from or within the job, so that vehicular movements are accomplished with minimum interference and interruption to traffic. This will necessitate vehicles to "slip off" or "slip on" in the direction of traffic lanes.

The Supplier shall maintain the adjacent side streets in a condition free from debris resulting from their operations, such as materials spilling from trucks. It is expected that the Supplier shall regularly inspect the surface condition of these streets and promptly dispose of all the debris.

Should the Supplier be unable to conduct the required remedial measures, the WRDSB may conduct the necessary maintenance and the costs for the work shall be deducted from payments due to the Supplier.

The Supplier shall, at his own expense and to the satisfaction of the WRDSB, provide all vehicular traffic control equipment, signs, material, and labor required to perform the work in a safe manner in accordance with the "Occupational Health and Safety Act" and the "Ontario Traffic Manual" (Book 7). The Supplier shall assure that all required forms are completed and on-site for inspection. In the event a traffic control company is contracted for the purpose of signage, information regarding the Supplier must be included in the quotation and included with the bid price.

The Supplier shall be responsible for the supply of traffic flag person(s) where required under the "Ontario Traffic Manual" (Book 7), with all costs included in the base unit price.

70. Usage Reports

The WRDSB, at no additional cost, may request detailed usage reports or activity log reports in Excel (unprotected) to be provided annually or upon request. Reports may include but are not limited to descriptions, codes, quantities, extended quantity, price.

71. Variation of Bid Prices

No variation in the Total Price, unit prices and/or optional pricing will be permitted after Closing Time, except in the instance of variation solely due to an increase or decrease in the rate of eligible taxes, beyond the control of the Bidder, occurring after the time of submission of their Bid. An increase or a decrease in the rate of eligible taxes, under these circumstances, shall alter the price of the Bid, but only to the extent of the tax increase or decrease.

72. Volume and Exclusivity

Quantities and/or WRDSB sites may be added, deleted, or adjusted at the discretion of the WRDSB due to but not limited to unintentional omissions, inventory adjustments, new schools/school closures, and/or budget restraints.

The WRDSB makes no guarantee of value or volume of work to be assigned to the Supplier. Any agreement executed with the Supplier may not be an exclusive contract for the provision of the described goods/services. The WRDSB reserves the right to contract with other Supplier for good(s) and/or service(s) of the same as or like the deliverables or may obtain such good(s) and service(s) internally.

73. Waiver

No term or provision of the Procurement Document shall be deemed waived, and no breach consented to, unless such waiver or consent is in writing and signed by an authorized representative of the party claimed to have waived or consented to the breach. No consent by a party to, or waiver of, a breach under the procurement process shall constitute consent to, waiver of, or excuse for any other, different, or subsequent breach.

The WRDSB does not accept responsibility for any information or any errors or omissions which may be contained in the Procurement Document, or the data, materials or documents disclosed or as provided to the Bidders pursuant to the procurement. The WRDSB make no representation or warranty, either expressed or implied, in fact or in law with respect to the accuracy or completeness of the Procurement Document or such data, materials or documents and the WRDSB shall not be responsible for any actions, costs, losses or liability whatsoever arising from any Bidder's reliance or use of the Procurement Document or any other technical or historical data, materials or documents provided by the WRDSB. The Bidder is responsible for obtaining its own independent financial, legal, accounting, and technical advice with respect to any information included in the Procurement Document or in any data, materials, or documents provided or required by the WRDSB.

74. Warranty and Maintenance

The Supplier, at the time of substantial completion, shall furnish a written warranty covering material, maintenance, and work performed under the contract for a minimum period of two (2) years from the date of completion, unless otherwise stated. Individual sections may extend warranties beyond the two (2) year time frame. The Supplier is responsible for all required maintenance complete with materials and labour during the warranty period.

75. Work Continuity

The Supplier shall take adequate care to protect the Work, the WRDSB's property, adjacent properties and shall be fully responsible for any damage or injury due to their act or neglect or is attributable to the acts or omissions of the Supplier, its Subcontractors, sub-suppliers, agents, employees, officers, directors, and all other persons and other entities for whose acts the Supplier may be liable or for whom it is responsible in law and their respective officers, directors, agents and employees.

The Supplier shall ensure minimal to no disturbance to the user(s) of the surrounding facilities. Replacement and repairs due to any damage caused to any existing structure, WRDSB equipment, public assets or private property during the Work shall be the responsibility of the Supplier.

76. Work Requirements

The Supplier shall perform entire work with minimal to no disturbance to the routine operations of the respective facility. Further, the Supplier shall ensure safety of WRDSB assets, students, staff as well as public always.

77. Workplace Safety Insurance Board (WSIB) Certificate

The WRDSB requires all Suppliers and service providers be in full compliance with all requirements imposed upon them by the Workplace Safety Insurance Board. All certificates of training and Safety Policies and Manuals must be available for presentation upon request.

Prior to a formal award and commencing the services covered by this Procurement, the recommended Bidder(s) make available to the WRDSB a copy of certificates of good standing with the Workplace Safety and Insurance Board ("WSIB Certificates") listing appropriate NAICS Code and Code Description stating that the Supplier/consultant and all of its subcontractors/consultants have complied with the requirements of the Workplace Safety and Insurance Act and in particular, that all requisite premiums under such Act have been paid. Where the Bidder is exempt from registration with the WSIB, the Bidder must provide evidence of such by way of written confirmation from WSIB.

WSIB Certificate evidencing renewal or replacement of Certificates listing appropriate NAICS Code and Code Description shall be uploaded through the Bidding System within 72 hours of the expiration or replacement of the current certificate, without demand by the WRDSB.

END OF SECTION

00 73 00 “The Supplementary Conditions”

**SUPPLEMENTARY CONDITIONS & AMENDMENTS TO STANDARD CONSTRUCTION
DOCUMENT CCDC2 -2020 STIPULATED PRICE SUBCONTRACT**

(the “Supplementary Conditions”)

**AGREEMENT, DEFINITIONS, AND
GENERAL CONDITIONS**

The Standard Construction Document CCDC 2 2020 for a Stipulated Price Contract, English version, consisting of the Agreement Between *Owner* and Contractor, Definitions and General Conditions of the Stipulated Price Contract, Parts 1 to 13 inclusive, governing same, together with the changes with the new *Construction Act* is hereby made part of these *Contract Documents*, with the following amendments, additions and modifications:

AGREEMENT BETWEEN OWNER AND CONTRACTOR

ARTICLE A-1 – THE WORK

SC17.1	A-1.3	<u>Amend</u> Article A-1.3 by <u>deleting</u> all of the words after “<i>Contract Documents</i>” and <u>replace</u> them with the following” “attain .1 <i>Substantial Performance of the Work</i> by the 21 day of August in the year 2026. .2 (if applicable) <i>Occupancy</i> by the 28 day of August in the year 2026, and .3 <i>Ready-for-Takeover</i> by the 28 day of August in the year 2026.”
SC1.1		

ARTICLE A-3 – CONTRACT DOCUMENTS

SC2.1	A-3.1	<u>Add</u> the following documents to the list of <i>Contract Documents</i> in Article A-3.1: • Waterloo Region District School Board’s Supplementary Conditions & Amendments to Standard Construction Document CCDC 2-2020 Stipulated Price Subcontract, May 2022 Version, including any Special Supplementary Conditions listed in Appendix 2 thereto • <i>Drawings</i> • <i>Specifications</i> • Performance Bond (Form 32 -Performance Bond under Section 85.1 of the Act) if applicable • Labour and Material Payment Bond (Form 31 – Labour and Material Payment Bond under Section 85.1 of the Act), if applicable

ARTICLE A-4 – CONTRACT PRICE

SC3.1	A-4.4	<u>Delete</u> Article A-4.4 and <u>replace</u> it with the following: “4.4 The <i>Contract Price</i> shall remain fixed for the duration of the <i>Contract Time</i>, subject only to adjustments as provided for in the <i>Contract Documents</i>. For certainty, and without limiting the general application of the preceding sentence, the <i>Contractor</i> assumes all risks in connection with cost increases for overhead, <i>Products</i>, <i>Labour</i>, and <i>Construction Equipment</i> prescribed by the <i>Contract Documents</i> for the performance of the <i>Work</i>, and the <i>Contractor</i> assumes all responsibility for liabilities and additional costs that may arise as a result of the <i>Contractor’s</i> inclusion of any <i>Product</i>, <i>Construction Equipment</i>, <i>Supplier</i>, or <i>Subcontractor</i> in its calculation of the <i>Contract Price</i>.”

ARTICLE A-5 – PAYMENT

SC4.1	A-5.1	<u>Delete</u> Article A- 5.1 in its entirety including all subparagraphs and <u>replace</u> it with the following: “5.1 Subject to the provisions of the <i>Contract Documents</i> and the <i>Construction Act</i>, the <i>Owner</i> shall:

		.1 make progress payments to the <i>Contractor</i> on account of the <i>Contract Price</i> when due together with such <i>Value Added Taxes</i> as may be applicable to such payments, .2 upon <i>Substantial Performance of the Work</i> as certified by the <i>Consultant</i>, and on the 61st day after the publication of the certificate of <i>Substantial Performance of the Work</i>, in accordance with the <i>Construction Act</i>, there being no claims for lien registered against the title to the <i>Place of the Work</i> and no written notices of lien delivered to the <i>Owner</i>, pay the <i>Contractor</i> the unpaid balance of the 10% holdback, together with such <i>Value Added Taxes</i> as may be applicable to such payment, less any amount stated in the <i>Owner's Notice of Non-Payment</i>. .3 after <i>Ready-for-Takeover</i> has been achieved in accordance with the <i>Contract Documents</i> and the <i>Work</i> is complete, there being no claims for lien registered against the title to the <i>Place of the Work</i> and no written notices of lien delivered to the <i>Owner</i>, pay the <i>Contractor</i> any unpaid balance of the <i>Contract Price</i> in accordance with GC 5.5 – FINAL PAYMENT, excluding <i>Deficiency Holdback</i>, together with such <i>Value Added Taxes</i> as may be applicable to such payment."
SC 4.2	A-5.2.1	Delete subparagraph 5.2.1 in its entirety and <u>replace</u> it with the following: "1 Should either party fail to make payments as they become due under the terms of the <i>Contract</i> or in an award by arbitration or court, interest shall also become due and payable on such unpaid amounts at the prejudgment interest rate prescribed by the <i>Courts of Justice Act</i> (Ontario), as it may change from time to time."

***NEW* ARTICLE A-9 – CONFLICT OF INTEREST**

SC3.1	A-9	<u>Add</u> new ARTICLE A-9 CONFLICT OF INTEREST as follows: "ARTICLE A-9 CONFLICT OF INTEREST 9.1 The <i>Contractor</i>, <i>Subcontractors</i> and <i>Suppliers</i> and any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall not engage in any activity or provide any services where such activity or the provision of such services creates a conflict of interest (actually or potentially, in the sole opinion of the <i>Owner</i>) with the provision of the <i>Work</i> pursuant to the <i>Contract</i>. The <i>Contractor</i> acknowledges and agrees that a conflict of interest, as described in this Article A-9, includes, but is not limited to, the use of <i>Confidential Information</i> where the <i>Owner</i> has not specifically authorized such use. 9.2 The <i>Contractor</i> shall disclose to the <i>Owner</i>, in writing, without delay, any actual or potential situation that may be reasonably interpreted as either a conflict of interest or a potential conflict of interest, including the retention of any <i>Subcontractor</i> or <i>Supplier</i> that is directly or indirectly affiliated with or related to the <i>Contractor</i>. 9.3 The <i>Contractor</i> covenants and agrees that it will not hire or retain the services of any employee or previous employee of the <i>Owner</i> where to do so constitutes a breach by such employee or previous employee of the <i>Owner's</i> conflict of interest policy, as it may be amended from time to time, until after completion of the <i>Work</i> under the <i>Contract</i>. 9.4 It is of the essence of the <i>Contract</i> that the <i>Owner</i> shall not have direct or indirect liability to any <i>Subcontractor</i> or <i>Supplier</i>, and that the <i>Owner</i> relies on the maintenance of an arm's-length relationship between the <i>Contractor</i> and its <i>Subcontractors</i> and <i>Suppliers</i>. Consistent with this fundamental term of the <i>Contract</i>, the <i>Contractor</i> will not enter into any agreement or understanding with any <i>Subcontractor</i> or <i>Supplier</i>, whether as part of any contract or any written or oral collateral agreement, pursuant to which the parties thereto agree to

		cooperate in the presentation of a claim for payment against the <i>Owner</i>, directly or through the <i>Contractor</i>, where such claim is, in whole or in part, in respect of a disputed claim by the <i>Subcontractor or Supplier</i> against the <i>Contractor</i>, where the payment to the <i>Subcontractor or Supplier</i> by the <i>Contractor</i> is agreed to be conditional or contingent on the ability to recover those amounts or a portion thereof from the <i>Owner</i>, failing which the <i>Contractor</i> shall be saved harmless from all or a portion of those claims. The <i>Contractor</i> acknowledges that any such agreement would undermine the required arm's-length relationship and constitute a conflict of interest. For greater certainty, the <i>Contractor</i> shall only be entitled to advance claims against the <i>Owner</i> for amounts pertaining to <i>Subcontractor or Supplier</i> claims where the <i>Contractor</i> has actually paid or unconditionally acknowledged liability for those claims or where those claims are the subject of litigation or binding arbitration between the <i>Subcontractor or Supplier</i> and the <i>Contractor</i> has been found liable for those claims.
	9.5	Notwithstanding paragraph 7.1.2 of GC 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, OR TERMINATE THE CONTRACT, a breach of this Article A-9 by the <i>Contractor</i>, any of the <i>Subcontractors</i>, or any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall entitle the <i>Owner</i> to terminate the <i>Contract</i>, in addition to any other rights and remedies that the <i>Owner</i> has in the <i>Contract</i>, in law, or in equity."

***NEW* ARTICLE A-10 TIME OF THE ESSENCE**

SC6.1	Article A-10	<u>Add</u> the following new Article A-10 as follows: "ARTICLE A-10 TIME OF THE ESSENCE 10.1 It is agreed that one of the reasons the <i>Contractor</i> was selected by the <i>Owner</i> for this <i>Contract</i> is the <i>Contractor's</i> representation and covenant that it will attain <i>Substantial Performance, Occupancy</i> (if applicable), and <i>Ready-for-Takeover</i> within the <i>Contract Time</i> stated in Article A-1 of this <i>Contract</i>. 10.2 The <i>Contractor</i> acknowledges and agrees that it is responsible to marshal its resources and those of its <i>Subcontractors and Suppliers</i> in a manner which will permit timely attainment of <i>Substantial Performance, Occupancy</i> (if applicable), and <i>Ready-for-Takeover</i>. The <i>Contractor</i> agrees that time is of the essence of this <i>Contract</i>."
SC6.2		

DEFINITIONS

Revisions to Existing Definitions		
SC5.1	Consultant	<u>Amend</u> the definition of "Consultant" by <u>adding</u> the following to the end of the definition: "For the purposes of the <i>Contract</i>, the terms "<i>Consultant</i>", "<i>Architect</i>" and "<i>Engineer</i>" shall be considered synonymous."
SC5.2	Payment Legislation/Construction Act	<u>Delete</u> the Definition of <i>Payment Legislation</i> and replace it with "Construction Act" as follows: "Construction Act <i>Construction Act</i> means the <i>Construction Act</i>, R.S.O. 1990, c. C.30, as amended, including all regulations passed under it that are enforceable as of the date of execution of this <i>Contract</i>. For certainty, the first procurement process for the <i>Project</i> (i.e., the "improvement" as that term is defined in the <i>Construction Act</i>) commenced on or after October 1, 2019."
SC5.3	Ready-for-Takeover	<u>Amend</u> the Definition of <i>Ready-for-Takeover</i> by deleting all the words after "as verified" and replacing them with "and approved by the <i>Owner</i>."
New Definitions		
	Adjudication	<u>Add</u> the following definition: "Adjudication <i>Adjudication</i> means construction dispute interim adjudication as defined under the <i>Construction Act</i>."
	Close-Out Documentation	<u>Add</u> the following new definition: "Close-Out Documentation <i>Close-Out Documentation</i> has the meaning given to it under GC 5.4.2."
	Confidential Information	<u>Add</u> the following definition: "Confidential Information <i>Confidential Information</i> means all the information or material of the <i>Owner</i> that is of a proprietary or confidential nature, whether it is identified as proprietary or confidential or not, including but not limited to information and material of every kind and description (such as drawings and move-lists) which is communicated to or comes into the possession or control of the <i>Contractor</i> at any time, but <i>Confidential Information</i> shall not include information that: .1 is or becomes generally available to the public without fault or breach on the part of the <i>Contractor</i>, including without limitation breach of any duty of confidentiality owed by the <i>Contractor</i> to the <i>Owner</i> or to any third party, but only after that information becomes generally available to the public; .2 the <i>Contractor</i> can demonstrate to have been rightfully obtained by the <i>Contractor</i> from a third party who had the right to transfer or disclose it to the <i>Contractor</i> free of any obligation of confidence;

		.3 the <i>Contractor</i> can demonstrate to have been rightfully known to or in the possession of the <i>Contractor</i> at the time of disclosure, free of any obligation of confidence; or .4 is independently developed by the <i>Contractor</i> without use of any <i>Confidential Information</i>."
	Construction Schedule	<u>Add</u> the following definition: "Construction Schedule <i>Construction Schedule</i> means the schedule for the performance of the <i>Work</i> provided by the <i>Contractor</i>, and approved by the <i>Owner</i>, pursuant to GC 3.4.1, including any amendments to the <i>Construction Schedule</i> made pursuant to the <i>Contract Documents</i>."
	Construction Schedule Update	<u>Add</u> the following definition: "Construction Schedule Update <i>Construction Schedule Update</i> means an update to the <i>Construction Schedule</i> by the <i>Contractor</i> using Microsoft Project (or other approved scheduling software) that accurately depicts the progress of the <i>Work</i> relative to the critical path established in the <i>Construction Schedule</i> approved in GC 3.5.1 (or any approved successor <i>Construction Schedule</i>), aligns with the currently approved date for <i>Substantial Performance of the Work</i>, shows up-to-date projected major activity sequences and durations, and shows any changes or delays in anticipated completion dates of major activities in the <i>Work</i> relative to the last <i>Construction Schedule Update</i>, and includes the following minimum deliverables: (a) a record version of the updated <i>Construction Schedule</i> in .pdf format; (b) an editable copy of the updated original digital file of the <i>Construction Schedule</i> (e.g., .mpp format files for Microsoft Project)."
	Deficiency Holdback	<u>Add</u> the following definition: Deficiency Holdback - a value applied to the total contract value to cover the cost of completing deficiencies in, or correcting defects in The Work.
	Direct Costs	<u>Add</u> the following definition: "Direct Costs <i>Direct Costs</i> are the reasonable costs of performing the contract or subcontract including costs related to the additional supply of services or materials (including equipment rentals), insurance and surety bond premiums, and costs resulting from seasonal conditions, that would not have been incurred, but do not include indirect damages suffered, such as loss of profit, productivity or opportunity, or any head office overhead costs."
	EFT	<u>Add</u> the following definition: "EFT <i>EFT</i> has the definition given to it under GC 5.3.2."

	Excess Soil	<u>Add</u> the following definition: "Excess Soil <i>Excess Soil</i> means "excess soil" as that term is defined under section 3 of the <i>Excess Soil Regulation</i>."
	Excess Soil Regulation	<u>Add</u> the following Definition: "Excess Soil Regulation <i>Excess Soil Regulation</i> means O. Reg. 406/19: On-Site and Excess Soil Management to the <i>Environmental Protection Act</i>, R.S.O. 1990, c. E.19."
	Final Pre-Invoice Submission Meeting	<u>Add</u> the following ne definition: "Final Pre-Invoice Submission Meeting <i>Final Pre-Invoice Submission Meeting</i> has the meaning given to it in GC 5.5.1."
	Force Majeure	<u>Add</u> the following definition: "Force Majeure <i>Force Majeure</i> means any cause, unknown at the effective date of the <i>Contract</i> and beyond either party's control, other than financial difficulties, bankruptcy or insolvency, which prevents the performance by a party, or both, of any of their respective obligations under the <i>Contract</i> and the event of <i>Force Majeure</i> did not arise from a party's default and could not be avoided or mitigated by the exercise of reasonable effort or foresight. <i>Force Majeure</i> includes <i>Labour Disputes</i>; fire; unusual delay by common carriers or unavoidable casualties; delays in obtaining third-party licences, permits, agreements, or approvals (excluding approvals of any <i>Subcontractors</i> or <i>Suppliers</i> of any tier); civil disturbance; emergency acts, orders, legislation, regulations or directives or revoking of funding from any government or other public authority; acts of a public enemy; war; riot; sabotage; blockage; embargo; lightning; earthquake; adverse weather conditions but only if substantially beyond the weather norms of the <i>Place of the Work</i>; acts of God; or declared epidemic or pandemic outbreak or other public health emergency (e.g. SARS, COVID-19)."
	Install	<u>Add</u> the following definition: "Install <i>Install</i> means install and connect. <i>Install</i> has this meaning whether or not the first letter is capitalized."
	Labour Dispute	<u>Add</u> the following definition: "Labour Dispute <i>Labour Dispute</i> means any lawful or unlawful labour problems, work stoppage, labour disruption, strike, job action, slow down, lock-outs, picketing, refusal to work or continue to work, refusal to supply materials, cessation or work or other labour controversy which does, or might, affect the <i>Work</i>."
	Notice of Non-Payment	<u>Add</u> the following definition:

		“Notice of Non-Payment <i>Notice of Non-Payment</i> means a notice of non-payment of holdback (Form 6) or a notice of non-payment (Form 1.1) under the <i>Act</i>, as applicable to the circumstances.”
	OHSA	<u>Add</u> the following definition: “OHSA <i>OHSA</i> means the <i>Occupational Health and Safety Act</i>, R.S.O. 1990, c. O.1, as amended, including all regulations thereto.”
	Overhead	<u>Add</u> the following definition: “Overhead <i>Overhead</i> means all site and head office operations and facilities, all site and head office administration and supervision; all duties and taxes for permits and licenses required by the authorities having jurisdiction at the <i>Place of the Work</i>; all requirements of Division 1, including but not limited to submittals, warranty, quality control, calculations, testing and inspections; meals and accommodations; and, tools, expendables and clean-up costs.”
	Payment Period	<u>Add</u> the following definition: “Payment Period <i>Payment Period</i> has the definition given to it under GC 5.2.1.”
	Pre-Invoice Submission Meeting	<u>Add</u> the following definition: “Pre-Invoice Submission Meeting <i>Pre-Invoice Submission Meeting</i> has the definition given to it under GC 5.2.1.”
	Proper Invoice	<u>Add</u> the following definition: “Proper Invoice <i>Proper Invoice</i> means a “proper invoice” as that term is defined in Section 6.1 of the <i>Act</i>, including the minimum requirements set out in Appendix “1” of the Supplementary Conditions.”
	Proper Invoice Submission Date	<u>Add</u> the following definition: “Proper Invoice Submission Date <i>Proper Invoice Submission Date</i> has the definition given to it under GC 5.2.2.1.”
	Request for Information (RFI)	<u>Add</u> the following definition: “Request for Information (RFI) <i>Request for Information</i> or <i>RFI</i> means written documentation sent by the <i>Contractor</i> to the <i>Owner</i> or to the <i>Owner’s</i> representative or the <i>Consultant</i> requesting written clarification(s) and/or interpretation(s) of the <i>Drawings</i> and/or <i>Specifications</i>, <i>Contract</i> requirements and/or other pertinent information required to complete the <i>Work</i> of the <i>Contract</i> without applying for a change or changes to the <i>Work</i>.”

	Restricted Period	<u>Add</u> the following definition: “Restricted Period <i>Restricted Period</i> means the (inclusive) period of time between December 1 to January 8 and August 15 to September 15 of any given year throughout the duration of the <i>Contract</i>.”

GENERAL CONDITIONS OF THE STIPULATED PRICE CONTRACT

Where a General Condition or paragraph of the General Conditions of the *Contract* is deleted by these amendments, the numbering of the remaining General Conditions or paragraphs shall remain unchanged, unless stated otherwise herein, and the numbering of the deleted item will be retained, unused.

PART 1 GENERAL PROVISIONS

GC 1.1 CONTRACT DOCUMENTS

SC5.1	1.1.3	<u>Delete</u> GC 1.1.3 in its entirety and <u>replace</u> it with the following: “1.1.3 The <i>Contractor</i> shall review the <i>Contract Documents</i> and shall report promptly to the <i>Consultant</i> any error, inconsistency, or omission the <i>Contractor</i> may discover. Such review by the <i>Contractor</i> shall be undertaken with the standard of care described in GC 3.13.1. Except for its obligation to make such a review and report the result, the <i>Contractor</i> does not assume any responsibility to the <i>Owner</i> or to the <i>Consultant</i> for the accuracy of the <i>Contract Documents</i>. Provided it has exercised the degree of care and skill described in this GC 1.1.3, the <i>Contractor</i> shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the <i>Contract Documents</i>, which the <i>Contractor</i> could not reasonably have discovered through the exercise of the required standard of care.”
SC5.2	1.1.4	<u>Delete</u> GC 1.1.4 in its entirety and <u>replace</u> it with the following: “1.1.4 Except for the obligation to complete the review prescribed in GC 1.1.3, and report the results as set out in this GC 1.1.4, the <i>Contractor</i> is not responsible for errors, omissions or inconsistencies in the <i>Contract Documents</i>. If there are errors, omissions or inconsistencies discovered by or made known to the <i>Contractor</i> as part of its review under GC 1.1.3 or at any time during the performance of the <i>Work</i>, the <i>Contractor</i> shall immediately notify the <i>Consultant</i>, and request instructions, a <i>Supplemental Instruction</i>, <i>Change Order</i>, or <i>Change Directive</i>, as the case may require, and shall not proceed with the <i>Work</i> affected until the <i>Contractor</i> has received corrected or additional information from the <i>Consultant</i>. The <i>Contractor</i> shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the <i>Contract Documents</i>, which the <i>Contractor</i> could not reasonably have discovered through the exercise of care and skill described in GC 3.13.”
	1.1.5.1	<u>Delete</u> GC 1.1.5.1 and <u>replace</u> with the following: “.1 the order of priority of documents, from highest to lowest, shall be: .1 Supplementary Conditions; .2 the Agreement between the Owner and the Contractor; .3 the Definitions; .4 the General Conditions; .5 Division 01 of the <i>Specifications</i>

		.6 technical <i>Specifications</i>; .7 material and finishing schedules; and .8 the <i>Drawings</i>.
	1.1.5.5	<u>Delete</u> GC 1.1.5.5 and <u>replace</u> with the following: “.5 Noted materials and annotations on the <i>Drawings</i> shall govern over the graphic representation of the <i>Drawings</i>.”
	1.1.5.6 to 1.1.5.8	<u>Add</u> the following new GC 1.1.5.6 to 1.1.5.8 as follows: “.6 Finishes in the room finish schedules shall govern over those shown on the <i>Drawings</i>. .7 Architectural drawings shall have precedence over structural, plumbing, mechanical, electrical and landscape drawings insofar as outlining, determining and interpreting conflicts over the required design intent of all architectural layouts and architectural elements of construction, it being understood that the integrity and installation of the systems designed by the <i>Consultant</i> or its sub-<i>Consultants</i> are to remain with each of the applicable drawing disciplines. .8 Should reference standards contained in the <i>Specifications</i> conflict with the <i>Specifications</i>, the <i>Specifications</i> shall govern. Should reference standards and <i>Specifications</i> conflict with each other or if certain requirements of the <i>Specifications</i> conflict with other requirements of the <i>Specifications</i>, the more stringent requirements shall govern.”
	1.1.9	<u>Add</u> the following to the end of GC 1.1.9: “The <i>Specifications</i> are divided into divisions and sections for convenience but shall be read as a whole and neither such division nor anything else contained in the <i>Contract Documents</i> will be construed to place responsibility on the <i>Owner</i> or the <i>Consultant</i> to settle disputes among the <i>Subcontractors</i> and <i>Suppliers</i> with respect to such divisions. The <i>Drawings</i> are, in part, diagrammatic and are intended to convey the scope of the <i>Work</i> and indicate general and appropriate locations, arrangements and sizes of fixtures, equipment, outlets and other elements. The <i>Contractor</i> shall obtain more accurate information about the locations, arrangements and sizes from study and coordination of the <i>Drawings</i>, including <i>Shop Drawings</i> and shall become familiar with conditions and spaces affecting those matters before proceeding with the <i>Work</i>. Where site conditions require reasonable minor changes where the change requires only the additional labour two hours or less, the <i>Contractor</i> shall make such changes at no additional cost to the <i>Owner</i>. Similarly, where known conditions or existing conditions interfere with new installation and require relocation, the <i>Contractor</i> shall include such relocation in the <i>Work</i>. The <i>Contractor</i> shall arrange and install fixtures and equipment in such a way as to conserve as much headroom and space as possible. The schedules are those portions of the <i>Contract Documents</i>, wherever located and whenever issued, which compile information of similar content and may consist of drawings, tables and/or lists.”
	1.1.13	<u>Add</u> new paragraphs 1.1.13 as follows: 1.1.13 The <i>Contractor</i> shall keep one copy of the current <i>Contract Documents</i>, <i>Supplemental Instructions</i>, contemplated <i>Change Orders</i>, <i>Change Orders</i>, <i>Change Directives</i>, cash allowance disbursement authorizations, reviewed <i>Shop Drawings</i>, submittals, reports and records of meeting at the <i>Place of the Work</i>, in good order and available to the <i>Owner</i> and <i>Consultant</i>.”

GC 1.3 RIGHTS AND REMEDIES

SC6.1	1.3.2	In paragraph 1.3.2 <u>delete</u> the word "No" from the beginning of the paragraph and <u>replace</u> it with the words: "Except with respect to the requirements set out in paragraphs 6.4.1, 6.5.4, 6.6.1 and 8.3.2, no..."

NEW GC 1.5 EXAMINATION OF DOCUMENTS AND SITE

SC8.1	1.5	<u>Add</u> new GC 1.5 – EXAMINATION OF DOCUMENTS AND SITE as follows: "GC 1.5 EXAMINATION OF DOCUMENTS AND SITE 1.5.1 The <i>Contractor</i> declares and represents that in tendering for the <i>Work</i>, and in entering into a Contract with the <i>Owner</i> for the performance of the <i>Work</i>, it has investigated for itself the character of the <i>Work</i> to be done, based on information generally available from a visit to the <i>Place of the Work</i> and to the standard set out under GC 3.14.1 and further represents and warrants and acknowledges that it considered and took into account in the <i>Contract Price</i> all reasonably known impacts and restrictions arising from the COVID-19 pandemic, including without limitation corresponding legislative changes that may impact performance of the <i>Project</i>, various weather conditions that may affect the <i>Work</i>, the availability of supplies and labour or other conditions or risks that the <i>Contractor</i> knew about or reasonably ought to have known about prior to the date of the <i>Contract</i>. The <i>Contractor</i> has assumed and does hereby assume all risk of known conditions now existing or arising in the course of the <i>Work</i> which might or could make the <i>Work</i>, or any items thereof more expensive in character, more onerous to fulfill than was contemplated or known when the tender was made or the <i>Contract</i> signed. 1.5.2 The <i>Contractor</i> also declares that prior to commencement of the <i>Work</i>, where in tendering for the <i>Work</i> and in entering into this <i>Contract</i>, the <i>Contractor</i> relied upon information furnished by the <i>Owner</i> or any of its agents or servants respecting the nature or confirmation of the ground at the site of the <i>Work</i>, the <i>Contractor</i> shall review to the standard specified in GC 3.14.1, the accuracy of the information furnished by the <i>Owner</i>. If a condition is materially different than what is stated in the information furnished by the <i>Owner</i>, the <i>Contractor</i> shall, no later than five (5) <i>Working Days</i> after the first observation of such condition(s), deliver to the <i>Owner</i> and to the <i>Consultant</i> a <i>Notice in Writing</i> specifying the materially different condition and the <i>Contractor</i> shall not proceed with the affected part of the <i>Work</i> until receiving written direction from the <i>Owner</i> or the <i>Consultant</i>. Where the <i>Contractor</i> fails to provide prompt <i>Notice in Writing</i> in accordance with this GC 1.5.2, the <i>Contractor</i> expressly waives and releases the <i>Owner</i> from all claims with respect to the said information with respect to the <i>Work</i>.

PART 2 ADMINISTRATION OF THE CONTRACT

GC 2.2 ROLE OF THE CONSULTANT

SC11.1	2.2.5	<u>Delete</u> paragraph 2.2.4 and <u>replace</u> it with the following: "2.2.4 Upon receipt of an application for payment that satisfies the requirement of a <i>Proper Invoice</i>, based on the <i>Consultant's</i> observations and evaluation of the <i>Contractor's</i> application for payment, the <i>Consultant</i> will determine the amounts owing to the <i>Contractor</i> under the <i>Contract</i> and will issue certificates for payment as provided in Article A-5 - PAYMENT, GC 5.3 - PAYMENT, GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK, and GC 5.5 - FINAL PAYMENT. If the <i>Consultant</i> determines that the amount payable to the <i>Contractor</i> differs from the amount stated in a <i>Proper</i>

		<i>Invoice, the Consultant shall notify the Owner as provided in GC 5.3.1.2 and prepare a draft of the applicable Notice of Non-Payment for the amount in dispute."</i>
	2.2.6	In the first sentence of paragraph 2.2.6, <u>delete</u> the words "Except with respect to GC 5.1 – FINANCING INFORMATION REQUIRED OF THE OWNER".
	2.2.12	At paragraph 2.2.12, <u>insert</u> the following at end of that paragraph: "If, in the opinion of the Contractor, the Supplemental Instruction involves an adjustment in the Contract Price or in the Contract Time, it shall, within ten (10) Working Days of receipt of a Supplemental Instruction, provide the Consultant with a notice in writing to that effect. Failure to provide written notification within the time stipulated in this paragraph 2.2.12 shall be deemed an acceptance of the Supplemental Instruction by the Contractor, without any adjustment in the Contract Price or Contract Time."

GC 2.3 REVIEW AND INSPECTION OF THE WORK

SC10.1	2.3.2	<u>Amend</u> paragraph 2.3.2 by <u>adding</u> the words "and Owner" after the words "Consultant" in the second and third lines.
	2.3.3	<u>Delete</u> paragraph 2.3.3 in its entirety and <u>replace</u> it with the following: "2.3.3 The Contractor shall furnish promptly two copies to the Consultant and one copy to the Owner of all certificates and inspection reports relating to the Work."
	2.3.4	In paragraph 2.3.4 <u>add</u> the word "review" after the word "inspections" in the first and second lines of paragraph 2.3.4.
	2.3.5	In paragraph 2.3.5 in the first line after the word "Consultant", <u>add</u> "or the Owner".
	2.3.8	<u>Add</u> a new paragraph 2.3.8 as follows: "2.3.8 The Consultant will conduct periodic reviews of the Work in progress, to determine general conformance with the requirements of the Contract Documents. Such reviews, or lack thereof, shall not give rise to any claims by the Contractor in connection with construction means, methods, techniques, sequences and procedures, nor in connection with construction safety at the Place of Work, responsibility for which belongs exclusively to the Contractor."

GC 2.4 DEFECTIVE WORK

SC11.1	2.4.1	<u>Amend</u> GC 2.4.1 by inserting ", the Owner and/or its agent" in the first sentence following "rejected by the Consultant".
	2.4.1.1 to 2.4.1.2	<u>Add</u> new paragraphs 2.4.1.1 and 2.4.1.2 as follows: "2.4.1.1 The Contractor shall rectify, in a manner acceptable to the Consultant and to the Owner through the Consultant all defective work and deficiencies throughout the Work, whether or not they are specifically identified by the Consultant. 2.4.1.2 The Contractor shall prioritize the correction of any defective work, which, in the sole discretion of the Owner through the Consultant, adversely affects the day to day operations of the Owner or which, in the sole discretion of the Consultant, adversely affects the progress of the Work."

	2.4.2	<u>Delete</u> paragraph 2.4.2 in its entirety and <u>replace</u> it with the following: "2.4.2 The <i>Contractor</i> shall promptly pay the <i>Owner</i> for costs incurred by the <i>Owner</i> , the <i>Owner's</i> own forces or the <i>Owner's</i> other contractors, for work destroyed or damaged or any alterations necessitated by the <i>Contractor's</i> removal, replacement or re-execution of defective work."
	2.4.4	<u>Add</u> new paragraph 2.4.4 as follows: "2.4.4 Neither acceptance of the <i>Work</i> by the <i>Consultant</i> or the <i>Owner</i> , nor any failure by the <i>Consultant</i> or the <i>Owner</i> to identify, observe or warn of defective <i>Work</i> or any deficiency in the <i>Work</i> shall relieve the <i>Contractor</i> from the sole responsibility for rectifying such defect or deficiency at the <i>Contractor's</i> sole cost, even where such failure to identify, observe or warn is negligent."

PART 3 EXECUTION OF THE WORK

GC 3.1 CONTROL OF THE WORK

SC12.1	3.1.2	Amend paragraph 3.1.2 by <u>inserting</u> the words "Construction Schedule" after the word "sequences".
SC12.2	3.1.3 & 3.1.4	<u>Add</u> new paragraphs 3.1.3 and 3.1.4 as follows: "3.1.3 Prior to commencing individual procurement, fabrication and construction activities, the <i>Contractor</i> shall verify at the <i>Place of the Work</i> , all relevant measurements and levels necessary for proper and complete fabrication, assembly and installation of the <i>Work</i> and shall further carefully compare such field measurements and conditions with the requirements of the <i>Contract Documents</i> . Where dimensions are not included or exact locations are not apparent, the <i>Contractor</i> shall immediately notify the <i>Consultant</i> in writing and obtain written instructions from the <i>Consultant</i> before proceedings with any part of the affected <i>Work</i> . 3.1.4 Notwithstanding the provisions of paragraphs 3.1.1 and 3.1.2, the <i>Owner</i> shall have access to the site at all times to monitor all aspects of construction. Such access shall in no circumstances affect the obligations of the <i>Contractor</i> to fulfill its contractual obligations."

GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

SC13.1	3.2.2.1	<u>Delete</u> subparagraph 3.2.2.1 and <u>replace</u> it with "[Intentionally left blank]".
	3.2.3.2	<u>Delete</u> subparagraph 3.2.3.2 and <u>replace</u> it with the following: ".2 co-ordinate and schedule the activities and work of other contractors and the <i>Owner's</i> own forces, including where other contractors or the <i>Owner's</i> own forces are used after the <i>Owner</i> and the <i>Contractor</i> cannot reach agreement on the value of a change, with the <i>Work</i> of the <i>Contractor</i> and connect as specified or shown in the <i>Contract Documents</i> ."
	3.2.3.4	<u>Delete</u> the period at the end of subparagraph 3.2.3.4 and <u>replace</u> it with a semicolon.
	3.2.3.5	<u>Add</u> new subparagraph 3.2.3.5 as follows: ".5 Subject to GC 9.4 CONSTRUCTION SAFETY, for the <i>Owner's</i> own forces and for other contractors, assume overall responsibility for compliance with all aspects of the applicable health and safety legislation in force at the <i>Place of the Work</i> , including all of the responsibilities of the "constructor", pursuant to the <i>OHSA</i> ."

GC 3.3 TEMPORARY WORK

SC14.1	3.3.2	In paragraph 3.3.2, in the second line after the words “where required by law”, insert “or by the <i>Consultant</i> ”.

GC 3.4 CONSTRUCTION SCHEDULE

SC17.1	3.4.1	<u>Delete</u> GC 3.4.1 in its entirety and <u>replace</u> it with the following: “3.4.1 The <i>Contractor</i> shall: 1 within five (5) calendar days of receiving written confirmation of the award of the <i>Contract</i>, prepare and submit to the <i>Owner</i> and the <i>Consultant</i> for their review and approval, a construction schedule in the format indicated below that indicates the timing of the activities of the <i>Work</i> and provides sufficient detail of the critical events and their inter-relationship to demonstrate the <i>Work</i> will be performed in conformity with the <i>Contract Time</i> and in accordance with the <i>Contract Documents</i>. Such schedule is to include a delivery schedule for <i>Products</i> whose delivery is critical to the schedule for the <i>Work</i> or are required by the <i>Contract</i> to be included in a <i>Products</i> delivery schedule. The <i>Contractor</i> shall employ construction scheduling software, being the latest version of “Microsoft Project”, that permits the progress of the <i>Work</i> to be monitored in relation to the critical path established in the schedule. The <i>Contractor</i> shall provide such schedule and any successor or revised schedules in both original digital file format (e.g., .mpp format for Microsoft Project), portable data file (PDF) format, and hard copy. Once accepted by the <i>Owner</i> and the <i>Consultant</i>, the construction schedule submitted by the <i>Contractor</i> shall become the baseline “Construction Schedule”; .2 provide the expertise and resources, such resources including manpower equipment and tools, as are necessary on a best efforts basis to maintain progress under the accepted baseline <i>Construction Schedule</i> or revised construction schedule accepted by the <i>Owner</i> pursuant to GC 3.4 CONSTRUCTION SCHEDULE, which includes without limitation, the <i>Contractor’s</i> use of all possible and, if necessary, extraordinary measures, to bring the progress of the <i>Work</i> into compliance with the <i>Construction Schedule</i>, such as (i) increasing the presence of its own forces at the <i>Place of the Work</i>; (ii) directing any <i>Subcontractors</i> or <i>Suppliers</i> to increase their labour forces and equipment; (iii) working overtime and extra shifts; and (iv) providing any additional supervision and coordination of the <i>Project</i>, all at the <i>Contractor’s</i> own cost and expense save and except where GC 6.5.1, 6.5.2, or 6.5.3 apply; and, .3 monitor the progress of the <i>Work</i> on a weekly basis relative to the baseline <i>Construction Schedule</i>, or any revised <i>Construction Schedule</i> accepted by the <i>Owner</i> pursuant to GC 3.4 CONSTRUCTION SCHEDULE, deliver a <i>Construction Schedule Update</i> to the <i>Consultant</i> and <i>Owner</i> with each application for payment, at a minimum, or as may be reasonably required by the <i>Consultant</i> and advise the <i>Consultant</i> and the <i>Owner</i> weekly in writing of any variation from the baseline or slippage in the schedule; and, .4 if after applying the expertise and resources required under paragraph 3.4.1.2, the <i>Contractor</i> forms the opinion that the slippage in schedule reported in paragraph 3.4.1.3

		cannot be recovered by the <i>Contractor</i>, it shall, in the same notice provided under paragraph 3.4.1.3, indicate to the <i>Consultant</i> if the <i>Contractor</i> intends to apply for an extension of <i>Contract Time</i> as provided in PART 6 —CHANGES IN THE WORK; and, .5 ensure that the <i>Contract Price</i> shall include all costs required to phase or stage the <i>Work</i>.”
	3.4.2	<u>Add</u> new GC 3.4.2 and GC 3.4.3 as follows: “3.4.2 If, at any time, it should appear to the <i>Owner</i> or the <i>Consultant</i> that the actual progress of the <i>Work</i> is behind schedule or is likely to become behind schedule, or if the <i>Contractor</i> has given notice of such to the <i>Owner</i> or the <i>Consultant</i> pursuant to GC 3.4.1.3, the <i>Contractor</i> shall, either at the request of the <i>Owner</i> or the <i>Consultant</i>, or following giving notice pursuant to GC 3.4.1.3, take appropriate steps to cause the actual progress of the <i>Work</i> to conform to the schedule or minimize the resulting delay. Within 5 calendar days of the request by the <i>Owner</i> or the <i>Consultant</i> or the notice being given pursuant to GC 3.4.1.3, the <i>Contractor</i> shall produce and present to the <i>Owner</i> and the <i>Consultant</i> a plan demonstrating how the <i>Contractor</i> will recover the performance of the <i>Work</i> to align with the currently approved <i>Construction Schedule</i>. 3.4.3 The <i>Contractor</i> shall not amend the <i>Construction Schedule</i> without the prior written consent of the <i>Owner</i>.. Any revisions to the <i>Construction Schedule</i> approved by the <i>Owner</i> shall not be deemed to be an extension of the <i>Contract Time</i>. All requests by the <i>Contractor</i> for a revision to the <i>Construction Schedule</i> that include an extension to the <i>Contract Time</i> must be approved by the <i>Owner</i> through an executed <i>Change Order</i>.”

GC 3.5 SUPERVISION

SC17.1	3.5.1	<u>Delete</u> GC 3.5.1 and <u>replace</u> it with the following: “3.5.1 The <i>Contractor</i> shall employ a competent full-time superintendent, acceptable to the <i>Owner</i> and <i>Consultant</i>, who shall be in full time attendance at the <i>Place of the Work</i> while the <i>Work</i> is being performed. The superintendent shall not be changed by the <i>Contractor</i> without valid reason which shall be provided in writing and shall not be changed without prior consultation with and agreement by the <i>Owner</i> and the <i>Consultant</i>. The <i>Contractor</i> shall replace the superintendent within 7 <i>Working Days</i> of the <i>Owner’s</i> written notification, if the superintendent’s performance is not acceptable to the <i>Owner</i>. The <i>Contractor</i> shall provide the <i>Owner</i> and the <i>Consultant</i> with the names, addresses and telephone numbers of the superintendent referred to in this GC 3.5.1 and other responsible persons who may be contacted for emergency and other reasons during non-working hours. .”
	3.5.2	<u>Delete</u> GC 3.5.2 and <u>replace</u> it with the following: “3.5.2 The superintendent, and any project manager appointed by the <i>Contractor</i>, shall represent the <i>Contractor</i> at the <i>Place of the Work</i> and shall have full authority to act on written instructions given by the <i>Consultant</i> and/or the <i>Owner</i>. Instructions given to the

		superintendent or the project manager shall be deemed to have been given to the <i>Contractor</i> and both the superintendent and any project manager shall have full authority to act on behalf of the <i>Contractor</i> and bind the <i>Contractor</i> in matters related to the <i>Contract</i> ."
	3.5.3 to 3.5.6	<u>Add</u> new GC 3.5.3, 3.5.4, 3.5.5 and 3.5.6 as follows: "3.5.3 The <i>Owner</i> may, at any time during the course of the <i>Work</i>, request the replacement of the appointed representative(s). Immediately upon receipt of the request, the <i>Contractor</i> shall make arrangements to appoint an acceptable replacement, which is approved by the <i>Owner</i>. 3.5.4 The supervisory staff assigned to the <i>Project</i> shall also be fully competent to implement efficiently all requirements for scheduling, coordination, field engineering, reviews, inspections and submittals defined in the <i>Specifications</i>, and have a minimum 5 years documented "Superintendent/Project Management" experience. 3.5.5 The <i>Consultant and Owner</i> shall reserve the right to review the record of experience and credentials of supervisory staff assigned to the <i>Project</i> prior to commencement of the <i>Work</i>. 3.5.6 A superintendent assigned to the <i>Work</i> shall be "Gold Seal Certified" as per the Canadian Construction Association; or a superintendent that can demonstrate the requisite experience and success related to the <i>Project</i> to the sole satisfaction of the <i>Owner</i>."

GC 3.6 SUBCONTRACTORS AND SUPPLIERS

SC18.1	3.6.1.1	In paragraph 3.6.1.1 <u>add</u> to the end of the second line the words "including any warranties and service agreements which extend beyond the term of the <i>Contract</i> ."
	3.6.1.2	In subparagraph 3.6.1.2 after the words "the <i>Contract Documents</i> " <u>add</u> the words "including any required surety bonding".
	3.6.2	<u>Delete</u> paragraph 3.6.2. in its entirety and <u>replace</u> it with the following: "3.6.2 The substitution of any <i>Subcontractor</i> and/or <i>Suppliers</i> after submission of the <i>Contractor's</i> bid will not be accepted unless a valid reason is given in writing to and approved by the <i>Owner</i>, whose approval may be arbitrarily withheld. The reason for substitution must be provided to the <i>Owner</i> and to the original <i>Subcontractor</i> and/or <i>Supplier</i> and the <i>Subcontractor</i> and/or <i>Supplier</i> shall be given the opportunity to reply to the <i>Contractor</i> and <i>Owner</i>. The <i>Contractor</i> shall be fully aware of the capability of each <i>Subcontractor</i> and/or <i>Supplier</i> included in its bid, including but not limited to technical ability, financial stability and ability to maintain the proposed construction schedule."
	3.6.7, 3.6.8, 3.6.9 & 3.6.10	<u>Add</u> new paragraphs 3.6.7, 3.6.8, 3.6.9, and 3.6.10 as follows: "3.6.7 The <i>Contractor</i> represents and warrants that it has confirmed the availability of its <i>Subcontractors</i> for the <i>Project</i> and, in particular, for the performance of their respective portions of the <i>Work</i> to ensure completion of the <i>Project</i> within the <i>Contract Price</i> and the <i>Contract Time</i>.

		3.6.8 The <i>Consultant</i> or the <i>Owner</i>, acting reasonably, may from time to time require the <i>Contractor</i> to remove from the <i>Project</i> any personnel of the <i>Contractor</i>, including project managers, superintendents or <i>Subcontractors</i>. Such persons shall be replaced by the <i>Contractor</i> in a timely fashion to the satisfaction of the <i>Consultant</i> or the <i>Owner</i>, as the case may be, at no cost to the <i>Owner</i>. 3.6.9 Where provided in the <i>Contract</i>, the <i>Owner</i> may assign to the <i>Contractor</i>, and the <i>Contractor</i> agrees to accept, any contract procured by the <i>Owner</i> for <i>Work</i> or services required on the <i>Project</i> that has been pre-tendered or pre-negotiated by the <i>Owner</i>, and upon such assignment, the <i>Owner</i> shall have no further liability to any party for such contract. 3.6.10 The <i>Contractor</i> covenants that each subcontract or supply contract which the <i>Contractor</i> enters into for the purpose of performing the <i>Work</i> shall expressly provide for the assignment thereof to the <i>Owner</i> (at the option of the <i>Owner</i>) and the assumption by the <i>Owner</i> of the obligations of the <i>Contractor</i> thereunder, upon the termination of the <i>Contract</i> and upon written notice by the <i>Owner</i> to the other parties to such subcontracts or supply contracts, without the imposition of further terms or conditions; provided, however, that until the <i>Owner</i> has given such notice, nothing herein contained shall be deemed to create any contractual or other liability upon the <i>Owner</i> for the performance of obligations under such subcontracts or supply contracts and the <i>Contractor</i> shall be fully responsible for all of its obligations and liabilities (if any) under such subcontracts and supply contracts."

GC 3.7 LABOUR AND PRODUCTS

SC19.1	3.7.1	<u>Amend</u> paragraph 3.7.1 by <u>adding</u> the words, "... agents, <i>Subcontractors</i> and <i>Suppliers</i> ..." after the word "employees" in the first line.
SC19.2	3.7.2	<u>Delete</u> paragraph 3.7.2 and <u>substitute</u> with the following: "3.7.2 <i>Products</i> provided shall be new and shall conform to all current applicable specifications of the Canadian Standards Association, Canadian Standards Board or General Standards Board, ASTM, National Building Code, provincial and municipal building codes, fire safety standards, and all governmental authorities and regulatory agencies having jurisdiction at the <i>Place of the Work</i>, unless otherwise specified. <i>Products</i> which are not specified shall be of a quality consistent with those specified and their use acceptable to the <i>Consultant</i>. <i>Products</i> brought on to the <i>Place of the Work</i> by the <i>Contractor</i> shall be deemed to be the property of the <i>Owner</i>, but the <i>Owner</i> shall be under no liability for loss thereof or damage thereto arising from any cause whatsoever. The said <i>Products</i> shall be at the sole risk of the <i>Contractor</i>. Workmanship shall be, in every respect, first class and the <i>Work</i> shall be performed in accordance with the best modern industry practice."
	3.7.4 to 3.7.8	<u>Add</u> new paragraphs 3.7.4, 3.7.5, 3.7.6, 3.7.7, and 3.7.8 as follows: "3.7.4 Upon receipt of a <i>Notice in Writing</i> from the <i>Owner</i>, the <i>Contractor</i> shall immediately remove from the <i>Place of the Work</i>, tradesmen and labourers or anyone whose conduct jeopardizes the safety of the <i>Owner's</i> operations or who are considered by the <i>Owner</i> or the <i>Consultant</i> to be unskilled or otherwise objectionable. Immediately upon receipt of the request, the <i>Contractor</i> shall make arrangements to appoint an acceptable replacement.

		3.7.5 The <i>Contractor</i> shall cooperate with the <i>Owner</i> and its representatives and shall take all reasonable and necessary actions to maintain stable and harmonious labour relations with respect to the <i>Work</i> at the <i>Place of the Work</i>, including cooperation to attempt to avoid <i>Work</i> stoppages, trade union jurisdictional disputes and other <i>Labour Disputes</i>. Any costs arising from labour disputes shall be at the sole expense of the <i>Contractor</i>. 3.7.6 The cost for overtime required beyond the normal <i>Working Day</i> to complete individual construction operations of a continuous nature, such as pouring or finishing of concrete or similar work, or <i>Work</i> that the <i>Contractor</i> elects to perform at overtime rates without the <i>Owner</i> requesting it, shall not be chargeable to the <i>Owner</i>. 3.7.7 All manufactured <i>Products</i> which are identified by their proprietary names or by part or catalogue number in the <i>Specifications</i> shall be used by the <i>Contractor</i>. No substitutes for such specified <i>Products</i> shall be used without the written approval of the <i>Owner</i> and the <i>Consultant</i>. Substitutes will only be considered by the <i>Consultant</i> when submitted in sufficient time to permit proper review and investigation. When requesting approval for the use of substitutes, the <i>Contractor</i> shall include in its submission any proposed change in the <i>Contract Price</i>. The <i>Contractor</i> shall use all proprietary <i>Products</i> in strict accordance with the manufacturer's directions. Where there is a choice of proprietary <i>Products</i> specified for one use, the <i>Contractor</i> may select any one of the <i>Products</i> so specified for this use. 3.7.8 Materials, appliances, equipment and other <i>Products</i> are sometimes specified by reference to brand names, proprietary names, trademarks or symbols. In such cases, the name of a manufacturer, distributor, <i>Supplier</i> or dealer is sometimes given to assist the <i>Contractor</i> to find a source <i>Supplier</i>. This shall not relieve the <i>Contractor</i> from its responsibility from finding its own source of supply even if the source names no longer supplies the <i>Product</i> specified. If the <i>Contractor</i> is unable to obtain the specified <i>Product</i>, the <i>Contractor</i> shall supply a substitute product equal to or better than the specified <i>Product</i>, as approved by the <i>Consultant</i> with no extra compensation. Should the <i>Contractor</i> be unable to obtain a substitute <i>Product</i> equal to or superior to the specified <i>Product</i> and the <i>Owner</i> accepts a different <i>Product</i>, the <i>Contract Price</i> shall be adjusted accordingly, as approved by the <i>Consultant</i>."

GC 3.8 SHOP DRAWINGS

SC21.1	3.8.1	<u>Delete</u> paragraph 3.8.1 in its entirety and <u>replace</u> with the following: "3.8.1 The <i>Contractor</i> shall provide shop drawings as described in the <i>Contract Documents</i> and as the <i>Consultant</i> may reasonably request."
	3.8.3	<u>Delete</u> paragraph 3.8.3 and <u>replace</u> it with the following: "3.8.3 The <i>Contractor</i> shall prepare a <i>Shop Drawings</i> schedule acceptable to the <i>Owner</i> and the <i>Consultant</i> prior to the first application for payment. A draft of the proposed <i>Shop Drawings</i> schedule shall be submitted by the <i>Contractor</i> to the <i>Consultant</i> and the <i>Owner</i> for approval. The draft <i>Shop Drawings</i> schedule shall clearly indicate the phasing of <i>Shop</i>

		<i>Drawings</i> submissions. The <i>Contractor</i> shall periodically re-submit the <i>Shop Drawings</i> schedule to correspond to changes in the <i>Construction Schedule</i> ."
	3.8.5	<u>Delete</u> paragraph 3.8.5 in its entirety and <u>substitute</u> the following: "3.8.5 At the time of providing <i>Shop Drawings</i> , the <i>Contractor</i> shall advise the <i>Consultant</i> in writing of any deviations in <i>Shop Drawings</i> from the requirements of the <i>Contract Documents</i> . The <i>Consultant</i> shall indicate the acceptance of such deviation expressly in writing. Where manufacturers' literature is submitted in lieu of scaled drawings, it shall be clearly marked in ink, to indicate the specific items for which review is requested."
	3.8.8 to 3.8.12	<u>Add</u> new paragraphs 3.8.8, 3.8.9, 3.8.10, 3.8.11, and 3.8.12 as follows: "3.8.8 Reviewed <i>Shop Drawings</i> shall not authorize a change in the <i>Contract Price</i> and/or the <i>Contract Time</i> . 3.8.9 Except where the parties have agreed to a different <i>Shop Drawings</i> schedule pursuant to paragraph 3.10.3, the <i>Contractor</i> shall comply with the requirements for <i>Shop Drawings</i> submissions stated in the <i>Specifications</i> . 3.8.10 The <i>Contractor</i> shall not use the term "by others" on <i>Shop Drawings</i> or other submittals. The related trade, <i>Subcontractor</i> or <i>Supplier</i> shall be stated. 3.8.11 Certain <i>Specifications</i> sections require the <i>Shop Drawings</i> to bear the seal and signature of a professional engineer. Such professional engineer must be registered in the jurisdiction of the <i>Place of the Work</i> and shall have expertise in the area of practice reflected in the <i>Shop Drawings</i> . 3.8.12 The <i>Consultant</i> will review and return <i>Shop Drawings</i> and submittals in accordance with the schedule agreed upon in paragraph 3.10.3, The <i>Contractor</i> shall allow the <i>Consultant</i> a minimum of 10 <i>Working Days</i> to review <i>Shop Drawings</i> from the date of receipt. If resubmission of <i>Shop Drawings</i> is required, a further 10 <i>Working Day</i> period is required for the <i>Consultant's</i> review."

***NEW* GC 3.9 USE OF THE WORK**

SC22.1	GC 3.9	<u>Add</u> new GC 3.9 – USE OF THE WORK as follows: "GC 3.9 USE OF THE WORK 3.9.1 The <i>Contractor</i> shall confine <i>Construction Equipment</i> , <i>Temporary Work</i> , storage of <i>Products</i> , waste products and debris, and operations of employees and <i>Subcontractors</i> to limits indicated by laws, ordinances, permits, by the direction of the <i>Owner</i> or the <i>Consultant</i> , or the <i>Contract Documents</i> and shall not unreasonably encumber the <i>Place of the Work</i> . 3.9.2 The <i>Contractor</i> shall not load or permit to be loaded any part of the <i>Work</i> with a weight or force that will endanger the safety of the <i>Work</i> .

		3.9.3 The <i>Owner</i> shall have the right to enter or occupy the <i>Place of the Work</i> in whole or in part for the purpose of placing fittings and equipment, or for other use before <i>Substantial Performance of the Work</i>, if, in the opinion of the <i>Consultant</i>, such entry and occupation does not prevent or substantially interfere with the <i>Contractor</i> in the performance of the <i>Contract</i> within the <i>Contract Time</i>. Such entry or occupation shall neither be considered as acceptance of the <i>Work</i> or in any way relieves the <i>Contractor</i> from its responsibility to complete the <i>Contract</i>."

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***NEW* GC 3.10 CUTTING AND REMEDIAL WORK**

SC23.1	GC 3.10	Add new GC 3.10 – CUTTING AND REMEDIAL WORK as follows: "GC 3.10 CUTTING AND REMEDIAL WORK 3.10.1 The <i>Contractor</i> shall perform the cutting and remedial work required to make the affected parts of the <i>Work</i> come together properly. Such cutting and remedial work shall be performed by specialists familiar with the <i>Products</i> affected and shall be performed in a manner to neither damage nor endanger the <i>Work</i>. 3.10.2 The <i>Contractor</i> shall coordinate the <i>Work</i> to ensure all cutting and remedial work required is kept to a minimum. 3.10.3 Unless specifically stated otherwise in the <i>Specifications</i>, the <i>Contractor</i> shall do all cutting and making good necessary for the proper installation and performance of the <i>Work</i>. 3.10.4 To avoid unnecessary cutting, the <i>Contractor</i> shall lay out its work and advise the <i>Subcontractors</i>, when necessary, where to leave holes for installation of pipes and other work."

***NEW* GC 3.11 CLEAN UP**

SC24.1	3.11.1, 3.11.2, 3.11.3, 3.11.4, 3.11.5 & 3.11.6	Add new paragraphs 3.11.1, 3.11.2, 3.11.3, 3.11.4, 3.11.5, and 3.11.6 as follows: "3.11.1 The <i>Contractor</i> shall maintain the <i>Work</i> in a safe and tidy condition and free from the accumulation of waste products and debris, other than that caused by the <i>Owner</i>, other contractors or their employees. The <i>Contractor</i> shall remove accumulated waste and debris at least once a week as a minimum or as required by the nature of the <i>Work</i>. 3.11.2 Before applying for <i>Substantial Performance of the Work</i>, the <i>Contractor</i> shall remove waste products and debris, other than that resulting from the work of the <i>Owner</i>, other contractors or their employees, and shall leave the <i>Place of the Work</i> clean and suitable for use or occupancy by the <i>Owner</i>. The <i>Contractor</i> shall remove products, tools, materials, <i>Construction Equipment</i>, and <i>Temporary Work</i> not required for the performance of the remaining work.

		3.11.3 As a condition precedent to submitting its application for final payment, the <i>Contractor</i> shall remove any remaining products, tools, materials, <i>Construction Equipment</i>, <i>Temporary Work</i>, and waste products and debris, other than those resulting from the work of the <i>Owner</i>, other contractors or their employees. 3.11.4 The <i>Contractor</i> shall clean up garbage during and after construction and maintain the <i>Place of the Work</i> in a neat and orderly condition on a daily basis. Prior to leaving the <i>Place of the Work</i> and following completion of the <i>Work</i>, the <i>Contractor</i> shall make good all damage to the building and its components caused by the performance of the <i>Work</i> or by any <i>Subcontractor</i> or <i>Supplier</i>. The <i>Contractor</i> shall leave the <i>Place of the Work</i> in a clean and finished state; remove all <i>Construction Equipment</i> and materials; remove all paint, stains, labels, dirt, etc. from the <i>Place of the Work</i>; and touch up all damaged painted areas (if applicable). The <i>Contractor</i> shall be responsible for restoring those areas of the <i>Place of the Work</i>, impacted by the <i>Work</i>, to their original condition." 3.11.5 Without limitation to or waiver of the <i>Owner's</i> other rights and remedies, the <i>Owner</i> shall have the right to back charge to the <i>Contractor</i> the cost of damage to the site caused by transportation in and out of the <i>Place of the Work</i> by the <i>Contractor</i>, <i>Subcontractors</i> or <i>Suppliers</i>, if not repaired before final payment. 3.11.6 The <i>Contractor</i> shall dispose of debris at a location and in a manner acceptable to the <i>Owner</i> (and to the authorities having jurisdiction at the <i>Place of the Work</i> and at the disposal area) and the <i>Contractor</i> shall cover containers with tarpaulins."

***NEW* GC 3.12 EXCESS SOIL MANAGEMENT**

SC25.1	GC 3.12	<u>Add</u> new GC 3.12 – EXCESS SOIL MANAGEMENT as follows: "GC 3.12 EXCESS SOIL MANAGEMENT 3.12.1 The <i>Contractor</i> shall be solely responsible for the proper management of all <i>Excess Soil</i> at the <i>Place of the Work</i> and for performance of the <i>Work</i> in compliance with the rules, regulations and practices required by the <i>Excess Soil Regulation</i> until such time as <i>Ready-for-Takeover</i> is achieved. Without restricting the generality of the previous sentence, the <i>Contractor's</i> responsibility under this GC 3.12 includes the designation, transportation, tracking, temporary and/or final placement, record keeping, and reporting of all <i>Excess Soil</i> in connection with the <i>Work</i> all in compliance with the <i>Excess Soil Regulation</i>. 3.12.3 The <i>Contractor</i> shall indemnify and save harmless the <i>Owner</i>, their agents, officers, directors, administrators, employees, consultants, successors and assigns from and against the consequences of any and all health and safety infractions committed directly by the <i>Contractor</i>, or those for whom it is responsible at law, under the <i>Excess Soil Regulation</i>, or any environmental protection legislation, including the payment of legal fees and disbursements on a substantial indemnity basis. Such indemnity shall apply to the extent to which the <i>Owner</i> is not covered by insurance."

***NEW* GC 3.13 CONTRACTOR STANDARD OF CARE**

SC25.1	3.13	<u>Add</u> a new GC 3.13 – CONTRACTOR STANDARD OF CARE as follows: “GC 3.13 CONTRACTOR STANDARD OF CARE “3.13.1 In performing its services and obligations under the <i>Contract</i>, the <i>Contractor</i> shall exercise the standard of care, skill and diligence that would normally be provided by an experienced and prudent contractor supplying similar services for similar projects. The <i>Contractor</i> acknowledges and agrees that throughout the <i>Contract</i>, the performance of the <i>Contractor’s</i> obligations, duties and responsibilities shall be interpreted in accordance with this standard. The <i>Contractor</i> shall exercise the same standard of care, skill and diligence in respect of any <i>Products</i>, personnel or procedures which it may recommend to the <i>Owner</i> or employ on the <i>Project</i>. 3.13.2 The <i>Contractor</i> further represents, covenants and warrants to the <i>Owner</i> that: .1 the personnel it assigns to the <i>Project</i> are appropriately experienced; .2 it has a sufficient staff of qualified and competent personnel to replace any of its appointed representatives, subject to the <i>Owner’s</i> approval, in the event of death, incapacity, removal or resignation; and .3 there are no pending, threatened or anticipated claims, liabilities or contingent liabilities that would have a material effect on the financial ability of the <i>Contractor</i> to perform its work under the <i>Contract</i>.”

PART 4 ALLOWANCES

GC 4.1 CASH ALLOWANCES

SC27.1	4.1.3	In GC 4.1.3 <u>delete</u> the words “through the <i>Consultant</i> ” and <u>replace</u> them with “in writing.”
	4.1.4	<u>Delete</u> GC 4.1.4 in its entirety and <u>replace</u> it with the following: “4.1.4 Where the actual cost of the <i>Work</i> under any cash allowance exceeds the amount of the allowance, any unexpended amounts from other cash allowances shall be reallocated, by the <i>Consultant</i> at the <i>Owner’s</i> direction, to cover the shortfall, and, in that case, there shall be no additional amount added to the <i>Contract Price</i> for overhead and profit. Only where the actual cost of the <i>Work</i> under all cash allowances exceeds the total amount of all cash allowances shall the <i>Contractor</i> be compensated for the excess incurred and substantiated, plus an amount for overhead and profit on the excess only, as set out in the <i>Contract Documents</i>.”
	4.1.7	<u>Delete</u> GC 4.1.7 in its entirety and <u>replace</u> it with the following:

		"4.1.7 The net amount of any unexpended cash allowances, after providing for any reallocations as contemplated in paragraph 4.1.4, shall be deducted from the <i>Contract Price</i> by <i>Change Order</i> without any adjustment for the <i>Contractor's</i> overhead and profit on such amount."
	4.1.8 and 4.1.9	<u>Add</u> new GC 4.1.8 and 4.1.9 as follows: "4.1.8 The <i>Owner</i> reserves the right to call, or to have the <i>Contractor</i> call, for competitive bids for portions of the <i>Work</i> to be paid for from cash allowances. 4.1.9 Cash allowances cover the net cost to the <i>Contractor</i> of services, <i>Products</i>, <i>Construction Equipment</i>, freight, unloading, handling, storage, installation, provincial sales tax, and other authorized expenses incurred in performing any <i>Work</i> stipulated under the cash allowances but does not include any <i>Value Added Taxes</i> payable by the <i>Owner</i> and the <i>Contractor</i>."

PART 5 PAYMENT

GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

SC28.1	5.1	<u>Delete</u> GC 5.1 – FINANCING INFORMATION REQUIRED OF THE OWNER and all paragraphs thereunder, including any reference to GC 5.1 throughout the <i>Contract</i>.

GC 5.2 APPLICATIONS FOR PAYMENT

SC29.1	5.2.1	<u>Delete</u> GC 5.2.1 and <u>replace</u> it with the following: "5.2.1 Upon execution of the <i>Contract</i>, and in any event prior to the <i>Contractor</i> submitting its first application for payment, the <i>Owner</i> shall issue a purchase order to the <i>Contractor</i> for the performance of the <i>Contract</i>. The number indicated on such purchase order must be clearly identifiable on all applications for payment. Applications for payment shall be dated the last day of each month or an alternative day of each month agreed to in writing by the parties, with each month representing one payment period under the <i>Contract</i> (each a "Payment Period"). Within 3 calendar days of the end of each <i>Payment Period</i>, the <i>Contractor</i> will submit a draft application for payment to the <i>Owner</i> and the <i>Consultant</i>. Upon receipt of the draft application for payment, and within 7 calendar days, a representative of each of the <i>Contractor</i>, <i>Owner</i>, and the <i>Consultant</i> shall attend a meeting to discuss and review the work completed during the <i>Payment Period</i>, including quantities, if applicable (the "Pre-Invoice Submission Meeting"). In the event that the scheduled date for the <i>Pre-Invoice Submission Meeting</i> is not a <i>Working Day</i>, the <i>Pre-Invoice Submission Meeting</i> shall occur on the next <i>Working Day</i>. The <i>Contractor</i> shall bring with it to the <i>Pre-Invoice Submission Meeting</i> the following: .1 a copy of the draft application for payment; .2 any documents the <i>Contractor</i> is required to bring to the <i>Pre-Invoice Submission Meeting</i> as stipulated in the <i>Contract Documents</i> or as reasonably requested by the <i>Owner</i>; and

		.3 any other documents reasonably requested, in advance, by the <i>Owner</i> or the <i>Consultant</i> ."
SC29.2	5.2.2	<u>Delete</u> GC 5.2.2 in its entirety and <u>replace</u> it with the following: "5.2.2 Applications for payment shall be given in accordance with the following requirements: .1 Within 5 calendar days following the <i>Pre-Invoice Submission Meeting</i>, the <i>Contractor</i> shall deliver its application for payment to the <i>Owner</i> and to the <i>Consultant</i> for <i>Work</i> performed during the <i>Payment Period</i> ("Proper Invoice Submission Date") subject to the following: .1 If the fifth calendar day following the <i>Pre-Invoice Submission Meeting</i>, to which an invoice relates falls on a day that is not a <i>Working Day</i>, the <i>Proper Invoice Submission Date</i> shall be deemed to fall on the next <i>Working Day</i>. .2 The application for payment must be delivered to the <i>Owner</i> and to the <i>Consultant</i> in the same manner as a <i>Notice in Writing</i> during the hours of 9:00 am to 4:00pm (EST) on the <i>Proper Invoice Submission Date</i>. Delivery to the <i>Owner</i> shall be to the following email address: facilities_cap@wrdsb.ca .3 If an application for payment is received after 4:00 p.m. (EST) on the applicable <i>Proper Invoice Submission Date</i>, the application for payment will not be considered or reviewed by the <i>Owner</i> and <i>Consultant</i> until the next <i>Proper Invoice Submission Date</i>. Notwithstanding the foregoing, the <i>Owner</i> in its sole and absolute discretion may elect to accept an application for payment submitted after 4:00 p.m. on the applicable <i>Proper Invoice Submission Date</i>; however, such acceptance shall not be construed as a waiver of any of its rights or waive or release the <i>Contractor's</i> obligations to strictly comply with the requirements prescribed in this subparagraph 5.2.2.3. .4 No applications for payment shall be accepted by the <i>Owner</i> prior to the <i>Proper Invoice Submission Date</i>. .5 All applications for payment shall include all of the requirements for a <i>Proper Invoice</i> prescribed by the <i>Construction Act</i> and this <i>Contract</i> and be dated the last day of the applicable <i>Payment Period</i>;"
SC29.3	5.2.3	<u>Delete</u> GC 5.2.3 and <u>replace</u> it with the following: "5.2.3 The amount claimed shall be for the value, proportionate to the amount of the <i>Contract</i>, of <i>Work</i> performed and <i>Products</i> delivered and incorporated into the <i>Work</i> as of the last date of the applicable <i>Payment Period</i>. Materials may also be deemed to be supplied to an improvement, for payment purposes, when, in the <i>Owner's</i> opinion, they are placed and properly secured on the land on which the improvement is made, or placed upon land designated by the <i>Owner</i> or agent of the <i>Owner</i>, but placing the materials on the land so designated does not, of itself, make that land subject to a lien. No amount claimed shall include products delivered and incorporated into the work, unless the products are free

		and clear of all security interests, liens and other claims of third parties. No amount claimed shall include <i>Products</i> delivered to the <i>Place of the Work</i> unless the <i>Products</i> are free and clear of all security interests, liens, and other claims of third parties."
SC29.4	5.2.4	After the word " <i>Consultant</i> " in GC 5.2.4 <u>add</u> the words "and the <i>Owner</i> "
SC29.5	5.2.5	After the word " <i>Consultant</i> " in GC 5.2.5 <u>add</u> the words "or the <i>Owner</i> ".
SC29.6	5.2.9	<u>Add</u> new 5.2.9 as follows: "5.2.9 The <i>Contractor</i> shall prepare and maintain current as-built drawings which shall consist of the <i>Drawings</i> and <i>Specifications</i> revised by the <i>Contractor</i> during the <i>Work</i> , showing changes to the <i>Drawings</i> and <i>Specifications</i> , which current as-built drawings shall be maintained by the <i>Contractor</i> and made available to the <i>Consultant</i> for review with each application for progress payment. The <i>Consultant</i> shall recommend to the <i>Owner</i> that the <i>Owner</i> retain a reasonable amount for the value of the as-built drawings not presented for review."

GC 5.3 PAYMENT

SC30.1	5.3.1	<u>Delete</u> GC 5.3.1 in its entirety, including all subparagraphs thereunder, and <u>replace</u> it with the following: "5.3.1 After receipt by the <i>Owner</i> and the <i>Consultant</i> of an application for payment submitted by the <i>Contractor</i> in accordance with GC 5.2 - APPLICATIONS FOR PAYMENT: .1 the <i>Consultant</i> will either: (a) issue to the <i>Owner</i> with a copy to the <i>Contractor</i>, a progress payment certificate in the amount applied for by the <i>Contractor</i> in the <i>Proper Invoice</i>, or (b) issue to the <i>Owner</i>, with a copy to the <i>Contractor</i>, a certificate for payment for an amount determined by the <i>Consultant</i> to be properly due to the <i>Contractor</i> after applying any credits, withheld amounts, or other set-offs which the <i>Consultant</i> has determined that the <i>Owner</i> is entitled to notwithstanding any notice of dispute or disagreement that the <i>Contractor</i> may have served, along with the <i>Consultant's</i> reasons why an amount other than what is claimed in the <i>Proper Invoice</i> is properly due to the <i>Contractor</i>, which finding the <i>Owner</i> may accept or amend prior to the <i>Owner</i> issuing a <i>Notice of Non-Payment</i>, if any, in accordance with GC 5.3.2; .2 the <i>Owner</i> shall make payment to the <i>Contractor</i> on account as provided in Article A-5 PAYMENT, (a) in the amount stated in the certificate for payment, or (b) in the amount stated in the certificate for payment less such amount stated in the <i>Owner's Notice of Non-Payment</i> issued pursuant to GC 5.3.3,

		on the 28th calendar day after receipt of a <i>Proper Invoice</i>, unless such 28th calendar day lands on a day that is other than a <i>Working Day</i>, in which case payment shall be made on the next <i>Working Day</i> after such 28th day."
5.3.2 to 5.3.7	<u>Add</u> new paragraphs 5.3.2, 5.3.3, 5.3.4, 5.3.4, 5.3.5, 5.3.6, and 5.3.7 as follows: 5.3.2 All payments to the <i>Contractor</i> shall be processed using electronic funds transfer ("EFT") and deposited directly to the <i>Contractor's</i> bank account unless agreed to otherwise by the <i>Contractor</i> and the <i>Owner</i> in writing. Prior to the <i>Contractor</i> submitting its first application for payment, the <i>Owner</i> and the <i>Contractor</i> shall exchange such information as is necessary to facilitate <i>EFT</i> payments. 5.3.3 In the event that the application for payment delivered by the <i>Contractor</i> pursuant to GC 5.2 - APPLICATIONS FOR PAYMENT does not include the requirements for a <i>Proper Invoice</i> or where the <i>Owner</i> disputes the amount claimed as payable in the <i>Proper Invoice</i>, then the <i>Owner</i> shall within 14 calendar days of receipt of the application for payment, issue a <i>Notice of Non-Payment</i> (Form 1.1). 5.3.4 Where the <i>Owner</i> has delivered a <i>Notice of Non-Payment</i>, the <i>Owner</i> and the <i>Contractor</i> shall first engage in good faith negotiations to resolve the dispute. If within 5 calendar days following the issuance of a <i>Notice of Non-Payment</i>, despite good faith efforts by both parties and the assistance of the <i>Consultant</i>, the <i>Owner</i> and the <i>Contractor</i> cannot resolve the dispute, either party may commence an <i>Adjudication</i> in accordance with the procedures set out in the <i>Construction Act</i>. Any portion of the <i>Proper Invoice</i> which is not the subject of the <i>Notice of Non-Payment</i> shall be payable within the time period set out in GC 5.3.1.2. 5.3.5 Provided that the <i>Owner</i> complies with its obligations under the <i>Construction Act</i>, and subject to any interim determination of an adjudicator in accordance with any <i>Adjudication</i>, and where applicable, a final determination made in accordance with the dispute resolution processes prescribed by this <i>Contract</i>, the <i>Owner</i> shall be entitled to claim in a <i>Notice of Non-Payment</i> a right to deduct from or, set off against, any payment of the <i>Contract Price</i>: .1 any amount expended by the <i>Owner</i> in exercising the <i>Owner's</i> rights under this <i>Contract</i> to perform any of the <i>Contractor's</i> obligations that the <i>Contractor</i> has failed to perform; .2 any damages, costs or expenses (including, without limitation, reasonable legal fees and expenses) incurred by the <i>Owner</i> as a result of the failure of the <i>Contractor</i> to perform any of its obligations under the <i>Contract</i>; .3 any other amount owing from the <i>Contractor</i> to the <i>Owner</i> under this <i>Contract</i>. 5.3.6 The amounts disputed and described under the <i>Notice of Non-Payment</i> shall be held by the <i>Owner</i> until all disputed amounts of the <i>Proper Invoice</i> have been resolved pursuant to PART 8 – DISPUTE RESOLUTION.	

		5.3.7 The <i>Contractor</i> represents, warrants, and covenants to the <i>Owner</i> that it is familiar with its prompt payment and trust obligations under the <i>Construction Act</i> and will take all required steps and measures to ensure that it complies with the applicable prompt payment and trust provisions under the <i>Construction Act</i> including, without limitation, section 8.1 of the <i>Construction Act</i>. Evidence of the <i>Contractor's</i> compliance under this GC 5.3.7, including evidence demonstrating that all <i>EFTs</i> by the <i>Owner</i> to the <i>Contractor</i> are kept in a bank account in the <i>Contractor's</i> name will be made available to the <i>Owner</i> within 5 <i>Working Days</i> following receipt by the <i>Contractor</i> of a <i>Notice in Writing</i> making such request."

GC 5.4

SUBSTANTIAL PERFORMANCE OF THE WORK- AND PAYMENT OF HOLDBACK

SC32.1	GC 5.4	<u>Delete</u> GC 5.4 – SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK in its entirety and <u>replace</u> it with the following: "GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK 5.4.1 When the <i>Contractor</i> considers that <i>Substantial Performance of the Work</i> has been achieved, the <i>Contractor</i> shall prepare and submit to the <i>Consultant</i> and the <i>Owner</i> a comprehensive deficiency list of items to be completed or corrected, including any incomplete <i>Close-Out Documentation</i>, and apply for a review by the <i>Consultant</i> and the <i>Owner</i> to establish <i>Substantial Performance of the Work</i>. Failure to include an item on the list does not alter the responsibility of the <i>Contractor</i> to complete the <i>Contract</i>. 5.4.2 Prior to, or as part of its written application for <i>Substantial Performance of the Work</i> the <i>Contractor</i> shall submit to the <i>Consultant</i> submit to the <i>Consultant</i> all closeout documentation required by the <i>Contract Documents</i>, including but not limited to, warranties, manuals, guarantees, as-built drawings, warranty cards and all other relevant literature from suppliers and manufacturers including, but not limited to, where applicable (the "Close-Out Documentation"): .1 equipment, maintenance, and operations manuals; .2 equipment specifications, data sheets and brochures, parts lists and assembly drawings, performance curves and other related data; .3 line drawings, value charts and control sheets sequences with description of the sequence of operations; .4 warranty documents; .5 guarantees; .6 certificates; .7 service and maintenance reports; .8 <i>Specifications</i>; .9 <i>Shop Drawings</i>; .10 coordination drawings; .11 testing and balancing results and reports; .12 <i>Commissioning</i> and quality assurance documentation; .13 distribution system diagrams;

		.14 spare parts; .15 samples; .16 existing reports and correspondence from authorities having jurisdiction in the <i>Place of the Work</i>; .17 inspection certificates; .18 red-lined record drawings from the construction trailer in two copies and .19 other materials or documentation required to be submitted under the <i>Contract</i>. 5.4.3 The <i>Consultant</i> will review the <i>Work</i> to verify the validity of the application and shall promptly, and in any event, no later than 30 calendar days after receipt of the <i>Contractor's</i> complete deficiency list and application: .1 prepare a final deficiency list incorporating all items to be completed or corrected, including any incomplete or unsubmitted <i>Close-Out Documentation</i>. Each item shall have an indicated value for correction or completion and the determination of the total value of such items shall be determined pursuant to GC 5.8 – DEFICIENCY HOLDBACK. The final deficiency list complete with values is to be included with the <i>Consultant's</i> draft verification and shall be reviewed with the <i>Owner</i> prior to the <i>Consultant</i> rendering a determination in accordance with GC 5.4.3.2 .2 having completed the requirements set out in GC 5.4.3.1, (a) the <i>Consultant</i> shall advise the <i>Contractor</i> in writing that the <i>Work</i> or the designated portion of the <i>Work</i> is not substantially performed and give reasons why, or (b) the <i>Consultant</i> shall state the date of <i>Substantial Performance of the Work</i> in a certificate and issue a copy of that certificate to each the <i>Owner</i> and the <i>Contractor</i>. 5.4.4 Following the issuance of the certificate of <i>Substantial Performance of the Work</i> referenced in subparagraph 5.4.3.2(b): .1 The <i>Contractor</i> shall publish, in a construction trade newspaper in the area of the location of the <i>Work</i>, a copy of the certificate of <i>Substantial Performance of the Work</i> referred to in GC 5.4.2.2(b) within seven (7) calendar days of receiving a copy of the certificate signed by the <i>Consultant</i>, and the <i>Contractor</i> shall provide suitable evidence of the publication to the <i>Consultant</i> and the <i>Owner</i>. If the <i>Contractor</i> fails to publish such notice, the <i>Owner</i> shall be at liberty to publish said certificate and back-charge the <i>Contractor</i> its reasonable costs for doing so; .2 The <i>Contractor</i> shall complete the <i>Work</i> within forty (40) calendar days of the date certified as the date of <i>Substantial Performance of the Work</i>; .3 Notwithstanding any other provisions of the <i>Contract</i>, no payments will be processed between <i>Substantial Performance of the Work</i> and <i>Ready-for-Takeover</i>; .4 The <i>Owner</i> reserves the right to contract out any or all unfinished <i>Work</i> if it has not been completed within forty (40) days of <i>Substantial Performance of the Work</i> using, without limitation, the funds retained in accordance with GC 5.8 - DEFICIENCY HOLDBACK, without prejudice to any other right or remedy and without affecting

		the warranty period. The cost to the <i>Owner</i> of completing the <i>Work</i> including <i>Owner</i> and <i>Consultant</i> wages and materials shall be deducted from the <i>Contract Price</i>. 5.4.5 After publication of the certificate of the <i>Substantial Performance of the Work</i>, and provided that the <i>Contractor</i> has completed performance of the <i>Work</i> within the 40 calendar days following certification of <i>Substantial Performance of the Work</i>, the <i>Contractor</i> may submit an application for payment of the outstanding <i>Construction Act</i> holdback amount, which application for payment shall: .1 include all of the requirements listed in EXHIBIT "1" - PROJECT SPECIFIC REQUIREMENTS FOR A PROPER INVOICE, as applicable to the application for payment of the holdback amount; and .2 include a statement that the <i>Contractor</i> has not received any written notices of lien or any claims for liens from any <i>Subcontractor</i> or <i>Supplier</i>. 5.4.6 The <i>Construction Act</i> holdback amount shall become due and payable the day immediately following the expiration of the holdback period prescribed by the <i>Construction Act</i> (in most cases being the 61st calendar day following the publication of the certificate of <i>Substantial Performance of the Work</i> referred to in GC 5.4.4.1), subject to the occurrence of any of the following: .1 the preservation of a lien in respect of the <i>Project</i> that has not been satisfied, discharged or otherwise provided for in accordance with the <i>Construction Act</i>; .2 receipt by the <i>Owner</i> of a written notice of lien that has not been satisfied, discharged or otherwise provided for in accordance with the <i>Construction Act</i>; or .3 prior to the expiry of 40 calendar days following the publication of the certificate of <i>Substantial Performance of the Work</i>, the <i>Owner</i> publishes a <i>Notice of Non-Payment</i> of holdback in accordance with the <i>Construction Act</i> (Form 6), setting out the amount of holdback that will not be paid, which may include non-payment to secure the correction of deficiencies and/or the completion of the <i>Work</i>. 5.4.7 Notwithstanding the <i>Owner's</i> obligation to make payment of the holdback amount in accordance with GC 5.4.6, the processing of such payment remains subject to the <i>Owner's</i> internal <i>EFT</i> timing limitations. The <i>Owner</i> covenants, and the <i>Contractor</i> agrees, that payment of the holdback shall be made by <i>EFT</i> at the first opportunity during the <i>Owner's</i> normal processing of <i>EFTs</i> upon the holdback becoming due in accordance with GC 5.4.6..

GC 5.5 FINAL PAYMENT

SC35.1	GC 5.5	<u>Delete</u> GC 5.5 in its entirety, including all subparagraphs thereunder and <u>replace</u> it with the following: "5.5.1 When <i>Ready-for-Takeover</i> has been achieved in accordance with GC 12.1 – READY-FOR-TAKEOVER and the <i>Contractor</i> considers the <i>Work</i> is complete, and after the <i>Contractor</i>, the <i>Owner</i>, and the <i>Consultant</i> have attended a <i>Pre-Invoice Submission Meeting</i> analogous

		to the requirement in GC 5.2.1 (the "<i>Final Pre-Invoice Submission Meeting</i>"), the <i>Contractor</i> may submit an application for final payment to the <i>Owner</i> and to the <i>Consultant</i>, which application for payment shall: .1 include all of the requirements set out in GC 5.2.2, including without limitation those requirements listed in APPENDIX "1" - PROJECT SPECIFIC REQUIREMENTS FOR A PROPER INVOICE that are specific to an application for final payment; and .2 if applicable, (a) a certificate from the <i>Consultant</i> or written confirmation from the <i>Owner</i> that the deficiencies or incomplete <i>Work</i> waived by the <i>Owner</i> pursuant to GC 12.1.2 have been fully rectified as of the date of the <i>Contractor's</i> application for final payment, and/or (b) written confirmation, signed by the <i>Owner</i> and the <i>Contractor</i>, that the <i>Contract Price</i> has been reduced by a specified amount in exchange for the <i>Owner</i> releasing the <i>Contractor</i> of its obligation to rectify the certain outstanding deficiencies and/or incomplete <i>Work</i> waived by the <i>Owner</i> pursuant to GC 12.1.2, as detailed in such written confirmation. 5.5.2 No later than 5 calendar days prior to the <i>Final Pre-Invoice Submission Meeting</i>, the <i>Contractor</i> will, if not already provided, submit to the <i>Consultant</i> all <i>Close-Out Documentation</i>. 5.5.3 Delivery of all <i>Close-Out Documentation</i> is a requirement for the <i>Proper Invoice</i> for final payment. 5.5.4 After receipt by the <i>Owner</i> and the <i>Consultant</i> of an application for payment submitted by the <i>Contractor</i> that is a <i>Proper Invoice</i> and by no later than 10 calendar days after the receipt of the <i>Proper Invoice</i>: .1 the <i>Consultant</i> will either: (a) issue to the <i>Owner</i> with a copy to the <i>Contractor</i>, a progress payment certificate in the amount applied for by the <i>Contractor</i> in the <i>Proper Invoice</i>, or (b) deliver a finding to the <i>Owner</i> with reasons why an amount other than what is claimed in the <i>Proper Invoice</i> is properly due to the <i>Contractor</i>, which finding the <i>Owner</i> may accept or amend prior to issuing a <i>Notice of Non-Payment</i> (Form 1.1), if any, in accordance with GC 5.5.2; .2 the <i>Owner</i> shall make payment to the <i>Contractor</i> on account as provided in Article A-5 PAYMENT, (a) in the amount stated in the certificate for payment, or (b) in the amount stated in the certificate for payment less such amount stated in the <i>Owner's Notice of Non-Payment</i> issued pursuant to GC 5.5.5, on the 28th calendar day after receipt of a <i>Proper Invoice</i>, unless such 28th calendar day lands on a day that is other than a <i>Working Day</i>, in which case payment shall be made on the next <i>Working Day</i> after such 28th day.

		5.5.5 In the event that the application for final payment delivered by the <i>Contractor</i> does not include the requirements of GC 5.5.1 (including the requirements for a <i>Proper Invoice</i>) and GC 5.5.2 or where the <i>Owner</i> disputes the amount claimed as payable in the <i>Proper Invoice</i>, then the <i>Owner</i> shall within 14 calendar days of receipt of the application for payment, issue a <i>Notice of Non-Payment</i>. Where the <i>Owner</i> has delivered a <i>Notice of Non-Payment</i>, as specified under this GC 5.5.5, the <i>Owner</i> and the <i>Contractor</i> shall first engage in good faith negotiations to resolve the dispute. If within 5 calendar days following the issuance of a <i>Notice of Non-Payment</i>, despite good faith efforts by both parties with the assistance of the <i>Consultant</i>, the <i>Owner</i> and the <i>Contractor</i> cannot resolve the dispute, either party may commence an <i>Adjudication</i> in accordance with the procedures set out in the <i>Construction Act</i>. Any portion of the <i>Proper Invoice</i> which is not the subject of the <i>Notice of Non-Payment</i> shall be payable within the time period set out in GC 5.5.4.2. 5.5.6 Subject to the provisions of the <i>Construction Act</i> and any other rights conferred on the <i>Owner</i> at law or under this <i>Contract</i> to withhold payment or back charge or set-off against payment, the <i>Owner</i> shall pay the amount payable under a <i>Proper Invoice</i> for final payment in accordance with the <i>Construction Act</i>. 5.5.7 When the <i>Consultant</i> issues a certificate of completion in accordance with GC 5.5.4.1, the <i>Consultant</i> shall also issue a certificate for release of any holdback for finishing work amount. In accordance with the <i>Construction Act</i>, the <i>Owner</i> may retain any amounts which are required by law to satisfy any liens against the <i>Work</i>, in respect of any third party claims made to the <i>Owner</i> in respect of the <i>Contract</i> or the <i>Work</i>, and in respect of any claims the <i>Owner</i> may have against the <i>Contractor</i>. Subject to the foregoing, the <i>Owner</i> shall release the holdback in accordance with the <i>Construction Act</i>."

GC 5.6 DEFERRED WORK

SC33.1	5.6.1	<u>Delete</u> paragraph 5.6.1 and <u>replace</u> with the following: "5.6.1 If because of conditions reasonably beyond the control of the <i>Contractor</i>, there are items of work that cannot be performed, payment in full for that portion of the <i>Work</i> which has been performed as certified by the <i>Consultant</i> shall not be withheld or delayed by the <i>Owner</i> on account thereof, but the <i>Owner</i> may withhold, subject to its requirement to issue a <i>Notice of Non-Payment</i> under the <i>Construction Act</i>, until the remaining portion of the <i>Work</i> is finished, only such an amount that the <i>Consultant</i> determines is sufficient and reasonable to cover the cost of performing such remaining work. The remaining work shall be valued as deficient work as defined in GC 5.8.1."

NEW GC 5.8

DEFICIENCY HOLDBACK

SC34.1	5.8.1	<u>Add</u> new GC 5.8 – DEFICIENCY HOLDBACK as follows: "GC 5.8 DEFICIENCY HOLDBACK 5.8.1 Notwithstanding any provisions contained in the <i>Contract Documents</i> concerning certification and release of monies to the <i>Contractor</i>, the <i>Owner</i> reserves the right to retain a <i>Deficiency Holdback</i>, In addition to the <i>Construction Act</i> holdback. The <i>Deficiency</i>

		<i>Holdback</i> in the value of 2% shall be applied against the total Contract value and shall be applied to each progress payment. The <i>Deficiency Holdback</i> shall be payable to the Contractor upon the confirmation of completion of all deficiencies and defects in work by the Consultant and the Owner. 5.8.2 In performing the calculation under GC 5.8.1, .1 no individual deficiency will be valued at less than five hundred dollars (\$500.00); and .2 for any <i>Close-Out Documentation</i> not submitted in advance of or as part of the Contractor's application for <i>Substantial Performance of the Work</i>, an amount shall be retained by the Owner as part of the deficiency holdback that is equal to the estimated time and material costs to retain a third-party to re-create the applicable <i>Close-Out Documentation</i>, as determined by the Consultant, until such time as the applicable <i>Close-Out Documentation</i> is submitted and approved. 5.8.3 The deficiency holdback shall be due and payable to the Contractor on the 61st day following completion of all of the deficiencies listed by the Consultant and confirmed to be corrected, there being no claims for lien registered against the title to the <i>Place of the Work</i> issued in accordance with the <i>Construction Act</i>, and less any amounts disputed under an Owner's <i>Notice of Non-Payment</i> (Form 1.1)."

PART 6 CHANGES IN THE WORK

GC 6.1 OWNER'S RIGHT TO MAKE CHANGES

SC37.1	6.1.2	<u>Add</u> the following to the end of GC 6.1.2: "This requirement is of the essence and it is the express intention of the parties that any claims by the Contractor for a change in the <i>Contract Price</i> and/or <i>Contract Time</i> shall be barred unless there has been strict compliance with PART 6 - CHANGES IN THE WORK. No verbal dealings between the parties and no implied acceptance of alterations or additions to the <i>Work</i> and no claims that the Owner has been unjustly enriched by any alteration or addition to the <i>Work</i>, whether in fact there is any such unjust enrichment or not, shall be the basis of a claim for additional payment under this <i>Contract</i>, an increase to the <i>Contract Price</i>, or a claim for any extension of the <i>Contract Time</i>."
	6.1.3 to 6.1.8	<u>Add</u> new paragraphs 6.1.3, 6.1.4, 6.1.5, 6.1.6, 6.1.7 and 6.1.8 as follows: "6.1.3 The Contractor agrees that changes resulting from construction coordination, including but not limited to, scheduling, site surface conditions, site coordination, and <i>Subcontractor and Supplier</i> coordination are included in the <i>Contract Price</i> and the Contractor shall be precluded from making any claim for a change in the <i>Contract Price</i> as a result of such changes. 6.1.4 Labour costs shall be actual, prevailing rates at the <i>Place of the Work</i> paid to workers, plus statutory charges on labour including WSIB, unemployment insurance, Canada pension,

		vacation pay, hospitalization and medical insurance. The <i>Contractor</i> shall provide these rates, when requested by the <i>Consultant</i>, for review and/or agreement. 6.1.5 Quotations for changes to the <i>Work</i> shall only include <i>Direct Costs</i> and be accompanied by itemized breakdowns together with detailed, substantiating quotations or cost vouchers from <i>Subcontractors</i> and <i>Suppliers</i>, submitted in a format acceptable to the <i>Consultant</i> and shall include any <i>Direct Costs</i> associated with extensions in <i>Contract Time</i>. 6.1.6 When both additions and deletions covering related <i>Work</i> or substitutions are involved in a change to the <i>Work</i>, payment, including <i>Overhead</i> and profit, shall be calculated on the basis of the net difference, if any, with respect to that change in the <i>Work</i>. 6.1.7 Changes to the contract shall be quoted to permit the work to be executed within the <i>Contract Time</i> unless approved by the <i>Consultant</i> and the <i>Owner</i>. 6.1.8 No extension to the <i>Contract Time</i> shall be granted for changes in the <i>Work</i> unless the <i>Contractor</i> can clearly demonstrate that such changes significantly alter the overall construction schedule submitted at the commencement of the <i>Work</i>. Extensions of <i>Contract Time</i> and all associated costs, if approved, shall be included in the relevant <i>Change Order</i>. 6.1.9 When a change in the <i>Work</i> is proposed or required, the <i>Contractor</i> shall within 10 calendar days submit to the <i>Consultant</i> for review a claim for a change in <i>Contract Price</i> and/or <i>Contract Time</i>. Should 10 calendar days be insufficient to prepare the submission, the <i>Contractor</i> shall within 5 calendar days, advise the <i>Consultant</i> in writing of the proposed date of submission of the claim. Claims submitted after the dates prescribed herein will not be considered."

GC 6.2 CHANGE ORDER

SC38.1	6.2.1	In paragraph 6.2.1 after the last sentence in the paragraph <u>add</u> the following: "The adjustment in the <i>Contract Time</i> and the <i>Contract Price</i> shall include an adjustment, if any, for delay or for the impact that the change in the <i>Work</i> has on the <i>Work</i> of the <i>Contractor</i>, and once such adjustment is made, the <i>Contractor</i> shall be precluded from making any further claims for delay or impact with respect to the change in the <i>Work</i>."
	6.2.3 to 6.2.5	<u>Add</u> new paragraphs 6.2.3, 6.2.4, and 6.2.5 as follows: "6.2.3 The value of a change shall be determined in one or more of the following methods as directed by the <i>Consultant</i>: .1 by estimate and acceptance of a lump sum; .2 by negotiated unit prices which include the <i>Contractor's</i> overhead and profit, or;

		.3 by the actual <i>Direct Cost</i> to the <i>Owner</i>, such costs to be the actual cost after all credits included in the change have been deducted, plus the following ranges of mark-up on such costs: .1 Contractor on work of their own forces, 5% overhead, 5% profit. .2 Subcontractor on work of their own forces, 5% overhead, 5 % profit .3 Contractor on work of Subcontractor, 5% overhead only. 6.2.4 All quotations shall include <i>Direct Costs</i> and be submitted in a complete manner listing: .1 quantity of each material, .2 unit cost of each material, .3 man hours involved, .4 cost per hour, .5 <i>Subcontractor</i> quotations submitted listing items 1 to 4 above and item 6 below. .6 mark-up. 6.2.5 The <i>Owner</i> and the <i>Consultant</i> will not be responsible for delays to the <i>Work</i> resulting from late, incomplete or inadequately broken-down valuations submitted by the <i>Contractor</i>."

GC 6.3 CHANGE DIRECTIVE

SC39.1	6.3.6.1	<u>Amend</u> paragraph 6.3.6.1 by deleting the final period and adding the following: “.1 Contractors work by their own forces - 5% overhead and 5% profit, Subcontractor work by their own forces – 5% overhead and 5% profit, Contractors on Subcontractors work – 5% overhead only.
	6.3.6.2	<u>Delete</u> paragraph 6.3.6.2 and <u>replace</u> it with the following: “.2 If a change in the <i>Work</i> results in a net decrease in the <i>Contract Price</i>, the amount of the credit shall be the net cost, without deduction for <i>Overhead</i> or profit.”
	6.3.7.1(4)	<u>Delete</u> GC 6.3.7.1(4).
	6.3.7.7	Amend GC 6.3.7.7 by <u>deleting</u> the words “described in paragraph 6.3.7.1” and <u>replacing</u> them with “approved by the <i>Owner</i> in writing and in advance of any such expenses being incurred;”
	6.3.7.9	Amend GC 6.3.7.9 by <u>adding</u> the following to the end of the paragraph: “...when specifically requested by the <i>Owner</i> or as directed by the <i>Consultant</i>.”.

	6.3.7.10	Amend GC 6.3.7.10 by <u>adding</u> the following to the end of the paragraph: “, provided that such amounts are not caused by negligent acts, omissions, or default of the <i>Contractor</i> or <i>Subcontractor</i> ;”.
	6.3.7.13	<u>Delete</u> GC 6.3.7.13.
	6.3.7.15	<u>Delete</u> GC 6.3.7.15.
	6.3.7.17	<u>Delete</u> GC 6.3.7.17 in its entirety including all subparagraphs.
	6.3.11	<u>Delete</u> GC 6.3.11 and <u>replace</u> it with the following: “6.3.11 The value of the <i>Work</i> performed as a result of a <i>Change Directive</i> shall not be eligible to be included in progress payments until the amount, including the method for determining the amount, of such <i>Change Directive</i> has been determined.”

GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

SC40.1	6.4.1	<u>Delete</u> paragraph 6.4.1 in its entirety and <u>replace</u> with the following: “6.4.1.1 Prior to the submission of the bid on which the Contract was awarded, the Contractor confirms that it carefully investigated the Place of the Work insofar as the Place of Work was available for investigation and, in doing so, applied to that investigation the degree of care and skill required by paragraph 3.14.1 6.4.1.2 No claim by the <i>Contractor</i> will be considered by the <i>Owner</i> or the <i>Consultant</i> in connection with conditions which could reasonably have been ascertained by such investigation or other due diligence undertaken prior to the execution of the <i>Contract</i> .”
	6.4.2	<u>Amend</u> paragraph 6.4.2 by <u>adding</u> a new first sentence as follows: “Having regard to paragraph 6.4.1, if the <i>Contractor</i> believes that the conditions of the <i>Place of the Work</i> differ materially from those reasonably anticipated, differ materially from those indicated in the <i>Contract Documents</i> and were concealed from discovery notwithstanding the conduct of the investigation described in paragraph 6.4.1, it shall provide the <i>Owner</i> and the <i>Consultant</i> with <i>Notice in Writing</i> no later than five (5) <i>Working Days</i> after the first observation of such conditions.” -and- <u>amend</u> the existing second sentence of paragraph 6.4.2 in the second line, following the word “materially” by <u>adding</u> the words “or were concealed from discovery notwithstanding the conduct of the investigation described in paragraph 6.4.1,”.
	6.4.3	<u>Delete</u> paragraph 6.4.3 in its entirety and <u>substitute</u> the following:

		"6.4.3 If the <i>Consultant</i> makes a finding pursuant to paragraph 6.4.2 that no change in the <i>Contract Price</i> or the <i>Contract Time</i> is justified, the <i>Consultant</i> shall report in writing the reasons for this finding to the <i>Owner</i> and the <i>Contractor</i>."
	6.4.5	<u>Add</u> new paragraph 6.4.5 as follows: "6.4.5 No claims for additional compensation or for an extension of <i>Contract Time</i> shall be allowed if the <i>Contractor</i> fails to give <i>Notice in Writing</i> to the <i>Owner</i> or <i>Consultant</i>, as required by paragraph 6.4.2."

GC 6.5 DELAYS

SC41.1	6.5.1	In paragraph 6.5.1 <u>delete</u> the words after the word "for" in the fourth line and <u>replace</u> them with the words "...reasonable <i>Direct Costs</i> directly flowing from the delay, but excluding any consequential, indirect or special damages (including, without limitation, loss of profits, loss of opportunity or loss of productivity)."
	6.5.2	<u>Delete</u> GC 6.5.2 in its entirety and <u>replace</u> it with the following: "6.5.2 If the <i>Contractor</i> is delayed in the performance of the <i>Work</i> by a stop work order issued by a court or other public authority and providing that such order was issued on account of a direct breach, violation, contravention, or a failure to abide by any laws, ordinances, rules, regulations, or codes by the <i>Owner</i>, <i>Other Contractor(s)</i>, or the <i>Consultant</i>, and relating to the <i>Work</i> or the <i>Place of the Work</i>, then the <i>Contract Time</i> shall be extended for such reasonable time as the <i>Consultant</i> may determine. The <i>Contractor</i> shall be reimbursed by the <i>Owner</i> for reasonable <i>Direct Costs</i> directly flowing from the delay, but excluding any consequential, indirect or special damages (including, without limitation, loss of profits, loss of opportunity or loss of productivity)."
	6.5.3	<u>Delete</u> paragraph 6.5.3 in its entirety and <u>replace</u> with the following: "6.5.3 If either party is delayed in the performance of their obligations under this <i>Contract</i> by <i>Force Majeure</i>, then the <i>Contract Time</i> shall be extended for such reasonable time as the <i>Owner</i> and the <i>Contractor</i> shall agree. The extension of time shall not be less than the time lost as a result of the event causing the delay, unless the parties agree to a shorter extension. Neither party shall be entitled to payment for costs incurred by such delays. Upon reaching agreement on the extension of the <i>Contract Time</i> attributable to the <i>Force Majeure</i> event, the <i>Owner</i> and the <i>Contractor</i> shall execute a <i>Change Order</i> indicating the length of the extension to the <i>Contract Time</i> and confirming that there are no costs payable by the either party for the extension of <i>Contract Time</i>. However, if at the time an event of <i>Force Majeure</i> arises a party is in default of its obligations under the <i>Contract</i> and has received a notice of default pursuant to PART 7 – DEFAULT NOTICE, this paragraph 6.5.3 shall not excuse a party from its obligation to cure the default(s). For greater certainty, the defaulting party, to the extent possible, must continue to address and cure the default notwithstanding an event of <i>Force Majeure</i>."

	6.5.4	<u>Delete</u> paragraph 6.5.4 in its entirety and <u>replace</u> it with the following: “6.5.4 No extension or compensation shall be made for delay or impact on the <i>Work</i> unless notice in writing of a claim is given to the <i>Consultant</i> not later than ten (10) <i>Working Days</i> after the commencement of the delays or impact on the <i>Work</i>, provided however, that, in the case of a continuing cause of delay or impact on the <i>Work</i>, only one notice of claim shall be necessary.”
	6.5.6 to 6.5.8	<u>Add</u> new paragraphs 6.5.6, 6.5.7 and 6.5.8 as follows: “6.5.6 If the <i>Contractor</i> is delayed in the performance of the <i>Work</i> by an act or omission of the <i>Contractor</i> or anyone directly or indirectly employed or engaged by the <i>Contractor</i>, or by any cause within the <i>Contractor’s</i> control, then (i) firstly, at its expense, and to the extent possible, the <i>Contractor</i> shall accelerate the work and/or provide overtime work to recover time lost by a delay arising under this paragraph 6.5.6, and (ii) secondly, where it is not possible for the <i>Contractor</i> to recover the time lost by implementing acceleration measures and/or overtime work, the <i>Contract Time</i> may be extended for such reasonable time as the <i>Owner</i> may decide in consultation with the <i>Consultant</i> and the <i>Contractor</i>. The <i>Owner</i> shall be reimbursed by the <i>Contractor</i> for all reasonable costs incurred by the <i>Owner</i> as the result of such delay, including, but not limited to, <i>Owner’s</i> staff costs, the cost of all additional services required by the <i>Owner</i> from the <i>Consultant</i> or any sub-consultants, project managers, or others employed or engaged by the <i>Owner</i>, and in particular, the costs of the <i>Consultant’s</i> services during the period between the date of <i>Substantial Performance of the Work</i> stated in Article A-1 herein, as the same may be extended through the provision of these General Conditions, and any later or actual date of <i>Substantial Performance of the Work</i> achieved by the <i>Contractor</i>. 6.5.7 Without limiting the obligations of the <i>Contractor</i> described in GC 3.2 – CONSTRUCTION BY OWNER OR OTHER CONTRACTORS or GC 9.4 – CONSTRUCTION SAFETY, the <i>Owner</i> or <i>Consultant</i> may, by <i>Notice in Writing</i>, direct the <i>Contractor</i> to stop the <i>Work</i> where the <i>Owner</i> or <i>Consultant</i> determines that there is an imminent risk to the safety of persons or property at the <i>Place of the Work</i>. In the event that the <i>Contractor</i> receives such notice, it shall immediately stop the <i>Work</i> and secure the site. The <i>Contractor</i> shall not be entitled to an extension of the <i>Contract Time</i> or to an increase in the <i>Contract Price</i> unless the resulting delay, if any, would entitle the <i>Contractor</i> to an extension of the <i>Contract Time</i> or the reimbursement of the <i>Contractor’s</i> costs as provided in paragraphs 6.5.1, 6.5.2 or 6.5.3. 6.5.8 No claim for delay shall be made by the <i>Contractor</i> and the <i>Contract Time</i> shall not be extended due to climatic conditions or arising from the <i>Contractor’s</i> efforts to maintain the <i>Construction Schedule</i>.”

PART 7 DEFAULT NOTICE

GC 7.1

OWNER’S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR’S RIGHT TO CONTINUE WITH THE WORK OR TERMINATE THE CONTRACT

SC43.1	7.1.2	In GC 7.1.2, <u>delete</u> the words “and if the <i>Consultant</i> has given a written statement to the <i>Owner</i> and <i>Contractor</i> which provides the detail of such neglect to perform the <i>Work</i> properly or such failure to comply with the requirements of the <i>Contract</i> to a substantial degree”.
SC43.2	7.1.3.4	<u>Add</u> a new subparagraph 7.1.3.4 as follows: “.4 an “acceptable schedule” as referred to in subparagraph 7.1.3.2. means a schedule approved by the <i>Consultant</i> and the <i>Owner</i> wherein the default can be corrected within the balance of the <i>Contract Time</i> and shall not cause delay to any other aspect of the <i>Work</i> or the work of other contractors, and in no event shall it be deemed to give a right to extend the <i>Contract Time</i> .”
	7.1.4.1	<u>Delete</u> subparagraph 7.1.4.1 and <u>replace</u> it with the following: “.1 correct such default and deduct the cost, including <i>Owner’s</i> expenses, thereof from any payment then or thereafter due the <i>Contractor</i> .”
	7.1.4.2	<u>Delete</u> subparagraph 7.1.4.2 and <u>replace</u> it with the following: “.2 by providing <i>Notice in Writing</i> to the <i>Contractor</i> , terminate the <i>Contractor’s</i> right to continue with the <i>Work</i> in whole or in part or terminate the <i>Contract</i> , and publish a notice of termination (Form 8) in accordance with the <i>Act</i> .”
	7.1.5.3	In subparagraph 7.1.5.3 <u>delete</u> the words: “however, if such cost of finishing the <i>Work</i> is less than the unpaid balance of the <i>Contract Price</i> , the <i>Owner</i> shall pay the <i>Contractor</i> the difference”
	7.1.6 to 7.1.10	<u>Delete</u> GC 7.1.6 and <u>replace</u> it with new paragraphs 7.1.6, 7.1.7, 7.1.8, 7.1.9 and 7.1.10 as follows: 7.1.6 In addition to its right to terminate the <i>Contract</i> set out herein, the <i>Owner</i> may terminate this <i>Contract</i> at any time for any other reason and without cause upon giving the <i>Contractor</i> fifteen (15) <i>Working Days Notice in Writing</i> to that effect. In such event, the <i>Contractor</i> shall be entitled to be paid for all <i>Work</i> performed including reasonable profit, for loss sustained upon <i>Products</i> and <i>Construction Equipment</i> , and such other damages as the <i>Contractor</i> may have sustained as a result of the termination of the <i>Contract</i> , but in no event shall the <i>Contractor</i> be entitled to be compensated for any loss of profit on unperformed portions of the <i>Work</i> , or indirect, special, or consequential damages incurred. 7.1.7 The <i>Owner</i> may suspend <i>Work</i> under this <i>Contract</i> at any time for any reason and without cause upon giving the <i>Contractor Notice in Writing</i> to that effect. In such event, the <i>Contractor</i> shall be entitled to be paid for all <i>Work</i> performed to the date of suspension and be compensated for all actual costs incurred arising from the suspension, including reasonable profit, for loss sustained upon <i>Products</i> and <i>Construction Equipment</i> , and such other damages as the <i>Contractor</i> may have sustained as a result of the suspension of the <i>Work</i> , but in no event shall the <i>Contractor</i> be entitled to be compensated for any indirect, special, or consequential damages incurred. In the event that the suspension continues for more than thirty (30) calendar days, the <i>Contract</i> shall be deemed to be terminated and the provisions of paragraph 7.1.6 shall apply. 7.1.8 In the case of either a termination of the <i>Contract</i> or a suspension of the <i>Work</i> under GC 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, OR TERMINATE THE CONTRACT or GC 7.2 - CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the <i>Contractor</i> shall use its best commercial efforts to mitigate the financial consequences to the <i>Owner</i> arising out of the termination or suspension, as the case may be.

		7.1.9 Upon the resumption of the <i>Work</i> following a suspension under GC 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, OR TERMINATE THE CONTRACT or GC 7.2 - CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the <i>Contractor</i> will endeavour to minimize the delay and financial consequences arising out of the suspension. 7.1.10 The <i>Contractor's</i> obligations under the <i>Contract</i> as to quality, correction, and warranty of the <i>Work</i> performed by the <i>Contractor</i> up to the time of termination or suspension shall continue after such termination of the <i>Contract</i> or suspension of the <i>Work</i>."

GC 7.2

CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT

SC44.1	7.2.2	<u>Delete</u> paragraph 7.2.2 and <u>replace</u> it with the following: "7.2.2 If the <i>Work</i> is suspended or otherwise delayed for a period of 40 consecutive <i>Working Days</i> or more under a stop work order issued by a court or other public authority on account of a breach, violation, contravention, or a failure to abide by any laws, ordinances, rules, regulations, or codes directly by the <i>Owner</i>, the <i>Owner's</i> other contractor(s), or the <i>Consultant</i>, and relating to the <i>Work</i> or the <i>Place of the Work</i>, the <i>Contractor</i> may, without prejudice to any other right or remedy the <i>Contractor</i> may have, terminate the <i>Contract</i> by giving the <i>Owner</i> Notice in <i>Writing</i> to that effect."
SC44.2	7.2.3.1	<u>Delete</u> subparagraph 7.2.3.1 in its entirety.
	7.2.3.2	<u>Delete</u> subparagraph 7.2.3.2 in its entirety.
	7.2.3.4	In subparagraph 7.2.3.4, <u>delete</u> the words "except for GC 5.1 - FINANCING INFORMATION REQUIRED OF THE OWNER".
	7.2.5	<u>Delete</u> paragraph 7.2.5 and <u>replace</u> it with the following: "7.2.5 If the default cannot be corrected within the 5 <i>Working Days</i> specified in paragraph 7.2.4, the <i>Owner</i> shall be deemed to have cured the default if it: .1 commences correction of the default within the specified time; .2 provides the <i>Contractor</i> with an acceptable schedule for such correction; and, .3 completes the correction in accordance with such schedule."
	7.2.6 to 7.2.9	<u>Add</u> new paragraphs 7.2.6, 7.2.7, 7.2.8 and 7.2.9 as follows: "7.2.6 If the <i>Contractor</i> terminates the <i>Contract</i> under the conditions described in GC 7.2 – CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the <i>Contractor</i> shall be entitled to be paid for all <i>Work</i> performed to the date of termination, as determined by the <i>Consultant</i>. The <i>Contractor</i> shall also be entitled to recover the direct costs associated with termination, including the costs of demobilization and losses sustained

		on <i>Products</i> and <i>Construction Equipment</i>. The <i>Contractor</i> shall not be entitled to any recovery for any special, indirect or consequential losses, including loss of profit. 7.2.7 The <i>Contractor</i> shall not be entitled to give notice of the <i>Owner's</i> default or terminate the <i>Contract</i> in the event the <i>Owner</i> withholds certificates or payment or both in accordance with the <i>Contract</i> because of: .1 the <i>Contractor's</i> failure to pay all legitimate claims promptly, or .2 the failure of the <i>Contractor</i> to discharge construction liens which are registered against the title to the <i>Place of the Work</i>. 7.2.8 The <i>Contractor's</i> obligations under the <i>Contract</i> as to quality, correction and warranty of the <i>Work</i> performed by the <i>Contractor</i> up to the effective date of termination shall continue in force and shall survive termination of this <i>Contract</i> by the <i>Contractor</i>. 7.2.9 If the <i>Contractor</i> suspends the <i>Work</i> or terminates the <i>Contract</i> as provided for in GC 7.2 – CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the <i>Contractor</i> shall ensure the site and the <i>Work</i> are left in a safe, secure condition as required by authorities having jurisdiction at the <i>Place of the Work</i> and the <i>Contract Documents</i>."

PART 8 DISPUTE RESOLUTION

GC 8.1 AUTHORITY OF THE CONSULTANT

SC45.1	8.1.3	<u>Delete</u> paragraph 8.1.3 in its entirety and <u>substitute</u> as follows: "8.1.3 If a dispute is not resolved promptly, the <i>Consultant</i> will give such instruction as in the <i>Consultant's</i> opinion are necessary for the proper performance of the <i>Work</i> and to prevent delays pending settlement of the dispute. The parties shall act immediately according to such instructions, it being understood that by doing so neither party will jeopardize any claim the party may have."

GC 8.2 ADJUDICATION

SC45.2	8.2.2 to 8.2.7	<u>Add</u> new GC 8.2.2, 8.2.3, 8.2.4, 8.2.5, 8.2.6, and 8.2.7 as follows: "8.2.2 Save and except where the <i>Contractor</i> has given an undertaking, in accordance with the <i>Act</i>, to refer a dispute to <i>Adjudication</i>, prior to delivering a notice of <i>Adjudication</i> in a form prescribed by the <i>Act</i>, the parties agree to first address all disputes with at least one in-person meeting with the <i>Owner's</i> representative, the <i>Consultant's</i> representative, and the <i>Contractor's</i> representative. The parties agree that such steps will be taken to resolve any disputes in a timely and cost-effective manner. 8.2.3 Notwithstanding any other provisions in PART 8 DISPUTE RESOLUTION, the parties shall engage in <i>Adjudication</i> proceedings as required by, and in accordance with, the <i>Construction Act</i>. 8.2.4 The following procedures shall apply to any <i>Adjudication</i> the parties engage in under the <i>Construction Act</i>:

		.1 any hearings shall be held at a venue within the jurisdiction of the <i>Place of the Work</i> or such other venue as the parties may agree and which is acceptable to the adjudicator; .2 the <i>Adjudication</i> shall be conducted in English; .3 each party may be represented by counsel throughout an <i>Adjudication</i>; .4 there shall not be any oral communications with respect to issues in dispute that are the subject of an <i>Adjudication</i> between a party and the adjudicator unless it is made in the presence of both parties or their legal representatives; and .5 a copy of all written communications between the adjudicator and a party shall be given to the other party at the same time. 8.2.5 Any documents or information disclosed by the parties during an <i>Adjudication</i> are confidential and the parties shall not use such documents or information for any purpose other than the <i>Adjudication</i> in which they are disclosed and shall not disclose such documents and information to any third party, unless otherwise required by law, save and except the for the adjudicator. 8.2.6 If the <i>Contractor</i> fails to comply with any of the notice requirements set out in the <i>Contract</i>, including the time limits set out in any of the following: .1 GC 6.4 – CONCEALED OR UNKNOWN CONDITIONS; .2 GC 6.5 – DELAYS; .3 GC 6.6 – CLAIMS FOR A CHANGE IN CONTRACT PRICE; .4 PART 8 DISPUTE RESOLUTION .5 GC 9.2 – TOXIC AND HAZARDOUS SUBSTANCES .6 GC 9.3 – ARTIFACTS AND FOSSILS; or .7 GC 9.5 - MOULD in respect of any claim or dispute, the <i>Contractor</i> shall have no entitlement whatsoever (including to an increase in the <i>Contract Price</i>, or an extension of <i>Contract Time</i>) in the context of an <i>Adjudication</i> under the <i>Construction Act</i> and waives the right to make any such claims or disputes in an <i>Adjudication</i>. This GC 8.2.6 shall operate conclusively as an estoppel and bar in the event such claims or disputes are brought in an <i>Adjudication</i> and the <i>Owner</i> may rely on this GC 8.2.6 as a complete defence to any such claims or disputes. 8.2.7 The parties hereby acknowledge and agree, .1 that counterclaims, claims of set-off or the exercise or use of other contractual rights that permit the <i>Owner</i> to withhold, deduct or retain from monies otherwise owed to the <i>Contractor</i> under the <i>Contract</i> may be referred to, and included as part of, <i>Adjudications</i> under the <i>Construction Act</i>; .2 that disputes related to the termination or abandonment of the <i>Contract</i>, as well as any disputes that arise or are advanced following the termination or abandonment of the <i>Contract</i>, shall not be referred to <i>Adjudication</i> under the <i>Construction Act</i>; .3 that notice(s) of <i>Adjudication</i>, with respect to any dispute or claim relating to the <i>Project</i>, shall not be given, and no <i>Adjudication</i> shall be commenced following <i>Contract</i> completion, <i>Contract</i> abandonment, or termination of the <i>Contract</i>; .4 that any <i>Adjudication</i> between the <i>Contractor</i> and a <i>Subcontractor</i> or a supplier that relates to an <i>Adjudication</i> between the <i>Owner</i> and the <i>Contractor</i> shall be

		joined together to be adjudicated by a single adjudicator, provided that the adjudicator agrees to do so, and the <i>Contractor</i> shall include a provision in each of its contracts that contain an equivalent obligation to this GC 8.2.7.4; and .5 that, other than where the <i>Contractor</i> is obliged to commence an <i>Adjudication</i> pursuant to an undertaking under the <i>Construction Act</i>, neither the <i>Owner</i> nor the <i>Contractor</i> shall commence an <i>Adjudication</i> during the <i>Restricted Period</i>. 8.2.8 The parties acknowledge and agree that no <i>Adjudication</i>, arbitration, action, suit or other proceeding may be brought by the <i>Contractor</i> against the <i>Owner</i> in respect of a claim for an increase to the <i>Contract Price</i> as set out in GC 6.6, before the <i>Consultant</i> has issued its findings in respect of same, pursuant to GC 6.6.5. For greater clarity and without limiting the foregoing, the amount applied for in each <i>Proper Invoice</i> shall not include any amounts pertaining to the <i>Contractor's</i> claim for an increase in <i>Contract Price</i> unless and until the <i>Consultant</i> has issued a written notice to the <i>Contractor</i> regarding the validity of such claim, as provided for in GC 6.6.5. However, nothing in this GC 8.2.8 shall prevent a <i>Contractor</i> from commencing an <i>Adjudication</i> where, pursuant to the <i>Construction Act</i>, the <i>Contractor</i> is required to give an undertaking to a <i>Subcontractor</i> to commence an <i>Adjudication</i> following delivery of a <i>Notice of Non-Payment</i>."

GC 8.3 NEGOTIATION, MEDIATION AND ARBITRATION

SC46.1	8.3.1	<u>Amend</u> paragraph 8.3.1 by changing part of the second line from "shall appoint a <i>Project Mediator</i> " to "may appoint a <i>Project Mediator</i> , except that such an appointment shall only be made if both the <i>Owner</i> and the <i>Contractor</i> agree."
	8.3.4	<u>Amend</u> paragraph 8.3.4 by changing part of the second line from "the parties shall request the <i>Project Mediator</i> " to "and subject to paragraph 8.3.1 the parties may request the <i>Project Mediator</i> ".
	8.3.6 to 8.3.9	<u>Delete</u> paragraphs 8.3.6, 8.3.7 and 8.3.8 in their entirety and <u>replace</u> them with the following new GCs 8.3.6, 8.3.7, 8.3.8, and 8.3.9: "8.3.6 The dispute may be finally resolved by arbitration under the Rules for Arbitration of Construction Disputes as provided in CCDC 40 in effect at the time of bid closing, provided that both the <i>Contractor</i> and the <i>Owner</i> agree. If the <i>Contractor</i> and the <i>Owner</i> agree to resolve the dispute by arbitration, the arbitration shall be conducted in the jurisdiction of the <i>Place of the Work</i>. 8.3.7 Prior to delivering a notice of <i>Adjudication</i> in a form prescribed by the <i>Act</i>, the parties agree to first address all disputes by attending at least one meeting with the <i>Owner's</i> representative, the <i>Consultant's</i> representative, and the <i>Contractor's</i> representative, prior to commencing an <i>Adjudication</i>. The parties agree that such steps will be taken to resolve any disputes in a timely and cost effective manner. If a resolution to the dispute(s) is not made at such a meeting, any party who plans to commence an <i>Adjudication</i> shall provide the other party with 5 <i>Working Days' Notice in Writing</i> of its intention to issue a notice of <i>Adjudication</i>. 8.3.8 Other than where the <i>Contractor</i> is obliged to commence an <i>Adjudication</i> pursuant to an undertaking under the <i>Construction Act</i>, neither the <i>Owner</i> nor the <i>Contractor</i> shall commence an <i>Adjudication</i> during the <i>Restricted Period</i>. 8.3.9 Where either party has delivered a notice of <i>Adjudication</i> in a form prescribed by the <i>Act</i>, the procedures and rules set out under the <i>Construction Act</i> and the regulations thereto shall govern the <i>Adjudication</i>."

PART 9 PROTECTION OF PERSONS AND PROPERTY

GC 9.1 PROTECTION OF WORK AND PROPERTY

SC47.1	9.1.1.1	<u>Delete</u> subparagraph 9.1.1.1 in its entirety and <u>substitute</u> the following: “.1 errors in the <i>Contract Documents</i> which the <i>Contractor</i> could not have discovered applying the standard of care described in paragraph 3.14.1;”
	9.1.2	<u>Delete</u> paragraph 9.1.2 in its entirety and <u>substitute</u> as follows: “9.1.2 Before commencing any <i>Work</i> , the <i>Contractor</i> shall determine the locations of all underground or hidden utilities and structures indicated in or inferable from the <i>Contract Documents</i> , or that are inferable from an inspection of the <i>Place of the Work</i> exercising the degree of care and skill described in paragraph 3.14.1.”
	9.1.5	<u>Add</u> new paragraph 9.1.5 as follows: “9.1.5 With respect to any damage to which paragraphs 9.1.3 or 9.1.4 apply, the <i>Contractor</i> shall neither undertake to repair or replace any damage whatsoever to the work of other contractors, or to adjoining property, nor acknowledge that the same was caused or occasioned by the <i>Contractor</i> , without first consulting the <i>Owner</i> and receiving written instructions as to the course of action to be followed from either the <i>Owner</i> or the <i>Consultant</i> . Where, however, there is danger to life, the environment, or public safety, the <i>Contractor</i> shall take such emergency action as it deems necessary to remove the danger.”

GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

SC48.1	9.2.1	Amend GC 9.2.1 by <u>inserting</u> the following to the end of the paragraph: “For the purposes of GC 9.2 – TOXIC AND HAZARDOUS SUBSTANCES, <i>Excess Soil</i> shall not be considered a ‘toxic and hazardous substance’.”
SC48.2	9.2.5.5	Add a new subparagraph 9.2.5.5 as follows: “.5 in addition to the steps described in subparagraph 9.2.5.3, take any further steps it deems necessary to mitigate or stabilize any conditions resulting from encountering toxic or hazardous substances or materials.”
	9.2.6	<u>Amend</u> GC 9.2.6 by <u>adding</u> the following words after the word “responsible” in the second line: “or whether any toxic or hazardous substances or materials already at the <i>Place of the Work</i> (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the <i>Contractor</i> or anyone for whom the <i>Contractor</i> is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damages to the property of the <i>Owner</i> or others,”.

	9.2.8	<u>Amend</u> GC 9.2.8 by <u>adding</u> the following words after the word “responsible” in the second line: “or whether any toxic or hazardous substances or materials already at the <i>Place of the Work</i> (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the <i>Contractor</i> or anyone for whom the <i>Contractor</i> is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damages to the property of the <i>Owner</i> or others,”.
	9.2.10	<u>Add</u> new paragraph 9.2.10 as follows: “9.2.10 The <i>Contractor, Subcontractors and Suppliers</i> shall not bring on to the <i>Place of the Work</i> any toxic or hazardous substances and materials except as required in order to perform the <i>Work</i>. If such toxic or hazardous substances or materials are required, storage in quantities sufficient to allow work to proceed to the end of any current work week only shall be permitted. All such toxic and hazardous materials and substances shall be handled and disposed of only in accordance with all laws and regulations that are applicable at the <i>Place of the Work</i>.”

GC 9.4 CONSTRUCTION SAFETY

SC49.1	9.4.1	<u>Delete</u> GC 9.4.1 in its entirety and <u>replace</u> it with the following: “9.4.1 The <i>Contractor</i> shall be solely responsible for construction safety at the <i>Place of the Work</i> and for compliance with the rules, regulations, and practices required by the <i>OHSA</i>, including, but not limited to those of the “constructor”, and shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the <i>Work</i>. The <i>Contractor’s</i> health and safety program documentation shall be made available for review by the <i>Owner</i> or <i>Consultant</i> immediately upon request. Without limiting the foregoing, the <i>Contractor</i> shall be solely responsible for construction safety in respect of the <i>Consultant, Subcontractors and Suppliers</i>, the <i>Owner’s</i> own forces, <i>Other Contractors</i>, and all persons attending the <i>Place of the Work</i> during the course of the <i>Project</i>.”
	9.4.2	Amend GC 9.4.2 by <u>adding</u> the following words after “and the <i>Contractor</i>”: “, <i>Subcontractors and Suppliers</i>”.
	9.4.3	Amend GC 9.4.3 by <u>adding</u> the following words after “and the <i>Contractor</i>”: “, <i>Subcontractors and Suppliers</i>”.
	9.4.4	<u>Delete</u> GC 9.4.4 and replace it with the following:

		"9.4.4 The <i>Owner</i> undertakes to include in its contracts with other contractors and in its instructions to its own forces the requirement that the other contractor or its own forces, as the case may be, comply with the policies and procedures of and the directions and instructions from the <i>Contractor</i> with respect to occupational health and safety and related matters."
	9.4.5	<u>Delete</u> GC 9.4.5 in its entirety and <u>replace</u> it with the following: "9.4.5 Prior to the commencement of the <i>Work</i>, the <i>Contractor</i> shall submit to the <i>Owner</i>: .1 a current WSIB clearance certificate; .2 copies of the <i>Contractor's</i> insurance policies having application to the <i>Project</i> or certificates of insurance, at the option of the <i>Owner</i>; .3 documentation setting out the <i>Contractor's</i> in-house safety programs; .4 a copy of the Notice of Project filed with the Ministry of Labour naming itself as "constructor" under the <i>OHSA</i>; and .5 copies of any documentation or notices to be filed or delivered to the authorities having jurisdiction for the regulation of occupational health and safety at the <i>Place of the Work</i>;"
	9.4.6 to 9.4.12	<u>Add</u> new GC 9.4.6, 9.4.7, 9.4.8, 9.4.9, 9.4.10, 9.4.11, and 9.4.12 as follows: "9.4.6 The <i>Contractor</i> shall indemnify and save harmless the <i>Owner</i>, its agents, trustees, officers, directors, employees, consultants, successors, appointees, and assigns from and against the consequences of any and all safety infractions committed by the <i>Contractor</i> under <i>OHSA</i> and any other occupational health and safety legislation in force at the <i>Place of the Work</i> including the payment of legal fees and disbursements on a solicitor and client basis. Such indemnity shall apply to the extent to which the <i>Owner</i> is not covered by insurance. 9.4.7 If the <i>Owner</i> is of the reasonable opinion that the <i>Contractor</i> has not taken such precautions as are necessary to ensure compliance with the requirements of paragraph 9.4.1, the <i>Owner</i> may take any remedial measures which it deems necessary, including stopping the performance of all or any portion of the <i>Work</i>, and the <i>Owner</i> may use its employees, the <i>Contractor</i>, any <i>Subcontractor</i> or any other contractors to perform such remedial measures. 9.4.8 The <i>Contractor</i> shall file any notices or any similar document required pursuant to the <i>Contract</i> or the safety regulations in force at the <i>Place of the Work</i>. This duty of the <i>Contractor</i> will be considered to be included in the <i>Work</i> and no separate payment therefore will be made to the <i>Contractor</i>. 9.4.9 Unless otherwise provided in the <i>Contract Documents</i>, the <i>Contractor</i> shall develop, maintain and supervise for the duration of the <i>Work</i> a comprehensive safety program that will effectively incorporate and implement all required safety precautions. The program shall, at a minimum, respond fully to the applicable safety regulations and general construction practices for the safety of persons or property, including, without limitation, any general safety rules and regulations of the <i>Owner</i> and any workers' compensation or occupational health and safety statutes or regulations in force at the <i>Place of the Work</i>.

		9.4.10 The <i>Contractor</i> shall provide a copy of the safety program described in GC 9.4.9 hereof to the <i>Consultant</i> for delivery to the <i>Owner</i> prior to the commencement of the <i>Work</i>, and shall, ensure, as far as it is reasonably practical to do so, that every employer and worker performing work in respect of the <i>Project</i> complies with such program. 9.4.11 The <i>Contractor</i> shall arrange regular safety meetings, and shall supply and maintain, at its own expense, at its office or other well-known place at the job site, safety equipment necessary to protect the workers and general public against accident or injury as prescribed by the authorities having jurisdiction at the <i>Place of the Work</i>, including, without limitation, articles necessary for administering first-aid to any person and an emergency procedure for the immediate removal of any injured person to a hospital or a doctor's care. 9.4.12 The <i>Contractor</i> shall promptly report in writing to the <i>Owner</i> and the <i>Consultant</i> all accidents of any sort arising out of or in connection with the performance of the <i>Work</i>, whether on or adjacent to the job site, giving full details and statement of witnesses. If death or serious injuries or damages are caused, the accident shall be promptly reported by the <i>Contractor</i> to the <i>Owner</i> and the <i>Consultant</i> by telephone or messenger in addition to any reporting required under the applicable safety regulations."."

PART 10 GOVERNING REGULATIONS

GC 10.1 TAXES AND DUTIES

SC50.1	10.1.2	<u>Amend</u> paragraph 10.1.2 by <u>adding</u> the following sentence to the end of the paragraph: "For greater certainty, the <i>Contractor</i> shall not be entitled to any mark-up for overhead or profit on any increase in such taxes and duties and the <i>Owner</i> shall not be entitled to any credit relating to mark-up for overhead or profit on any decrease in such taxes. The <i>Contractor</i> shall provide a detailed breakdown of <u>Additional</u> taxes if requested by the <i>Owner</i> in a form satisfactory to the <i>Owner</i>."
	10.1.3	<u>Add</u> new paragraph 10.1.3 as follows: "10.1.3 Where the <i>Owner</i> is entitled to an exemption or a recovery of sales taxes, customs duties, excise taxes or <i>Value Added Taxes</i> applicable to the <i>Contract</i>, the <i>Contractor</i> shall, at the request of the <i>Owner</i>, assist with the application for any exemption, recovery or refund of all such taxes and duties and all amounts recovered or exemptions obtained shall be for the sole benefit of the <i>Owner</i>. The <i>Contractor</i> agrees to endorse over to the <i>Owner</i> any cheques received from the federal or provincial governments, or any other taxing authority, as may be required to give effect to this paragraph."

GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

SC51.1	10.2.5	<u>Amend</u> paragraph 10.2.5 by <u>adding</u> the words "Subject to paragraph 3.4" at the beginning of the paragraph. -and- <u>Add</u> the following to the end of the second sentence:

		"...and no further <i>Work</i> on the affected components of the <i>Contract</i> shall proceed until these directives have been obtained by the <i>Contractor</i> from the <i>Consultant</i> ."
	10.2.6	<u>Amend</u> paragraph 10.2.6 by <u>adding</u> the following sentence to the end of the paragraph: "In the event the <i>Owner</i> suffers loss or damage as a result of the <i>Contractor's</i> failure to comply with paragraph 10.2.5 and notwithstanding any limitations described in paragraph 12.1.1, the <i>Contractor</i> agrees to indemnify and to hold harmless the <i>Owner</i> and the <i>Consultant</i> from and against any claims, demands, losses, costs, damages, actions suits or proceedings resulting from such failure by the <i>Contractor</i> ."
	10.2.7	<u>Amend</u> paragraph 10.2.7 by inserting the words "which changes were not, or could not have reasonably been known to the <i>Owner</i> or to the <i>Contractor</i> , as applicable, at the time of bid closing and which changes did not arise as a result of a public emergency or other <i>Force Majeure</i> event" to the second line, after the words "authorities having jurisdiction".
	10.2.8	<u>Add</u> new paragraph 10.2.8 as follows: "10.2.8 The <i>Contractor</i> shall furnish all certificates that are required or given by the appropriate governmental authorities as evidence that the <i>Work</i> as installed conforms with the laws and regulations of authorities having jurisdiction, including certificates of compliance for the <i>Owner's</i> occupancy or partial occupancy. The certificates are to be final certificates giving complete clearance of the <i>Work</i> , in the event that such governmental authorities furnish such certificates."

GC 10.4 WORKERS' COMPENSATION

SC52.1	10.4.1	<u>Delete</u> paragraph 10.4.1 and <u>replace</u> with the following: "10.4.1 Prior to commencing the <i>Work</i> , and with each and every application for payment thereafter, including the <i>Contractor's</i> application for payment of the holdback amount following <i>Substantial Performance of the Work</i> and again with the <i>Contractor's</i> application for final payment, the <i>Contractor</i> shall provide evidence of compliance with workers' compensation legislation in force at the <i>Place of the Work</i> , including payments due thereunder."

GC 11.1 INSURANCE

SC53.1	11.1	<u>Delete</u> entirety of GC 11.1 and <u>replace</u> with the following: "GC 11.1 INSURANCE 11.1.1 Without restricting the generality of GC 12 – INDEMNIFICATION, the <i>Contractor</i> shall provide, maintain, and pay for the insurance coverages specified in GC 11.1 – INSURANCE. Unless otherwise stipulated, the duration of each insurance policy shall be from the date of commencement of the <i>Work</i> until the expiration of the warranty periods set out in the <i>Contract Documents</i> . Prior to commencement of the <i>Work</i> and upon the placement, renewal, <u>amendment</u> , or extension of all or any part of the insurance, the <i>Contractor</i> shall promptly provide the <i>Owner</i> with confirmation of coverage and, if required, a certified true copy of the policies certified by an authorized representative of the insurer together with copies of any <u>amending</u> endorsements. .1 General Liability Insurance

		General liability insurance shall be in the name of the <i>Contractor</i>, with the <i>Owner</i> and the <i>Consultant</i> named as <u>Additional</u> insureds, with limits of not less than \$5,000,000.00 inclusive per occurrence for bodily injury, death, and damage to property, including loss of use thereof, for itself and each of its employees, <i>Subcontractors</i> and/or agents. The insurance coverage shall not be less than the insurance required by IBC Form 2100, or its equivalent <u>replacement</u>, provided that IBC Form 2100 shall contain the latest edition of the relevant CCDC endorsement form. To achieve the desired limit, umbrella, or excess liability insurance may be used. All liability coverage shall be maintained for completed operations hazards from the date of <i>Ready-for-Takeover</i>, as set out in the certificate of <i>Ready-for-Takeover</i>, on an ongoing basis for a period of 6 years following <i>Ready-for-Takeover</i>. Where the <i>Contractor</i> maintains a single, blanket policy, the <u>Addition</u> of the <i>Owner</i> and the <i>Consultant</i> is limited to liability arising out of the <i>Project</i> and all operations necessary or incidental thereto. The policy shall be endorsed to provide the <i>Owner</i> with not less than 30 days' notice, in writing, in advance of any cancellation and of change or <u>amendment</u> restricting coverage. .2 Automobile Liability Insurance Automobile liability insurance in respect of licensed vehicles shall limits of not less than \$2,000,000.00 inclusive per occurrence for bodily injury, death and damage to property, covering all licensed vehicles <i>owned</i> or leased by the <i>Contractor</i>, and endorsed to provide the <i>Owner</i> with not less than 30 days' notice, in writing, in advance of any cancellation, change or <u>amendment</u> restricting coverage. Where the policy has been issued pursuant to a government-operated automobile insurance system, the <i>Contractor</i> shall provide the <i>Owner</i> with confirmation of automobile insurance coverage for all automobiles registered in the name of the <i>Contractor</i>. .3 Aircraft and Watercraft Liability Insurance Intentional Deleted. Not Applicable .4 Property and Boiler and Machinery Insurance (1) Builder's Risk property insurance shall be in the name of the <i>Contractor</i> with the <i>Owner</i> and the <i>Consultant</i> named as <u>Additional</u> insureds. The policy shall insure against all risks of direct physical loss or damage to the property insured which shall include all property included in the <i>Work</i>, whether owned by the <i>Contractor</i> or the owner or owned by others, so long as the property forms part of the <i>Work</i>. The property insured also includes all materials and supplies necessary to complete the work, whether installed in the work temporarily or permanently, in storage on the project site, or in transit to the project site, as well as temporary buildings, scaffolding, falsework forms, hoardings, excavation, site preparation and similar work. The insurance shall be for not less than the sum of the amount of the contract price and the full value of products that are specified to be provided by the owner for incorporation into the work, if applicable, with the deductible of \$10,000.00 payable by the contractor. The insurance shall include the foregoing and, otherwise, shall not be less than the insurance required by IBC Form 4042 or its equivalent <u>replacement</u> provided that the IBC Form 4042 shall include the latest <u>Addition</u> of the relevant CCDC endorsement form. The coverage shall be based on a completed value form and shall be maintained continuously until ten (10) days after the date of the final certificate of payment.

		(2) Boiler and machinery insurance shall be in the name of the <i>Contractor</i>, with the <i>Owner</i> and the <i>Consultant</i> named as <u>Additional</u> insureds, for not less than the <u>replacement</u> value of the boilers, pressure vessels and other insurable objects forming part of the <i>Work</i>. The insurance provided shall not be less than the insurance provided by the "Comprehensive Boiler and Machinery Form" and shall be maintained continuously from commencement of use or operation of the property insured and until 10 days after the date of the final certificate for payment. (3) The policies shall allow for partial or total use or occupancy of the <i>Work</i>. (4) The policies shall provide that, in the case of a loss or damage, payment shall be made to the <i>Owner</i> and the <i>Contractor</i> as their respective interests may appear. The <i>Contractor</i> shall act on behalf of the <i>Owner</i> for the purpose of adjusting the amount of such loss or damage payment with the insurers. When the extent of the loss or damage is determined, the <i>Contractor</i> shall proceed to restore the <i>Work</i>. Loss or damage shall not affect the rights and obligations of either party under the <i>Contract</i> except that the <i>Contractor</i> shall be entitled to such reasonable extension of the <i>Contract Time</i>, relative to the extent of the loss or damage, as determined by the <i>Owner</i>, in its sole discretion. (5) The <i>Contractor</i> shall be entitled to receive from the <i>Owner</i>, in <u>Addition</u> to the amount due under the <i>Contract</i>, the amount at which the <i>Owner's</i> interest in restoration of the <i>Work</i> has been appraised, such amount to be paid as the restoration of the <i>Work</i> proceeds and as provided in GC 5.2 – APPLICATIONS FOR PROGRESS PAYMENT and GC 5.3 – PROGRESS PAYMENT. In <u>Addition</u>, the <i>Contractor</i> shall be entitled to receive from the payments made by the insurer the amount of the <i>Contractor's</i> interest in the restoration of the <i>Work</i>. (6) In the case of loss or damage to the <i>Work</i> arising from the work of other contractors, or the <i>Owner's</i> own forces, the <i>Owner</i>, in accordance with the <i>Owner's</i> obligations under paragraph 3.2.2.4 of GC 3.2 – CONSTRUCTION BY OWNER OR OTHER CONTRACTORS, shall pay the <i>Contractor</i> the cost of restoring the <i>Work</i> as the restoration of the <i>Work</i> proceeds and as provided in GC 5.2 – APPLICATIONS FOR PROGRESS PAYMENT and GC 5.3 – PROGRESS PAYMENT. .5 Contractors' Equipment Insurance "All risks" contractors' equipment insurance covering construction machinery and equipment used by the <i>Contractor</i> for the performance of the <i>Work</i>, excluding boiler insurance, shall be in a form acceptable to the <i>Owner</i> and shall not allow subrogation claims by the insurer against the <i>Owner</i>. The policies shall be endorsed to provide the <i>Owner</i> with not less than 30 days' notice, in writing, in advance of cancellation, change or <u>amendment</u> restricting coverage. Subject to satisfactory proof of financial capability by the <i>Contractor</i> for self-insurance of his equipment, the <i>Owner</i> agrees to waive the equipment insurance requirement. 11.1.2 The <i>Contractor</i> shall be responsible for deductible amounts under the policies except where such amounts may be excluded from the <i>Contractor's</i> responsibility by the terms of GC 9.1 - PROTECTION OF WORK AND PROPERTY and GC 9.2 - DAMAGES AND MUTUAL RESPONSIBILITY.

		11.1.3 Where the full insurable value of the <i>Work</i> is substantially less than the <i>Contract Price</i>, the <i>Owner</i> may reduce the amount of insurance required to waive the course of construction insurance requirement. 11.1.4 If the <i>Contractor</i> fails to provide or maintain insurance as required by the <i>Contract Documents</i>, then the <i>Owner</i> shall have the right to provide and maintain such insurance and provide evidence of same to the <i>Contractor</i>. The <i>Contractor</i> shall pay the costs thereof to the <i>Owner</i> on demand, or the <i>Owner</i> may deduct the amount that is due or may become due to the <i>Contractor</i>. 11.1.5 All required insurance policies shall be with insurers licensed to underwrite insurance in the jurisdiction of the <i>Place of the Work</i>."

***NEW* GC 11.2 CONTRACT SECURITY**

SC52.1	GC 11.2	<u>Add</u> new GC 11.2 – CONTRACT SECURITY as follows: "GC 11.2 CONTRACT SECURITY 11.2.1 The <i>Contractor</i> shall, prior to the execution of the <i>Contract</i>, furnish a performance bond and labour and material payment bond which meets the requirements under paragraph 11.2.2. 11.2.2 The performance bond and labour and material payment bond shall: .1 be issued by a duly licensed surety company, which has been approved by the <i>Owner</i> and is permitted under the <i>Construction Act</i>, .2 be issued by an insurer licensed under the <i>Insurance Act</i> (Ontario) and authorized to transact a business of suretyship in the Province of Ontario; .3 shall be in the form prescribed by the <i>Construction Act</i>; .4 have a coverage limit of at least 50 per cent of the <i>Contract Price</i>, or such other percentage of the <i>Contract Price</i> as stated in the <i>Contract Documents</i>; .5 extends protection to <i>Subcontractors</i>, <i>Suppliers</i>, and any other persons supplying labour or materials to the <i>Project</i>; and .6 shall be maintained in good standing until the fulfillment of the <i>Contract</i>, including all warranty and maintenance periods set out in the <i>Contract Documents</i>.. 11.2.3 It is the intention of the parties that the performance bond shall be applicable to all of the <i>Contractor's</i> obligations in the <i>Contract Document</i> and, wherever a performance bond is provided with language which conflicts with this intention, it shall be deemed to be amended to comply. The <i>Contractor</i> represents and warrants to the <i>Owner</i> that it has provided its surety with a copy of the <i>Contract Documents</i> prior to the issuance of such bonds. 11.2.4 Without limiting the foregoing in any way, the bonds shall indemnify and hold harmless the <i>Owner</i> for and against costs and expenses (including legal and <i>Consultant</i> services and court costs) arising out of or as a consequence of any default of the <i>Contractor</i> under this <i>Contract</i>. 11.2.4 The <i>Contractor</i> shall be responsible for notifying the surety company of any changes made to the <i>Contract</i> during the course of construction.

		11.2.5 The premiums for bonds required by the <i>Contract Documents</i> shall be included in the <i>Contract Price</i>. 11.2.6 Should the <i>Owner</i> require additional bonds by the <i>Contractor</i> or any of his <i>Subcontractors</i>, after the receipt of bids for the <i>Work</i>, the <i>Contract Price</i> shall be increased by all direct costs attributable to providing such bonds. The <i>Contractor</i> shall promptly provide the <i>Owner</i>, through the <i>Consultant</i>, with any such bonds that may be required."

PART 12 OWNER TAKEOVER

GC 12.1 READY-FOR-TAKEOVER

SC55.1	12.1.1	<u>Delete</u> GC 12.1.1 in its entirety and <u>replace</u> it with the following: "12.1.1 <i>Ready-for-Takeover</i> shall be achieved when all of the following has occurred, as verified and approved by the <i>Owner</i>: .1 <i>Substantial Performance of the Work</i> has been achieved, as certified by the <i>Consultant</i>; .2 a permit for occupancy of the <i>Place of the Work</i> has been obtained from the authorities having jurisdiction; .3 the <i>Work</i> to be performed under the <i>Contract</i> has satisfied the requirements for deemed completion in accordance with Section 2(3) of the <i>Construction Act</i>, .4 final cleaning and waste removal, as required by the <i>Contract Documents</i>; .5 the <i>Contractor</i> has delivered to the <i>Consultant</i> and the <i>Owner</i> all inspection certificates from authorities having jurisdiction with respect to any component of the <i>Work</i> which has been completed; .6 subject only to GC 12.1.2, the entire <i>Work</i> has been completed to the requirements of the <i>Contract Documents</i>, including completion of all items on the punch list prepared at the time of <i>Substantial Performance of the Work</i> and the <i>Work</i> is being used for its intended purpose, and is so certified by the <i>Consultant</i>; .7 subject only to GC 12.1.2, the <i>Contractor</i> has submitted to the <i>Owner</i> and the <i>Consultant</i> in a collated and organized matter, all <i>Close-Out Documentation</i> and any other materials or documentation required by the <i>Contract Documents</i>; .8 subject only to GC 12.1.2, all <i>Products</i>, systems and components of the <i>Project</i> have been commissioned and certified for operation and accepted by the <i>Owner</i> and <i>Consultant</i>, and 9 subject only to GC 12.1.2, the <i>Contractor</i> has submitted to the <i>Owner</i> and the <i>Consultant</i> full and complete as-built drawings and <i>Specifications</i> revised by the <i>Contractor</i> to reflect the as-built state of the <i>Work</i>, clearly showing changes to the <i>Drawings</i> and <i>Specifications</i> from the original <i>Contract Documents</i>, all of which have been approved by the <i>Owner</i> acting reasonably."
SC55.2	12.1.2	<u>Delete</u> GC 12.1.2 in its entirety and <u>replace</u> it with the following:

		"12.1.2 The <i>Owner</i> may, in its sole, absolute, and unfettered discretion, waive compliance with a requirement, or a part thereof, for achieving <i>Ready-for-Takeover</i> set out in GC 12.1.1.6 to 12.1.1.9 (inclusive). Where the <i>Owner</i> exercises the discretion afforded under this GC 12.1.2, the <i>Contractor</i> shall be required to comply with GC 5.5.1.2 as part of its application for final payment and the <i>Owner</i> and the <i>Contractor</i>, in consultation with the <i>Consultant</i>, shall establish a reasonable date for completing the <i>Work</i>."
SC55.3	12.1.3	<u>Delete</u> GC 12.1.3 in its entirety and <u>replace</u> it with the following: "12.1.3 When the <i>Contractor</i> considers the <i>Work Ready-for-Takeover</i>, it shall submit a written application to the <i>Owner</i> and the <i>Consultant</i> for review."
SC55.4	12.1.4	In GC 12.1.4, <u>delete</u> the words "list and" from the second line.
SC55.5	12.1.5	<u>Delete</u> GC 12.1.5 in its entirety and <u>replace</u> it with the following: "12.1.5 Following the confirmation of the date of <i>Ready-for-Takeover</i> by the <i>Consultant</i> and as confirmed by the <i>Owner</i>, the <i>Contractor</i> may submit a final application for payment in accordance with GC 5.5 – FINAL PAYMENT."
SC55.6	12.1.6	<u>Delete</u> GC 12.1.6 in its entirety.

GC 12.2 EARLY OCCUPANCY

SC56.1	GC 12.2	<u>Delete</u> GC 12.2 – EARLY OCCUPANCY BY THE OWNER in its entirety, including all subparagraphs thereunder and <u>replace</u> it with the following: "12.2.1 The Owner reserves the right to take possession of and use for any intended purpose any portion or all of the undelivered portion of the Project even though the Work may not have reached Substantial Performance of the Work. Where the Work extends beyond the Contract Time, progress and completion of the Work shall not unduly interfere with the delivery of scheduled school programs. The taking of possession or use of any such portion of the Project shall not be deemed to be the Owner's acknowledgement or acceptance of the Work or Project nor shall it relieve the Contractor of any of its obligations under the Contract. 12.2.2 Whether the Project contemplates Work by way of renovations in buildings which will be in use or be occupied during the course of the Work or where the Project involves Work that is adjacent to a structure which is in use or is occupied, the Contractor, without in any way limiting its responsibilities under this Contract, shall take all reasonable steps to avoid interference with fire exits, building access and egress, continuity of electric power and all other utilities, to suppress dust and noise and to avoid conditions likely to propagate mould or fungus of any kind and all other steps reasonably necessary to promote and maintain the safety and comfort of the users and occupants of such structures or adjacent structures."

GC 12.3 WARRANTY

SC57.1	12.3.1 12.3.2	<u>Delete</u> from the first line of paragraph 12.3.1 the words "one year" and <u>replace</u> it with the words "two years" <u>Delete</u> from the first line of paragraph 12.3.2 the word "The" and <u>replace</u> it with the words "Subject to GC 1.1.3, the..."
	12.3.7 to 12.3.12	<u>Add</u> new paragraphs 12.3.7 to 12.3.12 as follows: "12.3.7 Where required by the <i>Contract Documents</i>, the <i>Contractor</i> shall provide a maintenance bond as security for the performance of the <i>Contractor's</i> obligations as set out in GC 12.3 WARRANTY. 12.3.8 The <i>Contractor</i> shall provide fully and properly completed and signed copies of all warranties and guarantees required by the <i>Contract Documents</i>, containing: .1 the proper name of the <i>Owner</i>; .2 the proper name and address of the <i>Project</i>; .3 the date the warranty commences, which shall be at the "Ready-for-Takeover" unless otherwise agreed upon by the <i>Consultant</i> in writing. .4 a clear definition of what is being warranted and/or guaranteed as required by the <i>Contract Documents</i>; and .5 the signature and seal (if required by the governing law of the <i>Contract</i>) of the company issuing the warranty, countersigned by the <i>Contractor</i>. 12.3.9 Should any <i>Work</i> need to be repaired or replaced during the time period for which it is covered by the specified warranty, a new warranty shall be provided under the same conditions and for the same period as specified herein before. The new warranty shall commence at the completion of the repair or replacement. 12.3.10 The <i>Contractor</i> shall ensure that its <i>Subcontractors</i> are bound to the requirements of GC 12.3 – WARRANTY for the <i>Subcontractor's</i> portion of the <i>Work</i>. 12.3.11 The <i>Contractor</i> shall ensure that all warranties, guarantees or other obligations for <i>Work</i>, services or <i>Products</i> performed or supplied by any <i>Subcontractor</i>, <i>Supplier</i> or other person in connection with the <i>Work</i> are obtained and available for the direct benefit of the <i>Owner</i>. In the alternative, the <i>Contractor</i> shall assign to the <i>Owner</i> all warranties, guarantees or other obligations for <i>Work</i>, services or <i>Products</i> performed or supplied by any <i>Subcontractor</i>, <i>Supplier</i> or other person in connection with the <i>Work</i> and such assignment shall be with the consent of the assigning party, where required by law, or by the terms of that party's contract. Such assignment shall be in addition to, and shall in no way limit, the warranty rights of the <i>Owner</i> under the <i>Contract Documents</i>. 12.3.12 The <i>Contractor</i> shall commence or correct any deficiency within 2 <i>Working Days</i> after receiving a <i>Notice in Writing</i> from the <i>Owner</i> or the <i>Consultant</i>, and shall complete the <i>Work</i> as expeditiously as possible, except in the case where the deficiency prevents maintaining security or where basic systems essential to the ongoing business of the <i>Owner</i> and/or its tenants cannot be maintained operational as designed. In those circumstances all necessary corrections and/or installations of temporary replacements shall be carried out immediately as an emergency service. Should the <i>Contractor</i> fail to provide this emergency service within 8 hours of a request being made during the

		normal business hours of the <i>Contractor</i> , the <i>Owner</i> is authorized, notwithstanding GC 3.1, to carry out all necessary repairs or replacements at the <i>Contractor's</i> expense."

PART 13 INDEMNIFICATION AND WAIVER

GC 13.1 INDEMNIFICATION

SC58.1	GC 13.1	<u>Delete</u> GC 13.1 – INDEMNIFICATION in its entirety and <u>replace</u> it with the following: "13.1.1 The <i>Contractor</i> shall indemnify and hold harmless the <i>Owner</i>, its parent, subsidiaries and affiliates, their respective partners, trustees, officers, directors, agents and employees and the <i>Consultant</i> from and against any and all claims, liabilities, expenses, demands, losses, damages, actions, costs, suits, or proceedings (hereinafter called "claims"), whether in respect of claims suffered by the <i>Owner</i> or in respect of claims by third parties, that directly or indirectly arise out of, or are attributable to, the acts or omissions of the <i>Contractor</i>, its employees, agents, <i>Subcontractors</i>, <i>Suppliers</i> or any other persons for whom it is in law responsible (including, without limitation, claims that directly or indirectly arise out of, or are attributable to, loss of use or damage to the <i>Work</i>, the <i>Owner's</i> property or equipment, the <i>Contractor's</i> property or equipment or equipment or property adjacent to the <i>Place of the Work</i> or death or injury to the <i>Contractor's</i> personnel). 13.1.2 The <i>Owner</i> shall indemnify and hold the <i>Contractor</i>, its agents and employees harmless from and against claims, demands, losses, costs, damages, actions, suits or proceedings arising out of the <i>Contractor's</i> performance of the <i>Contract</i> which are attributable to a lack of or defect in title or an alleged lack of or defect in title to the <i>Place of the Work</i>. 13.1.3 The provisions of GC 13.1 - INDEMNIFICATION shall survive the termination of the <i>Contract</i>, howsoever caused and no payment or partial payment, no issuance of a final certificate of payment and no occupancy in whole or in part of the <i>Work</i> shall constitute a waiver or release of any of the provisions of GC 13.1 13.1.4 Notwithstanding the provisions of GC1.1 - CONTRACT DOCUMENTS, GC 1.1.6, GC13.1 - INDEMNIFICATION shall govern over the provisions of GC 1.3.1 of GC1.3 – RIGHTS AND REMEDIES."

GC 13.2 WAIVER OF CLAIMS

	13.2.1	In paragraph 13.2.1 in the third line after the word "limitation" <u>add</u> the words "claims for delay pursuant to GC 6.5 DELAYS" -and- <u>add</u> the words "(collectively "Claims")" after "<i>Ready-for-Takeover</i>" in the fourth line.
	13.2.1.1	In subparagraph 13.2.1.1, in each instance change the word "claims" to "Claims" and change the word "claim" to "Claim".

	13.2.1.2	In subparagraph 13.2.1.2 change the word “claims” to “Claims”.
	13.2.1.3	<u>Delete</u> subparagraph 13.2.1.3 in its entirety.
	13.2.1.4	In paragraph 13.2.1.4 change the word “claims” to “Claims”.
	13.2.2.1	In paragraph 13.2.2.1 <u>delete</u> the words “in paragraphs 13.2.1.2 and 13.2.1.3” and <u>replace</u> them with “in paragraph 13.2.1.2” -and- change the word “claims” to “Claims” in both instances and change the word “claim” to “Claim”.
	13.2.3	<u>Delete</u> paragraph 13.2.3 in its entirety.
	13.2.4	<u>Delete</u> paragraph 13.2.4 in its entirety.
	13.2.5	<u>Delete</u> paragraph 13.2.5 in its entirety.
	13.2.6	In paragraph 13.2.6 change the word “claim” to “Claim” in all instances in the paragraph.
	13.2.8	In paragraph 13.2.8 change “The party” to “The <i>Contractor</i> ” -and- change the word “claim” to “Claim” in all instances in the paragraph.
	13.2.9	In paragraph 13.2.9 <u>delete</u> the words “under paragraphs 13.2.1 or 13.2.3” and <u>replace</u> them with “under paragraph 13.2.1” -and- change both instances of the words “the party” to “the <i>Contractor</i> ”. Change the word “claim” to “Claim” in all instances in the paragraph.

***NEW* PART 14 OTHER PROVISIONS**

SC58.1	14.1	<u>Add</u> new PART 14 – OTHER PROVISIONS as follows: “PART 14 OTHER PROVISIONS GC 14.1 OWNERSHIP OF MATERIALS

		14.1.1 Unless otherwise specified, all materials existing at the <i>Place of the Work</i> at the time of execution of the <i>Contract</i> shall remain the property of the <i>Owner</i>. All <i>Work</i> and <i>Products</i> delivered to the <i>Place of the Work</i> by the <i>Contractor</i> shall be the property of the <i>Owner</i>. The <i>Contractor</i> shall remove all surplus or rejected materials as its property when notified in writing to do so by the <i>Consultant</i>."
	14.2	<u>Add</u> new GC 14.2 – CONSTRUCTION LIENS as follows: "GC 14.2 LIENS 14.2.1 Notwithstanding any other provision in the <i>Contract</i>, the <i>Consultant</i> shall not be obligated to issue a certificate, and the <i>Owner</i> shall not be obligated to make payment, subject to the <i>Owner's</i> requirement to issue a <i>Notice of Non-Payment</i> (Form 1.1) to the <i>Contractor</i>, if at the time such certificate or payment was otherwise due: .1 a claim for lien has been registered against the <i>Project</i> lands by a <i>Subcontractor</i> or a <i>Supplier</i> that has not been vacated or discharged by the <i>Contractor</i> in accordance with the requirements of this <i>Contract</i>, or .2 if the <i>Owner</i> or a mortgagee of the <i>Project</i> lands has received a written notice of a lien that has not been resolved by the <i>Contractor</i> through the posting of security or otherwise. 14.2.2 In the event a construction lien arising from the performance of the <i>Work</i> is registered or preserved against the <i>Project</i> lands by a <i>Subcontractor</i> or a <i>Supplier</i>, or a written notice of a lien is given or a construction lien action is commenced against the <i>Owner</i> by a <i>Subcontractor</i> or a <i>Supplier</i>, then the <i>Contractor</i> shall, at its own expense: .1 within 10 calendar days of registration of the construction lien, vacate or discharge the lien from title to the premises (i.e. the <i>Place of the Work</i>). If the lien is merely vacated, the <i>Contractor</i> shall, if requested, undertake the <i>Owner's</i> defence of any subsequent action commenced in respect of the lien, at the <i>Contractor's</i> sole expense; .2 within 10 calendar days of receiving notice of a written notice of a lien, post security with the Ontario Superior Court of Justice so that the written notice of a lien no longer binds the parties upon whom it was served; and .3 satisfy all judgments and pay all costs arising from such construction liens and actions and fully indemnify the <i>Owner</i> against all costs and expenses arising from same, including legal costs on a full indemnity basis. 14.2.3 In the event that the <i>Contractor</i> fails or refuses to comply with its obligations pursuant to paragraph 14.2.2, the <i>Owner</i> shall, at its option, be entitled to take all steps necessary to address any such construction liens including, without limitation and in addition to the <i>Owner's</i> rights under paragraph 13.2.4, the posting of security with the Ontario Superior Court of Justice to vacate the claim for lien from title to the <i>Project</i> lands, and in so doing will be entitled to a full indemnity from the <i>Contractor</i> for all legal fees, security,

		disbursements and other costs incurred and will be entitled to deduct same from amounts otherwise owing to the <i>Contractor</i>. 14.2.4 In the event that any <i>Subcontractor</i> or <i>Supplier</i> registers any claim for lien with respect to all or part of the <i>Place of Work</i>, the <i>Owner</i> shall have the right to withhold, in addition to the statutory holdback, the full amount of said claim for lien plus either: (a) \$250,000 if the claim for lien is in excess of \$1,000,000 or (b) 25% of the value of the claim for lien and to bring a motion to vacate the registration of said claim for lien and any associated certificate of action in respect of that lien, in accordance with Section 44 of the <i>Act</i>, by paying into court as security the amount withheld. 14.2.5 Nothing in this GC 14.2 serves to preclude the <i>Contractor</i> from preserving and perfecting its lien in the event of non-payment by the <i>Owner</i>."

APPENDIX 1
to the Supplementary Conditions

Project-specific requirements for a "Proper Invoice"

To satisfy the requirements for a *Proper Invoice*, the following criteria, as may be applicable in each case, must be included with the *Contractor's* application for payment:

- .1 the written bill or request for payment must be in writing;
- .2 the *Contractor's* name and current address;
- .3 the *Contractor's* HST registration number;
- .4 the date the application for payment was prepared by the *Contractor*;
- .5 the period of time in which the services or materials were supplied to the *Owner*;
- .6 the purchase order number provided by the *Owner*;
- .7 reference to the provisions of the *Contract* under which payment is being sought (e.g. GC 5.3 –PAYMENTS for progress payments, GC 5.4 – SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK GC 5.5 – FINAL PAYMENT for final payment, etc.);
- .8 a description, including quantities where appropriate, of the services or materials, or a portion thereof, that were supplied and form the basis of the *Contractor's* request for payment;
- .9 the amount the *Contractor* is requesting to be paid by the *Owner*, set out in a statement based on the schedule of values approved under GC 5.2.4, separating out any statutory or other holdbacks, set-offs and HST;
- .10 a sworn Statutory Declaration in the form CCDC 9A-2018, only for second and subsequent progress payments;
- .11 a current Workplace Safety Insurance Board clearance certificate;
- .12 a pre-approved schedule of values, supplied by the *Contractor*, for Divisions 1 through 14 of the *Specifications* (or equivalent Construction Specifications Institute Masterformat) of the *Work*, aggregating the total amount of the *Contract Price*, including all supporting invoicing;
- .13 a separate pre-approved schedule of values, supplied by each *Subcontractor*, for each of Division 15, 16, and 17 of the *Specifications* (or equivalent Construction Specifications Institute Masterformat) of the *Work*, aggregating the total amount of the *Contract Price*, including all supporting invoicing;

- .14 invoices and other supporting documentation for all claims against the cash allowance;
- .15 a current, acceptable, and up to date *Construction Schedule Update*;
- .16 if requested by the *Owner*, a current and valid certificate(s) of insurance as required under GC 11.1 – INSURANCE;
- .17 the name, title, telephone number and mailing address of the person at the place of business of the *Contractor* to whom payment is to be directed;
- .18 a current, up to date, and approved *Shop Drawing* log;
- .19 in the case of the *Contractor's* application for final payment, in addition to the foregoing requirements (as applicable):
 - (a) any *Close-Out Documentation*, together with complete and final as-built drawings;
 - (b) the *Contractor's* written request for release of the deficiency holdback, including a statement that no written notices of lien have been received by it;
 - (c) the *Contractor's* written certification that there are no outstanding claims, pending claims or future claims from the *Contractor* or their *Subcontractors* or *Suppliers*; and
 - (d) sufficient evidence of the *Contractor's* compliance with GC 3.11.

END OF AMENDMENTS TO CCDC 2 - 2020

DIVISION 01 - GENERAL REQUIREMENTS

01 14 00 – Work Restrictions

1.0 GENERAL

1.1. SECTION INCLUDES

- .1 Connecting to existing services
- .2 Special scheduling requirements

1.2. RELATED SECTIONS

- .1 Section 01 53 00 - Temporary Construction.
- .2 Section 01 33 00 - Submittal Procedures.
- .3 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3. EXISTING SERVICES

- .1 Notify Owner and Consultant and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Consultant and Owner forty-eight (48) hours of notice for necessary interruption of mechanical or electrical service throughout the course of work.
 - .1 Keep duration of interruptions minimum.
 - .2 Perform interruptions after normal working hours of occupants, preferably on weekends.
- .2 Provide for vehicular, pedestrian and personnel traffic.
- .3 Construct barriers in accordance with Section 01 53 00.

1.2. AFTER HOURS WORK

- .1 Schedule Work with school staff through the Board's contact so as to limit disruption to school operations. Include for any overtime, to ensure orderly and continuous progression of Work and operation of school.
- .2 Direct calls from Contractors to Board staff to adjust alarms and to arrange for access will not be accepted. All correspondence must be through the Project Manager.
- .3 Arrange 48 hours in advance with the Board to obtain an access card and adjust security alarms for after hours Work.
- .4 Bidders are cautioned that the Board will be compensated by the Contractor for false alarms. Any costs associated with each false alarm will be levied against the

Contractor for false fire alarm activation or security alarm activation. These costs may include, but are not limited to:

- .1 Fines or penalties imposed by the local Fire Services,
- .2 Fines or penalties imposed by the local Police Services,
- .3 Overtime costs borne by the Board.
- .5 Contractors are responsible for ensuring doors and windows are secured prior to leaving school.
- .6 Unless specifically stated otherwise school activities take precedence over Contractor's activities.

1.3. SPECIAL REQUIREMENTS

- .1 Schedule and perform work in occupied areas to the Board Representative's approval.
- .2 Schedule and perform noise generating work to the Board Representative's approval.
- .3 Submit schedule of special requirements or disruptions in accordance with Section 01 33 00.
- .4 All Contractor personnel are restricted to the job site and necessary access routes. No personnel shall visit other areas or buildings without specific authorization.

END OF SECTION

01 19 00 – Specifications and Documents

1.0 GENERAL

1.1. RELATED DOCUMENTS

- .1 This section describes requirements applicable to all sections within Divisions 02 to 49.

1.2. WORDS AND TERMS

- .1 Conform to definitions and their defined meanings in the Agreement and Definitions portion of CCDC 2 for Supplementary Words and Terms listed in Section 00 56 13.

1.3. COMPLEMENTARY DOCUMENTS

- .1 Generally, drawings indicate graphically, the dimensions and location of components and equipment. Specifications indicate specific components, assemblies, and identify quality.
- .2 Drawings, specifications, diagrams and schedules are complementary, each to the other, and what is required by one, to be binding as if required by all.
- .3 Should any conflict or discrepancy appear between documents, which leaves doubt as to the intent or meaning, apply the Precedence of Documents article below or obtain guidance or direction from Consultant.
- .4 Examine all discipline drawings, specifications, schedules, diagrams and related Work to ensure that Work can be satisfactorily executed.
- .5 All specification sections of the Project Manual and Drawings are affected by requirements of Division 01 sections.

1.4. PRECEDENCE OF DOCUMENTS

- .1 In the event of conflict within and between the Contract Documents, the order of priority within specifications and drawings for this project are - from highest to lowest:
 - .1 the Agreement and Definitions between the Owner and the Construction
 - .2 the Defined Terms, Definitions;
 - .3 Supplementary Conditions;
 - .4 the General Conditions;
 - .5 Sections of Division 01 of the specifications;
 - .6 Technical specifications Sections of Divisions 02 through 49 of the specifications.

- .7 Schedules and Keynotes:
 - .1 Material and finishing schedules within the specifications, then;
 - .2 Material and finishing schedules on drawings, then;
 - .3 Keynotes and definitions thereto, then;
- .8 Drawings:
 - .1 Drawings of larger scale shall govern over those of smaller scale of the same date, then;
 - .2 Dimensions shown on drawings shall govern over dimensions scaled from drawings, then;
 - .3 Location of utility outlets indicated on architectural detail drawings takes precedence over positions or mounting heights located on mechanical or electrical Drawings.
- .9 Later dated documents shall govern over earlier documents of the same type.

1.5. SPECIFICATION GRAMMAR

- .1 Specifications are written in the imperative command mode, in an abbreviated form.
- .2 Imperative language of the technical sections is always directed to the Contractor identified as a primary constructor, as sole executor of the Contract, unless specifically noted otherwise.
 - .1 This form of imperative command mode statement requires the primary constructor to perform such action or Work.
 - .2 Perform all requirements of the Contract Documents whether stated imperatively or otherwise.
- .3 Division of the Work among subcontractors, suppliers, or others is solely the prime contractor's responsibility. The Consultant(s) and specification authors assume no responsibility to function or act as an arbiter to establish subcontract scope or limits between sections or divisions of Work.

END OF SECTION

01 21 00 – Allowances

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 Section 01 45 00 – Quality Control.
- .2 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2. GENERAL

- .1 Allowances included herein are for items of Work which could not be fully quantified prior to Bidding.
- .2 Expend each allowance as directed by the Consultant. Work covered by allowances shall be performed for such amounts and by such persons as directed by Consultant.
- .3 Funds will be expended by means of Cash Allowance allocations and contingency allowance allocations.
- .4 Progress payments for Work and Products authorized under allowances will be made in accordance with the payment terms set out in the Conditions of the Contract.
- .5 The Contractor shall bid the work involved and submit the Bids received to the Consultant and the Board, for approval
- .6 The Contractor shall submit 3 bids unless directed by the Board.

1.3. CASH ALLOWANCES

- .1 Cash allowances, cover the net cost to the Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage, installation where indicated, and other authorized expenses incurred in performing the Work. Cash allowances shall not be included by a subcontractor in the amount for their subcontract work.
- .2 Supply only allowances shall include:
 - .1 Net cost of Products.
 - .2 Delivery to Site.
 - .3 Applicable taxes and duties, excluding HST.
- .3 Supply and install allowances shall include:
 - .1 Net cost of Products.
 - .2 Delivery to Site.
 - .3 Unloading, storing, handling or products on site.
 - .4 Installation, finishing and commissioning of products.

- .5 Applicable taxes and duties, excluding HST.
- .4 Inspection and testing allowances shall include:
 - .1 Net cost of inspection and testing services.
 - .2 Applicable taxes and duties, excluding HST.
- .5 Other costs related to work covered by cash allowances are not covered by the allowance, but shall be included in the Contract Price.
- .6 Where costs under a cash allowance exceed the amount of the allowance, the Contractor will be compensated for any excess incurred and substantiated plus an allowance for overhead and profit as set out in the Contract Documents.
- .7 Progress payments on accounts of work authorized under cash allowances shall be included in the monthly certificate for payment.
- .8 Submit, before application for final payment, copies of all invoices and statements from suppliers and subcontractors for work which has been paid from cash allowances.

1.4. ALLOWANCES SCHEDULE

Include in the Bid Price a cash allowance of to address the cost of the following items:

1	Independent Testing & Inspection (As directed by the Consultant)	\$5,000.00
2	FF & E	\$30,000.00
3	Furniture for Exterior Seating Area	\$22,000.00
4	Substation Maintenance	\$18,000.00
5	Unforeseen Site Conditions	\$10,000.00
6	Data cabling installation and network equipment (Including terminations)	\$5,000.00
7	Remedial Painting (in Addition to Painting in Contract)	\$10,000.00
8	Public Address (PA) systems. (Including all cabling and hardware)	\$10,000.00
Total of All Allowances:		\$110,000.00

END OF SECTION

01 31 00 – Project Managing And Coordination

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 Section 01 32 00 - Construction Progress Documentation.
- .2 Section 01 33 00 - Submittal Procedures.
- .3 Section 01 53 00 – Temporary Construction Facilities
- .4 Section 01 61 00 – Product Requirements
- .5 Section 01 78 10 – Closeout Submittals and Requirements
- .6 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2. PROJECT COORDINATION

- .1 Perform coordination of progress schedules, submittals, use of site, temporary utilities, construction facilities and construction Work, with progress of Work of other contractors, under instructions of the Consultant.
- .2 The Contractor shall have total control of the Work and shall effectively direct and supervise the Work so as to ensure conformity with the Contract Documents and within the Contract Time.
- .3 The Contractor shall be solely responsible for the construction means, methods, sequences, and procedures and for coordinating parts of the Work under the contract.
- .4 Coordinate progress of the Work, progress schedules, submittals, use of site, temporary utilities, construction facilities, safety regulations and fire protection, as per authorities having jurisdiction codes.
- .5 The Consultant has the authority to stop the Work:
 - .1 whenever they observe or are made aware of unsafe conditions.
 - .2 whenever it is deemed necessary to protect the interests of the Board,
 - .3 whenever materials or workmanship are in contravention to the Contract Documents.

1.3. SITE SUPERVISOR AND PROJECT MANAGER

- .1 If requested, the Contractor shall provide the Consultant, in writing, the name of the Project Manager and Site Supervisor, and proof of competent experience in similar projects.
- .2 Performance of the Contractors Project Manager and Site Supervisor

- .1 If the Board and or the Consultant become concerned with any of: Site Safety, Project Schedule, or general compliance with the tender documents due to the performance of the Site Supervisor or Project Manager, the Consultant and or the Board will identify the concerns in writing to the Contractor.
 - .2 The Contractor shall respond in writing to the Board and Consultant with a corrective action for each item within 24 hours.
 - .3 If it is found that any of the corrections are not immediately implemented, the Consultant and the Board shall meet with the General Contractor to review the credentials including curriculum vitae and comparable experience of a replacement Site Supervisor and or Project Manager proposed by that Contractor.
 - .4 All outstanding concerns initiating the replacement of the personnel will be immediately addressed to the satisfaction of the Consultant and the Board.
- .3 If the Board and or the Consultant become concerned with site safety, project schedule or general compliance with the tender documents due to the performance of the Site Supervisor or the Project Manager, the Consultant or the Board will issue the concerns in writing to the Contractor. The Contractor shall respond in writing within 24 hours to the Consultant and the Board. If any of the corrections are not immediately implemented, the Consultant or the Board will schedule a meeting with the Consultant, General Contractor and the Board. At this meeting the Contractor will introduce the new Project Manager, and or Site Supervisor and present the Curriculum Vitae for each showing proof of comparable experience in similar projects. The Contractor will then address the outstanding concerns to the satisfaction of the Consultant and the Board.
- .4 The Project Manager, and/or Site Supervisor shall not be replaced by the Contractor without prior written approval from the Board and the Consultant.

1.4. PERMITS

- .1 **The Board will obtain & pay for all building permits, but the Contractor is responsible for all other permits, including electrical inspection and fire alarm verification.**

1.5. CONSTRUCTION DOCUMENTS

- .1 The Consultant will provide the Contractor with PDF copies of both the drawings and the specification and CAD format files of the drawings at no charge to the Contractor. All printing will be at the cost of the Contractor including the AS-BUILT documents.

1.6. PRE-CONSTRUCTION MEETING

- .1 Immediately prior to construction and upon notification by the Consultant of a time and date, the Contractor shall attend the preconstruction meeting at a location as determined by the Consultant, along with authoritative representatives of certain key subcontractors as specifically indicated in the conference notice. Agenda to include following:
 - .1 Appointment of official representative of participants in Work.
 - .2 Project communications procedures
 - .3 Schedule of Work, progress scheduling (including long lead items, cash allowance items) as specified in Section 01 32 00.
 - .4 Schedule of submission of shop drawings, samples, colour chips as specified in Section 01 33 00.
 - .5 Requirements for temporary facilities, washrooms, refuse bin, site sign, offices, storage sheds, utilities, fences as specified in Section 01 53 00.
 - .6 Delivery schedule of specified equipment as specified in Section 01 61 00.
 - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.
 - .8 Owner furnished products.
 - .9 Record drawings as specified in Section 01 78 10.
 - .10 Maintenance material and data as specified in Section 01 78 10.
 - .11 Take-over procedures, acceptance, and warranties as specified in Section 01 78 10.
 - .12 Monthly progress claims, administrative procedures, photographs, and holdbacks.
 - .13 Appointment of inspection and testing agencies
 - .14 Insurances and transcript of policies.
 - .15 Review Vendor Performance Evaluation for the Contractor and Subcontractors
 - .16 Hot Work Permit Process
 - .17 Security Access, Fire Alarm shutdown procedures
 - .18 Any other items as required by the owner, contractor, or Consultant.

1.7. ON-SITE DOCUMENTS

- .1 Maintain at job site at all times, one copy (written or digital) each of the following:
 - .1 Complete set of Contract drawings.
 - .2 Specifications.
 - .3 All Addenda.

- .4 Site Instructions and Sketches
- .5 Reviewed shop drawings and samples.
- .6 Change Orders and Contemplated Change Orders.
- .7 Other modifications to Contract.
- .8 Site Instructions
- .9 Colour schedule
- .10 Hardware List
- .11 Field test reports.
- .12 Copy of approved Work schedule.
- .13 Manufacturers' installation and application instructions.
- .14 Progress reports and meeting minutes.
- .15 Approved building permit documents.
- .16 Copy of current Ontario Building Code and National Building Code.
- .17 CSA Standard, CGSB Specifications. ASTM Documents and other standards referenced to in the specifications.
- .18 Labour conditions and wage schedules.
- .19 Applicable current editions of municipal regulations and by-laws. Current building codes, complete with addenda bulletins applicable to the Place of the Work.

1.8. SCHEDULES

- .1 Within three weeks following the award of the Contract, submit a detailed, trade by trade progress schedule for the work in a bar chart form acceptable to the Consultant.
- .2 Submit preliminary construction progress schedule as specified in Section 01 32 00 to Consultant coordinated with Consultant's project schedule.
- .3 After review, revise and resubmit schedule to comply with revised project schedule.
- .4 During progress of Work revise and resubmit as directed by the Consultant.
- .5 Provide schedule updates every month with request for Payment, for duration of Contract.

1.9. CONSTRUCTION PROGRESS MEETINGS

- .1 Prior to the commencement of the Work, the Contractor together with the Consultant shall mutually agree to a sequence for holding regular "on site meetings".
- .2 The Contractor will organize site meetings. Ensure persons, whose presence is required, are present and relative information is available to allow meetings to be conducted efficiently.

- .3 Contractor, major subcontractors and consultants involved in Work are to be in attendance.
- .4 Post and forward copies of progress schedules for advice of Subcontractors, Owner and Consultant.
- .5 Notify parties minimum five (5) days prior to meetings.
- .6 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within two (2) days after meeting.
- .7 Agenda to include following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for effect on construction schedule and on completion date.
 - .12 Review site security issues.
 - .13 Other business.
- .8 Schedule additional meetings, to expedite progress, should work require it.
- .9 Keep Owner and Consultant informed of progress, of delays and potential delays during all stages of Work. Do everything possible to meet progress schedule
- .10 Schedule and administer pre-installation meetings when specified in sections and when required to coordinate related or affected Work.

1.10. SUBMITTALS

- .1 Prepare and issue submittals to Consultant for review.
- .2 Submit preliminary Shop Drawings, product data and samples for review for compliance with Contract Documents; for field dimensions and clearances, for relation to available space, and for relation to Work of other contracts. After review, revise and resubmit for transmittal to Consultant.
- .3 Submit requests for payment for review, and for transmittal to Consultant.
- .4 Submit requests for interpretation of Contract Documents, and obtain instructions through Consultant.

- .5 Process substitutions through Consultant.
- .6 Process change orders through Consultant.
- .7 Deliver closeout submittals for review and preliminary inspections, for transmittal to Consultant.

1.11. RECORD (AS-BUILT) DOCUMENTS AND SAMPLES

- .1 Procedures for record as-built documents and samples as specified in Section 01 78 10.
- .2 Keep as-built documents and samples available for inspection by the Consultant.

1.12. CLOSEOUT PROCEDURES

- .1 Take-over procedures, acceptance, and warranties as specified Section 01 78 10
- .2 Notify Consultant and Board when Work is considered ready for Substantial Performance.
- .3 Accompany Consultant and Board on preliminary inspection to determine items listed for completion or correction.
- .4 Comply with Consultant's instructions for correction of items of Work listed in executed certificate of Substantial Performance.
- .5 Notify Consultant of instructions for completion of items of Work determined in Consultant's final inspection.

END OF SECTION

01 32 00 – Construction Progress Documentation

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2. SCHEDULES

- .1 Within seven 7 days following the award of the Contract, submit a detailed cash flow chart broken down on a monthly basis, in a manner acceptable to the Consultant. Cash flow chart shall indicate anticipated Contractor's monthly progress billings from commencement of work until completion.
- .2 Update cash flow chart whenever changes occur to scheduling and in manner and at times satisfactory to Consultant.
- .3 Submit schedule of values at least fourteen (14) days before the first application
- .4 Submit schedules as follows:
 - .1 Submittal Schedule for Shop Drawings and Product Data.
 - .2 Submittal Schedule for Samples.
 - .3 Submittal Schedule for timeliness of Owner-furnished Products.
 - .4 Product Delivery Schedule.
 - .5 Cash Allowance Schedule for acquiring Products and Installation.
 - .6 Shutdown or closure activity.

1.3. CONSTRUCTION PROGRESS SCHEDULING

- .1 Submit initial schedule to the Consultant and the Board in duplicate within seven (7) days after following the award.
- .2 Schedule Format.
 - .1 Prepare schedule in form of a horizontal bar chart.
 - .2 Split horizontally for projected and actual performance.
 - .3 Provide horizontal time scale identifying each Working Day of each week.
- .3 Schedule Submission.
 - .1 Consultant will review schedule and return reviewed copies within five (5) days after receipt.
 - .2 Submit schedules in electronic format, forward to the Consultant and Owner as a pdf. file.
 - .3 Resubmit finalized schedule within five (5) days after return of review copy.

- .4 Submit revised progress schedule with each application for payment.
- .5 Distribute copies of revised schedule to:
 - .1 Job site office.
 - .2 Subcontractors.
 - .3 Other concerned parties.
- .6 Instruct Consultant to report to Contractor within ten (10) days, any problems anticipated by timetable shown in schedule.
- .4 Submit revised schedules with Application for Payment, identifying changes since previous version.
- .5 Select either of the following paragraphs to identify the type and format of schedule required.
- .6 Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.
- .7 Indicate estimated percentage of completion for each item of Work at each submission.
- .8 Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by Allowances.
- .9 Include dates for commencement and completion of each major element of construction:
 - .1 Site clearing.
 - .2 Site utilities.
 - .3 Foundation Work.
 - .4 Structural framing.
 - .5 Subcontractor Work.
 - .6 Equipment Installations.
 - .7 Finishes.
- .10 Indicate projected percentage of completion of each item as of first day of month.
- .11 Indicate progress of each activity to date of submission schedule.
- .12 Indicate changes occurring since previous submission of schedule:
 - .1 Major changes in scope.
 - .2 Activities modified since previous submission.
 - .3 Revised projections of progress and completion.
 - .4 Other identifiable changes.
- .13 Provide a written report to define:
 - .1 Problem areas, anticipated delays, and impact on schedule.

- .2 Corrective action recommended and its effect.
- .3 Effect of changes on schedules of other subcontractors.

1.4. PROGRESS PHOTOGRAPHS

- .1 Digital Photography:
 - .1 Submit electronic copy of progress photographs of project, Digital format, minimum 300 in megapixel resolution.
 - .2 Identification: Name and number of project and date of exposure indicated.
 - .3 Provide both interior and exterior photographs.
 - .4 Number of Viewpoints: Locations of viewpoints determined by Consultant.
 - .5 Frequency: Monthly with progress statement. Provide the required number of pictures to accurately reflect the submitted progress percentage.

1.5. SHOP DRAWING SUBMITTAL SCHEDULE

- .1 Include schedule for submitting shop drawings, product data, samples
- .2 Indicate dates for submitting, review time, resubmission time, and last date for meeting fabrication schedule.
- .3 Include dates when shop drawings and samples will be required for Owner-furnished products.
- .4 Include dates when reviewed submittals will be required from Consultant.
- .5 Provide final signed off copies of the shop drawings in digital format to the Board.

END OF SECTION

01 33 00 – Submittal Procedures

1.0 GENERAL

1.1 RELATED SECTIONS

1. Section 01 32 00 - Construction Progress Documentation.
2. Section 01 78 10 - Closeout Submittals.
3. This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.1 ADMINISTRATIVE

1. Submit to Consultant submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
2. Work affected by submittal shall not proceed until review is complete.
3. Present Shop Drawings, product data, samples and mock-ups in Metric (SI) units. Shop drawings containing imperial measurements will be rejected.
4. Where items or information is not manufactured or produced in SI Metric units, converted values within the metric measurement to the next largest imperial size available. Tolerances of .0625 acceptable.
5. Review submittals 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 co-ordinated with requirements of Work and Contract Documents.
6. Submittals not stamped, signed, dated, identified as to specific project, and attesting to their being reviewed will be returned without being examined and shall be considered rejected.
7. Shop drawings which require the approval of a legally constituted authority having jurisdiction shall be submitted by Contractor to such authority for approval. Such shop drawings shall receive final approval of authority having jurisdiction before Consultant's final review.
8. No work, requiring a shop drawing submission, shall be commenced until the submission has received Consultant's final review. Only shop drawings bearing Consultant's review stamp are to be sent and used on the job site.
9. Notify Consultant, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

10. Shop drawings shall not contain substituted materials unless such substitutions have been requested in advance and approved by Consultant.
11. Verify field measurements and affected adjacent Work are coordinated.
12. Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.
13. Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.
14. Keep one (1) reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "Shop Drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 The term "design team" means Consultant and Sub-consultants whether Sub-consultants are employees of Consultant or not, and includes structural, mechanical, electrical, etc.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow fourteen (14) days for Consultant's review of each submission.
- .5 Adjustments made on Shop Drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
- .6 Make changes in Shop Drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of any revisions other than those requested.
- .7 Accompany submissions with transmittal letter, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions shall include:
 - .1 Date and revision dates.

- .2 Project title and number.
- .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to other parts of the Work.
- .9 After Consultant's review, distribute copies.
- .10 Submit Shop Drawings in Pdf. format for each requirement requested in specification Sections and as consultant may reasonably request.
- .11 Submit product data sheets or brochures in Pdf. format for requirements requested in specification sections and as requested by Consultant where Shop Drawings will not be prepared due to standardized manufacture of product.
- .12 Delete information not applicable to project.
- .13 Supplement standard information to provide details applicable to project.
- .14 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, the drawings will be stamped as reviewed or reviewed as modified and will be returned. At this point fabrication and installation of Work may proceed. If Shop Drawings are rejected, noted copy will be returned and re-submission of corrected Shop Drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .15 Signed drawings shall be returned to and retained by Contractor who is then responsible for distribution of copies of corrected shop drawing to appropriate

Subcontractors for appropriate action and to municipal building department for their records of those subjects required by authorities.

- .16 The Consultant's review is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean the Consultant approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and this review shall not relieve the Contractor of his responsibility for meeting the requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the work of all subtrades.

1.3 SAMPLES

- .1 Submit for review to the Consultant three (3) samples as requested in respective specification Sections.
- .2 Submit samples with identifying labels bearing material or component description, manufacturer's name and brand name, Contractor's name, project name, location in which material or component is to be used, and date.
- .3 Deliver samples prepay any shipping charges involved for delivering samples to destination point and returning to point of origin if required.
- .4 Provide samples of special products, assemblies, or components when so specified.
- .5 No work requiring a sample submission shall commence until submission has received Consultant's final review.
- .6 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .7 Where colour, pattern or texture is criterion, submit full range of samples.
- .8 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
- .9 Make changes in samples which Consultant may require, consistent with Contract Documents.
- .10 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 MOCK-UP

- .1 Erect mock-ups to Section 01 45 00.

1.5 ` CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, and prior to commencing the work submit the performance bond and the labour and materials payment bond as described in the bid documents.
- .2 Submit transcription of certified true copies of insurance immediately after award of Contract.
- .3 A current WSIB clearance certificate
- .4 The bidder's health and safety policy for the project.
- .5 A copy of the notice of project issued by the ministry of labour for the project
- .6 Building materials, components and elements specified without the use of trade or proprietary names shall meet requirements specified. If requested by Consultant, submit evidence of meeting requirements specified. Evidence shall consist of certification based on tests carried out by an independent testing agency. Certification based on previous tests for same materials, components or elements is acceptable. Certification shall be in form of written test reports prepared by testing agency.

END OF SECTION

01 35 17 – Fire Safety Procedures

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 Section 01 14 00 – Work Restrictions.
- .2 Section 01 31 00 - Project Managing and Coordination.
- .3 Section 01 33 00 - Submittal Procedures.
- .4 Section 01 35 23 – Health and Safety
- .5 This section describes requirements applicable to all Sections within Divisions 02 to 49.
- .6 Appendix 01 35 17A Contractor Hot Work Permit

1.2. FIRE SAFETY PLAN

- .1 Contractors and their personnel will be familiar with this section and its requirements.
- .2 The contractor must take all necessary precautions during the carrying out of the work to prevent the possibility of fire occurring.

1.3. FIRE PROTECTION

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by the governing codes, regulations and bylaws.
- .2 The contractor will, at all times, when welding, brazing and performing any operation with an open flame, combustible adhesives or flammable solvents keep a portable, operable fire extinguisher within 3 meters of the operation.

1.4. HOT WORK

- .1 Take all precautions to Work safely and to provide the necessary protection to persons and property from Hot Work. This includes, but is not limited to Brazing, Cutting, Grinding, Soldering, Thawing Pipe, Torch Applied Roofing and Welding. With all such activity these steps are to be followed:
 - .1 Whenever possible, complete Hot Work in a welding shop or out of doors at the school.
 - .2 Flammable liquids, dust lint and oily deposits to be removed from within 50-ft (15m) of Work. Remove other combustibles where possible. Otherwise protect with fire-resistive tarpaulins or metal shields.
 - .3 Explosive atmosphere in area eliminated. Floors swept clean. Combustible floors wet down, covered with damp sand or fire-resistive tarpaulins.

- .4 All wall and floor openings covered. Fire-resistive tarpaulins suspended beneath Work.
- .5 For on-site Work (indoor and out of doors), advise the Head Custodian, Principal, Consultant (if assigned) and Project Coordinator prior to Work being performed, and of related dangers.
- .6 Where the Fire Alarm system is required to be set to stand-by to discourage false alarms from smoke detectors provide a firewatch throughout the building or structure being worked on. NEVER put the fire alarm system in stand-by mode when the building is occupied by staff or students.
- .7 In the event of a fire as a result of the Hot Work, notify the fire department immediately. Report incident to the head custodian, the Consultant, if assigned, and Project Coordinator immediately, whether extinguished or not. Provide a fire incident report to the Board.
- .8 Barriers must be set up to protect staff and students (i.e. pylons, shields, and caution tape) from exposure to arc flash and smoke migration.
- .9 Have all necessary doors, windows and/or drapes closed. Confer with the Head Custodian to shut down all fan systems in the area to reduce or eliminate smoke distribution.
- .10 Provide and keep fire extinguishers handy and in good Working condition. Temporarily cover all smoke detectors in the area during time of Work.
- .11 Provide a fire watch/spot check for several hours after Work is completed. Uncover smoke detectors.
- .12 On new construction, the requirements of the Hot Work permit may be waived, until such time as either Substantial Completion or Occupancy is granted, whichever comes first.
- .13 On additions to existing buildings, the requirements for Hot Work permits shall remain in place.

1.5. HOT WORK PERMIT

- .1 **A sample Hot Work Permit is attached to the specifications – refer to attached Appendix 01 35 17-A**
- .2 Each permit is valid for seven (7) days only and must be renewed prior to its expiration date
- .3 The contractor must obtain Hot Work Permits from the School Board's representative prior to the start of work.
- .4 The contractor must complete the form as required and must keep the form on site.

- .5 Return each completed form to the School Board's representative on the date of expiration.
- .6 The most current version of the Permit and its requirements shall be used for the purposes of the Work.

1.6. FIRE PROTECTION SYSTEMS

- .1 Any Modifications to Fire Alarm system and its devices including service, additions and changes in device location must be performed only by a Certified Fire Alarm Technician as per the Ontario Fire Code section 1.1, subsection 1.1.5.
- .2 The Contractor will receive from the Board's contact a contact number for the monitoring service and a school system number.
- .3 Bidders are cautioned that the Board will be reimbursed for the cost of false alarms. Refer to Section 01 14 00 Work Restrictions, Para. 1.4.4.
- .4 An approved inspection firm shall verify all new fire alarm devices, in accordance with CSA regulations. Certificate of Verification is required before occupancy.

1.7. FIRE ALARM SHUT-DOWN PROCEDURE

- .1 Plan the operation such that the required work minimizes system down time to the least amount possible. Do not shut the system down or engage silence mode when the building is occupied by students. Only shut the system down when necessary.
- .2 For the purposes of this section, unoccupied shall mean when the school is not occupied by students.
- .3 Wherever possible, shut down only the zone needing work,
- .4 and schedule down time in unoccupied school hours.
- .5 Contractor(s) shall ensure all costs are included in their bid price for work related to the fire alarm system outside of regular hours and/or during unoccupied school hours. This shall include evening and weekend work.
- .6 A fire alarm system must remain active when the building is not occupied by school or contractor's forces and should never be offline overnight.
- .7 Procedure
The following procedure shall be followed when a fire alarm system is completely or partially affected by maintenance, shutdown, bypass, silence, loss of power, or any other nomenclature that affects the proper operation of the complete system.
 - .1 Inform both the principal and head custodian whenever the fire alarm system is to be disabled prior to any partial or whole system shut down. Where school staff are not available, ensure that the Project Coordinator and/or area supervisor are informed.

- .2 Ensure that the school or building administration has advised all staff when the fire alarm system is disabled and/or when it is back online. This will include instructions to call 911 if they detect smoke or a fire.
- .3 Immediately prior to alarm system shutdown and upon restoring the fire alarm system, the person supervising the shutdown must:
 - 1.7.7.1.3.1. obtain the school account number, located on a red decal attached to the fire alarm panel. This number will be formatted as 20-9xxx, with the xxx being the school location code,
 - 1.7.7.1.3.2. contact Direct Detect at 519-741-2494 (the fire alarm monitoring company), to inform them of the state of the fire alarm and the approximate amount of time the fire alarm will be offline. They will require the building name and account number, the contact name, the contractor name as well as any other information they request, and
 - 1.7.7.1.3.3. contact Bestell at 519-741-2494 (the current security monitoring company), to inform them of the state of the fire alarm and the approximate amount of time the fire alarm will be offline. They may require the building name and account number as well as any other information they request.
- .4 A fire watch, at the Contractor's expense, shall be undertaken by a person with the sole and express purpose of completing the following tasks and in the event of the detection of smoke, fire, or any other emergency, notifying the fire department, and the building occupants. The fire watch patrol shall:
 - 1.7.7.1.4.1. patrol all halls and high-risk areas affected,
 - 1.7.7.1.4.2. have access to a phone and call 911 if they see or detect smoke or fire,
 - 1.7.7.1.4.3. report any other problems they encounter,
 - 1.7.7.1.4.4. notifying the building occupants in the event of an emergency and
 - 1.7.7.1.4.5. remain on patrol until the fire alarm system is reactivated and fully operational.
- .5 Contact Direct Detect, Bestell, and school administration to inform them that the fire alarm is back online.
- .6 In the event that a fire alarm system is activated, whether by smoke, fire or accidentally, the system must not be reset until authorized by the Fire Department (verbally or in person) and the cause of the alarm has been investigated.

1.8. FIRE PROTECTION EQUIPMENT IMPAIRMENT

- .1 Fire Protection Equipment referred to in this section includes sprinkler systems, special fire suppression systems, and kitchen hood suppression systems.
- .2 The Contractor will take all precautions including restrict all Hot Work operations and shut down hazardous processes during all Fire protection equipment impairment.
- .3 Do not shut the Fire protection equipment down unless necessary. Plan the operation required to reduce system impairment time to the least amount possible.
- .4 Wherever possible, shut down only the Fire protection equipment needing Work and schedule this impairment time for unoccupied school hours. Allow for this in your bid pricing.
- .5 Discuss the possible down time with the head custodian and principal prior to any partial or whole system impairment.
- .6 The school administration shall advise all staff of Fire protection equipment shut down. This will include instructions to call 911 if they see a fire and when system is back online
- .7 The Contractor will plan to use temporary protection such as extra extinguishers, charged hose lines and temporary sprinkler protection during all Fire protection equipment impairment.
- .8 If the sprinkler system is restorable, either in whole or in part, the Contractor or subcontractor shall assign someone to restore the system promptly in the event of a fire.
- .9 A fire patrol may need to be established and will include the following at the Contractor's expense:
 - .1 Patrol all halls and high-risk areas affected.
 - .2 Fire patrol shall have access to a phone and call 911 if they see a fire.
 - .3 Report all other problems they encounter.
 - .4 Remain on patrol until the system is back on.
- .10 The Contractor shall inform all sub trades that the Board has a Red Tag Permit System and it shall be used for all Fire protection equipment impairment.
- .11 For ease of use, a Factory Mutual hanging wall kit has been put in place at all Board Fire protection equipment locations. Supplies of Red Tag Permits are provided there.

1.9. FIRE ALARM MODIFICATIONS AND MAINTENANCE

- .1 Very important changes to Ontario Building Code as they relate to the Standard for the Verification of Fire Alarm Systems CAN/ULC-S537-M have taken effect December 24, 1999. (Minister's Ruling 99-BC-01)
 - .1 Clause 5.1; "Addition of conventional field device(s), or modification(s), to existing input circuit(s) or output circuit(s) shall require re-verification of all devices served by those input circuit(s) or output circuit(s)." If one device is added to a zone, the entire zone or in the case of a single zone panel the entire system is to be verified.
 - .2 Clause 5.2 "Addition of input circuit(s) or output circuit(s) to an existing fire alarm system shall require verification of the new circuit(s) in accordance with this standard, and shall also require all previously existing circuit(s) to be tested as follows:
 - .3 TEST: One conventional field device on each circuit shall be operated to confirm activation of all output circuits in accordance with the systems design." Even though no other zones have been touched, one device per input zone is to be tested when the Fire Alarm system is modified.
 - .4 Clause 5.5 "Where a transponder is added to an existing system, the transponder shall be verified in accordance with subsections 3.2, Wiring; and subsection 3.3 Control Units; and with CAN/ULC-S536, Standard for the Inspection and Testing of Fire Alarm Systems as well as re-verification of existing field devices and verification of new conventional field devices." If a new addressable device is added to a system, the new device is to be tested; as well a test must be conducted on all addressable devices on the loop.
 - .5 Clause 5.6 "Where an existing fire alarm system control unit is replaced with a new control unit, it shall be verified in accordance with CAN/ULC-S536, Standard for the Inspection and Testing of Fire Alarm Systems. Replacement of any control panel will require the testing of all existing fire alarm devices.
- .2 The Contractor and subcontractors shall include in the bid price for the above ULC Standards requirements referenced in the Ontario Building Code.

1.10. INSTALLATION AND/OR REPAIR OF ROOFING

- .1 The Contractor will review with the Consultant and the Board's representative of the location of any asphalt kettles and the dates the kettles will be in use. The Contractor, in the course of performing roofing work, will ensure all personnel utilize the following precautions:
 - .1 Use only kettles equipped with thermometers or gauges in good working order.
 - .2 Locate kettles in a safe place outside of the building.
 - .3 Maintain continuous supervision while kettles are in operation and provide metal covers for the kettles to smother any flames in case of fire.
 - .4 All roofing materials stored in locations no closer than 15 meters to any structures.

1.11. FIRE DEPARTMENT ACCESS

- .1 Designated fire routes must be maintained. The Fire Department must be advised of any work that would impede fire apparatus response.

1.12. SMOKING PRECAUTIONS

- .1 Smoking is not permitted anywhere on Board properties. Workers who wish to smoke must leave the property, and not within sight of students. Any worker found to be in contravention of the Ontario Smoke Free Act will be subject to legislated fines.

1.13. FLAMMABLE LIQUIDS

- .1 The handling and storage on site of flammable liquids are to be governed by the current National Fire Code of Canada.
- .2 Flammable liquids such as gasoline, kerosene and naphtha may be kept for ready use in quantities not exceeding 10 imperial gallons provided they are stored in approved safety cans bearing the Underwriter's Laboratory of Canada or Factory Mutual seal of approval.
- .3 Transfer of flammable liquids is prohibited within buildings.
- .4 Transfer of flammable liquids must not be carried out in the vicinity of open flame or any type of heat producing devices.
- .5 Flammable liquids having a flashpoint below 100° F (37.7°C) such as naphtha or gasoline must not be used as solvents or cleaning agents.
- .6 Flammable waste liquids, for disposal, must be stored in approved containers located in a safe ventilated area. Quantities are to be kept to a minimum.

END OF SECTION

Appendix - 013517-A

CONTRACTOR HOT WORK PERMIT

Avoid hot work or seek an alternative method if possible.

A SEPARATE PERMIT IS REQUIRED FOR EACH AREA

- i. Verify precautions taken in Section A
- ii. Complete and retain Part 1
- iii. Complete Section B prior to commencement of Hot Works
- iv. Issue Part 2 to Contractor completing Hot Work & Post
- v. Obtain Part 2 when Fire Monitoring complete
- vi. Return Part 1 and Part 2 to Controller, Facility Services

- i. Verify precautions taken in Section A
- ii. Complete Section C during each day that Hot Works takes place
- iii. Return Part 2 to Board Supervisor/Manager/Proj. Coordinator

Section A Indicate Precautions Taken

Within 35' or 11m of hot work

- ☐ Flammable liquid, dust, lint and oily deposits removed
- ☐ Explosive atmosphere in area eliminated
- ☐ Floors swept clean
- ☐ All wall and floor openings covered
- ☐ Combustible floors covered with fire resistant sheets
- ☐ Protect or shut down ducts that might carry sparks/smoke

Construction is noncombustible and without combustible covering or insulation

- ☐ Combustible materials on other side of walls, ceilings or roofs moved away
- ☐ Combustible structure wetted down

Enclosed equipment cleaned of all combustible

- material
- Containers purged of flammable liquid/vapour
- Pressurized vessels, piping & equipment removed from service, isolated & vented

Fire watch will be provided during and for

- ☐ 1 hour after work including break
- ☐ Fire watch is trained and supplied with suitable extinguishers

- Fire watch is trained in the use of sounding fire

- Fire watch conducted in adjoining areas, above and below the space where appropriate

☐ Monitor hot work area for an additional 2 hours after fire watch

Other precautions taken (please detail):

Section B Authorization Granted

Print Name _____

Signature

Permit Valid from / to: (max. 7 days)

From This Date

To This Date

(Maximum 7 days or until end of hot work whichever is sooner)

Section C	Contractor and Location Affected

Dates:
(max 7 days)

Name of Contractor
conducting hot work

Name & signature of Individual assigned to fire watch

Name & signature of individual assigned to fire monitoring

[illegible]

School:

Run/Arise

Nature of Job:

I verify the above location has been examined each day, the precautions listed in Section A have been taken each day, and permission is authorized for this work.
I further acknowledge that if activity is during school operational hours, that appropriate notification has been given to school administration.

Hot Works Contractor:

Signature

School Administrator notified:

Print Name _____

In Case of Emergency call: 911 - Then call: 519-570-0003 Ext. 4123

Refer to WRDSB Administration Procedure 1200 Hot Works/Fire Watch (Copies Available on Request)

I:\Facility Srv\Control\Board Procedures\2014-15\Hot Work Permit - Contractors - Final.xls

01 35 23 – Health And Safety

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 Section 01 31 00 - Project Managing and Coordination.
- .2 Section 01 33 00 - Submittal Procedures.
- .3 Section 01 35 17 – Fire Safety Requirements
- .4 Section 01 35 43 –**Designated Substances**
- .5 Section 01 41 00 – Regulatory Requirements
- .6 Section 01 53 00 – Temporary Construction Facilities
- .7 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2. REFERENCES

- .1 Province of Ontario, including requirements for a "Prime Contractor" as defined by the Act.

1.3. SAFETY PLAN

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to commencing any site Work and continue to implement, maintain, and enforce plan until final demobilization from site. The Health and Safety Plan must address project specifications.
- .2 Consultant may respond in writing, where deficiencies or concerns are noted and may request resubmission with correction of deficiencies or concerns.
- .3 Be governed by pertinent safety requirements of Federal or Provincial Governments and of municipal bodies having authority, particularly the Ontario Construction Safety Act, The Occupational Health and Safety Act for Ontario, and regulations of Ontario Ministry of Labour, and work in conjunction with proper safety associations operating under the authority of Ontario Workers' Compensation Act. Protect Owner, Owner's employees, the public and those employed on the Work from bodily injury and to protect adjacent public and private property and Owner's property from damage. Furnish and maintain protection, such as warning signs, tarpaulins, guard rails, barriers, guard lights, night lights, railings around shafts, pits and stairwells, etc. as required. Remove temporary protective measures when no longer required.

1.4. TEMPORARY WORK

- .1 Temporary work requiring engineering proficiency for the design, erection, operation maintenance and removal shall be designed and bear the stamp of the registered professional Engineer or Architect. Detail drawings will be submitted to the Consultant for review prior to commencing any work.
- .2 Before a temporary structure is used, the person responsible for design, or their representative, shall inspect the structure and certify it has been constructed according to their design.

1.5. RESPONSIBILITY

- .1 The "Prime Contractor" according to applicable local jurisdiction, is responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to the extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
- .3 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, and follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Health and Safety Act having jurisdiction. Advise the Board and the Consultant verbally and in writing.
- .4 The Contractor shall make their own arrangements for emergency treatment of accidents. Any accidents shall be reported immediately to the Board contact.
- .5 The Contractor agrees to hold the Board harmless of any and all liability of every nature and description, which may be suffered through bodily injuries, involving deaths of any persons, by reasons of negligence of the Contractor, his agents, employees, or his subcontractors.

1.6. SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00.
- .2 Submit site-specific Health and Safety Plan: Within ten (10) days after the date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation

- .3 Submit one (1) copy of Contractor's authorized representative's work site health and safety inspection reports to Consultant and Owner.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit Material Safety Data Sheets (MSDS) to Consultant.
- .7 Consultant's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .8 Medical Surveillance: Where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Consultant.
- .9 On-site Contingency and Emergency Response Plan: Address standard operating procedures to be implemented during emergency situations.
- .10 File Notice of Project with the Ministry of Labour prior to commencement of Work.

1.7. SAFETY ACTIVITIES

- .1 Perform site specific safety hazard assessment related to the project.
- .2 Schedule and administer Health and Safety meeting with Consultant prior to commencement of Work.
- .3 Perform Work in accordance with Section 01 41 00 - Regulatory Requirements and this section.

1.8. HEALTH AND SAFETY COORDINATOR

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:
 - .1 have previous experience as a Health & Safety coordinator,
 - .2 have working knowledge of occupational safety and health regulations,
 - .3 be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work,
 - .4 be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan, and
 - .5 be on site during execution of Work.

1.9. POSTING OF DOCUMENTS

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

1.10. CORRECTION OF NON-COMPLIANCE

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

1.11. PROJECT/SITE CONDITIONS

- .1 Work at site will involve contact with:
 - .1 Refer to Section 01 35 43 **Designated Substances**

1.12. HAZARDOUS WORK

- .1 Blasting or other use of explosives is not permitted at the place of work.

1.13. WORK STOPPAGE

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

1.14. LOCKOUT PROCEDURES

- .1 All Work to be done on electrical systems or machinery, where the unexpected switching on of the system or machinery could result in personal injury to a student, staff, employee, or the Contractor's employee, must be done in accordance with the Contractor's standard lockout procedure.
- .2 The Contractor shall provide his/her own locks for the above procedure.
- .3 The lock shall include contact information for the person(s) locking out such devices.

1.15. OVERHEAD LIFTING

- .1 Under no circumstances will a crane or lifting device be used over an occupied space.
- .2 When working adjacent to occupied spaces, ensure a clearance of one (empty) classroom, or a minimum of 10m between any occupied space and the furthest possible reach of the crane.

1.16. WARNING SIGNS AND NOTICES

- .1 Notices shall be posted advising of the hazard but will not be considered a substitute for providing approved protection, separation, and space from the hazard.

1.17. FIRE PROTECTION

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by the governing codes, regulations and bylaws.
- .2 Burning rubbish and construction waste materials is not permitted on site.
- .3 Maintain placed or installed Fire Protection to protect the portions of the Work during construction.

1.18. SCENT-FREE ENVIRONMENT

- .1 The Board requires that, where advised, a building may be deemed scent-free and as such, the wearing of scented products is prohibited.
- .2 Any methods or materials that are found to create negative responses in staff or students shall cease and be removed under advisement of the Consultant and or the Board, until alternate methods can be determined.

END OF SECTION

01 35 43 –Designated Substances

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 Section 01 35 23 – Health and Safety Requirements.
- .2 Section 01 41 00 – Regulatory Requirements.
- .3 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2. REFERENCES

- .1 Province of Ontario, including requirements for a "Prime Contractor" as defined by the Act.

1.3. ASBESTOS and OTHER REGULATED SUBSTANCES

- .1 An Asbestos Audit, as prepared by WRDSB retained consultants, for this facility, is attached under Appendix 013543 A. A duplicate set is also available in the Facilities Services Departments located in the Education Centre. Unless specifically covered by a Cash Allowance or Contingency Allowance that states otherwise, include in this Contract the required removal of all asbestos containing materials (ACM) to complete the work. No claims for extra costs will be accepted for areas known to contain ACM that are within the scope of this Work.
- .2 A Project Specific Designated Substance / Lead Report, as prepared by WRDSB retained consultants or Environmental Officer for this facility, is attached under Appendix 013543 B.
- .3 Comply with applicable legislation regarding asbestos. Should the Contractor encounter asbestos not noted in the referenced Asbestos Audit that would be disturbed during the course of the Work, they should stop the work in that immediate area and report the same to the Consultant and Board contact.
- .4 In addition, Lead, Mercury, Silica, and Isocyanates are anticipated to be present in existing facilities. New construction, renovations, or alterations require compliance by the Contractor with the applicable legislation.

1.4. PROTOCOL FOR ABATEMENT WORK

- .1 This Protocol establishes the requirements to be followed by all Asbestos Abatement Contractors working in buildings owned or operated by the Waterloo Region District School Board (hereinafter referred to as the Board). This protocol applies to Type 1, Type 2 and Type 3 Operations as identified in the most current

form of Ontario Regulation 278 as amended, and applies to both emergency and non-emergency work, whether directly retained by the Board or working as a subcontractor to a General Contractor retained by the Board.

- .2 Asbestos Abatement Contractors must maintain appropriate insurance coverage and WSIB certification and provide proof upon request.
- .3 Asbestos Abatement Contractors shall only use personnel certified by the Ontario College of Trades and must provide the Board with proof of asbestos certification (AAS and AAW) for all supervisors and all staff involved.
- .4 School Access: During regular school hours, all abatement contractors are to report to the school office upon arrival. They must sign in all personnel and identify to a person of authority, preferably the Principal, their purpose for being there as well as the area of work. After school hours, ensure card-in/card-out procedures are followed and building security is maintained. Contractor staff shall NOT prop doors open, and ensure that doors are locked.
- .5 Communication:
 - .1 Asbestos Abatement Contractor will contact the school's Principal and/or Vice Principal (phone numbers are available on the WRDSB website) to set up a firm date and time for the abatement (removal/repair). This communication shall allow at least 72 hours notice ahead of the proposed work unless it is emergency work.
 - .2 Confirmation of the date shall be via email to the following:
 - .1 Principal / Vice-principal
 - .2 Facility Manager
 - .3 Environmental Officers (environmental@wrdsb.ca)
 - .3 When working under a general contractor, also notify:
 - .1 Project manager for the General Contractor
 - .2 Architect/Consultant for the project
 - .3 The Board's Project Coordinator
 - .4 This communication shall indicate the date, the start time, the anticipated completion time (including any required air clearances and teardowns), the asbestos abatement type, and the areas of work within the school or building. It should also identify any mechanical equipment that is required to be disabled for the duration of the operations.
 - .5 For emergency work where requested by Area Supervisors, Facility Managers, On-Call Manager/Supervisor, or Environmental Officers, no notification to the school is required by the abatement contractor. Notification to the Principal

- or Vice-Principal will be managed by the Area Supervisor, Facility Manager, On-Call Manager/Supervisor, or Environmental Officers.
- .6 For **Type 2 Removals**, also notify: the Ministry of Labour, Immigration, Training and Skills Development (MLITSD) where required by Regulation.
 - .7 For Type 3 Removals, also notify: Manager of Health, Safety & Security, (healthandsafety@wrdsb.ca); and, the MLITSD where required by Regulation.
 - .8 Discussions related to the work, whether with media, school staff, or any others, is NOT permitted. Questions or enquiries shall be directed to the Board's Communication Officer (comms-team@wrdsb.ca) by the person(s) seeking information, where warranted.
- .6 Asbestos Removal Assessment
- .1 When working directly with the Board to undertake non-emergency abatement, the contractor is to assess the work on site and provide a cost estimate to the Environmental Officer. Some work will require discussion with the Facility Manager or Environmental Officer to determine if additional work should be done to completely remove all additional ACM material from the area or similar.
 - .2 When abatement is to be done under a General Contractor, the proposed work is to be quoted directly to the General Contractor. Additional abatement not already within the original scope of work or tender is to be quoted to the General Contractor for approval by the Project Coordinator or Architect.
- .7 Asbestos Operations
- .1 Asbestos operations shall be conducted according to Type, where each Type will require special timing and considerations as follows:
 - .2 **Type 1:** Any time behind a secured door or enclosure.
 - .3 **Type 2:** Any time when students and teaching staff are NOT present in the building, and behind a secured door or enclosure. During the school year, the work shall be performed outside of the regular program hours, Monday to Friday, anytime on weekends, when no regular programs are scheduled.
 - .4 The work shall be performed anytime during March Break, Winter Break, and Summer Break, when teaching staff are NOT present in the building.
 - .5 **Type 3:** Outside of school regular program hours, during unoccupied times, and behind a secured door or enclosure. During the school year, the work shall be performed outside of the regular program hours, Monday or Friday, anytime on weekends, provided all rentals are cancelled and card access is restricted for teaching staff entering the facility.

- .6 The work shall be performed anytime during March Break, Winter Break, and Summer Break, provided all rentals are cancelled and card access is restricted for teaching staff entering the facility
- .7 Facility Services personnel and Office staff may be present in the building due to training in Asbestos Awareness.
- .8 All Type 3 work must consider one (1) additional day in case the clearance sampling fail.
- .9 Emergency work shall be carried out the same day (evening/night) or under exceptional conditions the following day/evening/night. Contractors shall exercise discretion when working in the school to minimize the potential for health and safety concerns by the staff, students, and school community. Where warranted, contact Area Supervisor, Facility Manager, On-Call Manager/Supervisor, or Environmental Officer to obtain further direction.
- .10 Before beginning any Type 1, Type 2, or Type 3 Operations, the work area must be secured, all doors locked, WHITE poly and caution tape used in open areas/corridors and "construction" warning signs added to all access points to keep school staff and students clear of all work areas.
- .11 If the work area is in use by Board staff, contact the Area Supervisor to assist in vacating the area. If unable, contact the Area Supervisor, Facility Manager, On-Call Manager/Supervisor, Environmental Officer, or Project Coordinator to reschedule the work.
- .12 Board preference is to use "construction" warning signs at all areas accessible to school staff and students. Behind those secured areas, a sufficient number of "asbestos" signs, posted in compliance with O. Reg. 278/05.
- .13 The Asbestos Abatement Contractor is responsible to disable the air handling unit/fan serving the work area (school wing, floor, or multiple floors if air handling unit/fan serve more than one floor) and prevent operation using Lock-out/Tag-out devices for each air handling unit/fan. Exercise caution during the heating season to ensure areas of the building are maintained above freezing and ensure equipment is turned back on after abatement/air clearance completed.
- .14 Asbestos Abatement Contractor's employees shall put on/take off PPE within the work area marked by construction signs. No employee shall leave the work area wearing PPE.
- .15 All dust and waste is to be cleaned up and removed at frequent/regular intervals as the work proceeds and immediately upon completion, but no later than the end of the work day. No waste bags or similar are to be left behind. No additional construction work shall be performed by an Asbestos Abatement Contractor.

1.5. SUBMITTALS

- .1 Once the abatement is completed, forward a Letter of Completion to the Environmental Officers (environmental@wrdsb.ca). This letter shall be received no

later than 72 hours after completion of each abatement area/phase and shall include any sample results. The letter must also clearly identify what specifically has been abated and where (Fixed Reference Numbers), so that this information can be attached to the current AAU Asbestos Audits for future updates.

- .2 For those projects requiring air clearance, ensure this info is sent without delay but in all cases no later than 24 hours after sampling. All Type 3 work must take into account that the initial samples may not pass and the contractor must allow one (1) additional day to re-clean and re-sample before school is to resume operations. For those projects not under the direct supervision of an Environmental Consultant, the contractor is to expedite the air clearance sampling with the lab of their choice and carry these costs.
- .3 Forward Air Clearance results to:
 - .1 Principal/Vice-principal (contact info sent with Work Request)
 - .2 Facility Manager (contact info sent with Work Request)
 - .3 Environmental Officers (environmental@wrdsb.ca)
 - .4 Manager of Mechanical, Electrical and Environmental Services (lou_lima@wrdsb.ca)
 - .5 Manager of Health, Safety & Security (healthandsafety@wrdsb.ca)
 - .6 Project team when working under a General Contractor

1.6. ACKNOWLEDGEMENT

- .1 The protocols for asbestos work must be read and understood by Asbestos Contractor.
- .2 Submit a signed copy of the most current copy of PROTOCOL FOR ABATEMENT WORK (ASBESTOS ABATEMENT CONTRACTORS) to the General Contractor, the Consultant, and the Board's Environmental Officer.

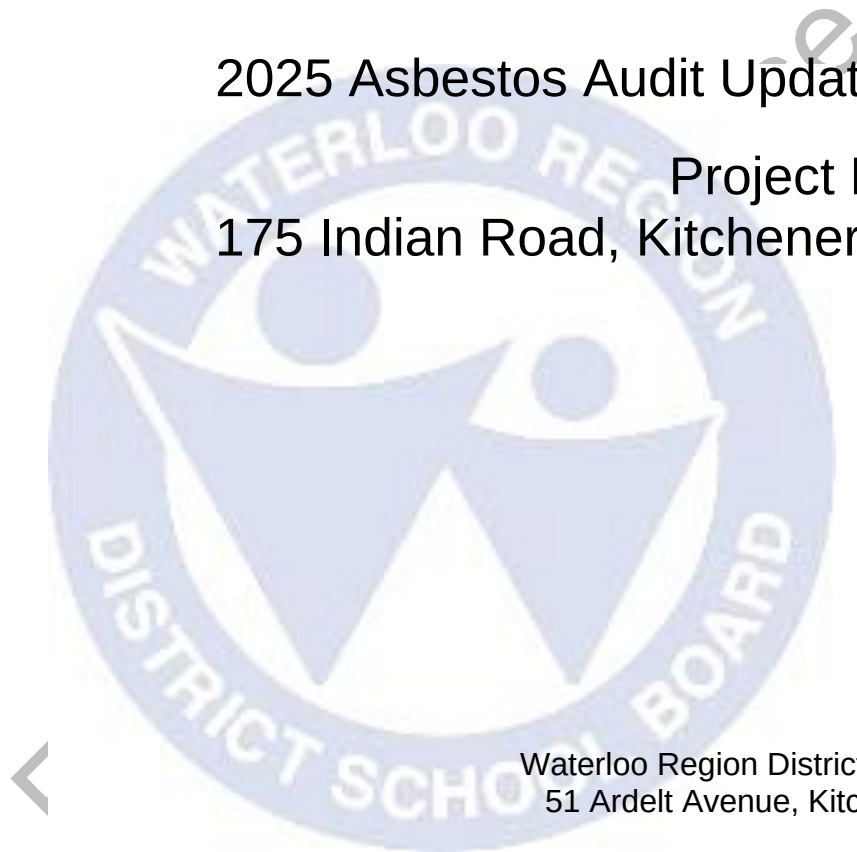
END OF SECTION

Appendix 01 35 43A Asbestos Audit Report

Grand River Collegiate Institute

2025 Asbestos Audit Update Report

Project Location:
175 Indian Road, Kitchener, Ontario



Prepared for:

Waterloo Region District School Board
51 Ardelt Avenue, Kitchener, Ontario

Prepared by:

Safetech Environmental Limited
100 Hanson Avenue, Kitchener, Ontario, N2C 2E2

Date of Issue: March 5, 2025

Safetech Project Number 2-3240073

March 5, 2025

Waterloo Region District School Board

51 Ardelt Avenue,
Kitchener, Ontario N2C 2R5

**Re: 2025 Asbestos Audit Update Report– Grand River Collegiate Institute
175 Indian Road, Kitchener, Ontario
Safetech Project No.: 2-3240073**

1.0 INTRODUCTION

Safetech Environmental Limited (Safetech) was authorized by the Waterloo Region District School Board (hereinafter referred to as the “Board”) to conduct the 2025 Asbestos Audit Update for Grand River Collegiate Institute located at 175 Indian Road, Kitchener, Ontario (subject site).

The audit was conducted in accordance with the Ontario Ministry of Labour, Immigration, Training and Skills Development (MLITSD), Regulation 278/05- Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations (O. Reg. 278/05).

The purpose of the assignment was to re-assess and document the location, type, and condition of identified asbestos-containing materials (ACM) present within the building and make appropriate recommendations for management, abatement or remedial activities, as required.

This report documents the findings of our on-site inspection that was conducted on January 3, 2025. This report shall replace ALL previous Asbestos Audit Update reports.

2.0 SCOPE OF WORK

The Scope of Work for this assessment included the following activities:

- Review of existing and historical reports and documentation pertaining to ACM within the building;
- Visual inspection to assess the condition of previously identified ACM, excluding portable structures;
- Collection of building material samples that are suspect ACM, as applicable;
- Submission of samples to an accredited laboratory, as applicable;
- Photographic log of damaged materials; and
- Preparation of this report with findings and recommendations.

3.0 METHODOLOGY & ASSESSMENT CRITERIA

This investigation was conducted by visual and laboratory identified methods (where applicable) for the assessment of ACM and their corresponding location, use, condition and friability. The areas outlined in Section 2.0 were inspected limited to building components, materials and service connections.

Where applicable, bulk sampling followed by laboratory analysis was conducted to confirm the presence/absence of asbestos in building materials. Bulk samples are retrieved in accordance with Section 3 and Table 1 of Ontario Regulation 278/05, *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations (O. Reg. 278/05)*, made under the Occupational Health and Safety Act. The number of samples collected for each material is based on the type and quantity of the material present within the area(s) investigated.

Each individual sample is placed in a labelled, sealable, plastic bag for transportation to an independent laboratory for bulk asbestos fibre analysis. Analysis for asbestos content is performed by the independent laboratory in accordance with the U.S. Environmental Protection Agency (EPA) Test Method EPA/600/R-93-116: Method for the Determination of Asbestos in Bulk Building Materials. June 1993. This method identifies the asbestos fibre content of building materials using polarized light microscopy (PLM) analytical techniques, with confirmation of presence and type of asbestos made by dispersion staining optical microscopy. This analytical method meets the requirements set forth in Section 3 of O. Reg. 278/05.

Where sampling could cause consequential damage to the property or compromise a materials function, sampling was not conducted. Therefore, these materials shall be deemed (visually confirmed) to be asbestos-containing.

Sampling of materials that are visually confirmed to be asbestos-containing shall be conducted prior to disturbance (i.e. prior to renovation or demolition) to confirm or refute the material as asbestos-containing. Alternatively, treat visually confirmed materials as asbestos-containing and remove and dispose in accordance with O. Reg. 278/05.

Destructive testing was not conducted as part of this assessment. Details regarding the possible presence of ACM in enclosed locations were provided on a case-by-case basis where our visual inspection indicated this possibility. Notwithstanding that, all reasonable attempts were made to identify all ACM's, the possibility of concealed materials exists and may not become visible or accessible until substantial demolition occurs and are therefore currently undocumented. This includes the following:

- Locations that may be hazardous to the surveyor, such as electrical equipment;
- Where invasive inspection could cause consequential damage to the property or impair the integrity of the equipment, such as roof systems, underground services or components of mechanical equipment;
- Locations concealed by building finishes that require substantial demolition or removal for access to ACMs; and,
- Materials that are present in such an inconsistent fashion that without complete removal of finishes, the extent cannot be determined.

It should be noted that the following items and conditions were not assessed under the scope of this assignment:

- Occupant items such as stored products, furnishings, and personal items; or,
- Settled general dust or airborne agents, unless otherwise specified.

3.1 Classification & Action of ACM

During this investigation, the general condition of ACM's were observed and noted. Materials which are damaged can pose an exposure risk to workers, building occupants and the public. As per Board request, abatement items were grouped into two (2) categories to aid in remedial prioritization based on the condition, type of material and accessibility of the material:

Monitor Annually

These are non-friable asbestos-containing materials which display minor damage; however, do not pose a risk to building occupants from exposure to asbestos fibres due to the current physical condition of the material and/or location. These items should be monitored on an annual basis for evidence of continued degradation. Should the condition of the material change, an evaluation should be completed by a competent person to determine remedial action.

Abatement Action Required

Any asbestos-containing material which displays moderate to significant damage and requires timely clean-up, repair, or removal due to the potential risk to building occupants from exposure to asbestos fibres due to physical condition and/or location of the material.

4.0 FINDINGS

An inspection of the building was conducted by Safetech on January 3, 2025. The Grand River Collegiate Institute facility is a two-storey structure built circa 1965 with additions constructed in 2002 and 2018. The inspection did not include areas of post 1986 construction or renovation (where all building finishes have been removed and replaced), as applicable.

The Asbestos Management Database is provided in **Appendix A** and associated Figures are provided in **Appendix B**. These documents together provide a current summary of the ACM identified throughout the building.

The Internal Abatement Management summary and corresponding photographs are provided in **Table 1** of **Appendix C**. This provides a summary of all ACM identified throughout the building that requires annual monitoring or Type 1 operations in accordance with O. Reg 278/05.

The External Abatement Management summary and corresponding photographs are provided in **Table 2** of **Appendix C**. This provides a summary of all ACM that has been identified as requiring Type 2, Type 2 Glove Bag, or Type 3 Operations in accordance with O. Reg 278/05.

The bulk asbestos sample location and analytical summary is provided in **Appendix C**.

4.1 Analytical Results

During this inspection, no samples were collected.

4.2 Removed ACM

A summary of ACM that have been removed since the previous audit and inspections is provided below:

Location FR#'s B-103, B-105, 3-1A, 3-100, 3-107, T-123A, and 2-201A:

- Parged cement pipe fitting insulation

Location FR# B-103C:

- Flex Joint Ducting

Location FR#'s 2-102, 2-104, 3-103E, 7-202, 7-204, and 7-206:

- 1'x1' Large and Small Pinhole Fixed-in-Place Ceiling Tiles

Location FR#'s 3-104, 3-105, 3-105B, and 1-219:

- 1'x1' Long Fissure Fixed-in-Place Ceiling Tiles

Location FR# 4-105:

- 2'x2' Medium Fissure and Random Pinhole Lay-in Ceiling Tiles

Location FR#'s 7-100, 7-102, 7-200, and 7-202:

- 9"x9" Beige Vinyl Floor Tiles and associated mastic

Location FR#'s 1-217, 1-219, 3-203, 7-204, and 7-206:

- 9"x9" Brown and White Vinyl Floor Tiles and associated mastic

Location FR#'s 3-211:

- 9"x9" Light Red Vinyl Floor Tiles and associated mastic

Location FR#'s 3-207:

- 9"x9" Grey with White Streaks Vinyl Floor Tiles and associated mastic

4.3 Discovery of Additional ACM

No additional ACM or suspect ACM was identified since the previous assessment.

4.4 Damaged ACM

Damaged ACM was identified. Refer to Appendix C, Tables 1 and 2 for a detailed summary of required actions, specific to each material. At the time of the audit, all other ACM at the building was noted to be in good condition.

5.0 RECOMMENDATIONS

5.1 Remedial

Damaged ACM was identified. Refer to Appendix C, Tables 1 and 2 for a detailed summary of required actions, specific to each material. At the time of the audit, all other ACM at the building was noted to be in good condition.

Type 1 abatement Operations may be conducted internally by trained and qualified WRDSB staff. All other abatement work must be conducted by certified asbestos contractors trained and qualified to conduct the type of work required.

5.2 Long Term Management

The purpose of this investigation was for the long term management of ACMs within the subject building. Prior to any future construction or renovation projects, additional project-specific assessment and/or sampling may be required.

Currently, there are no requirements under legislation to remove ACM from a building because it is present. However, O. Reg. 278/05 does require that an Asbestos Management Plan be developed, implanted and maintained on an annual basis. Asbestos awareness training should be provided for any staff that may come into contact with ACM during routine duties or in an emergency situation.

ACM that will be disturbed, or has the potential to be disturbed, during building maintenance, renovations, construction, or demolition activities shall be handled and disposed of in accordance with the procedures stipulated by O. Reg. 278/05.

ACM may be present in concealed locations. If any construction, renovation, alteration, or maintenance activities are required or planned, a project-specific intrusive investigation into concealed locations to assess for potential ACM must be performed. Should any suspect ACM be discovered, work should cease and the materials should be assessed by a competent person. Suspect ACM shall be treated as asbestos-containing or sampled to confirm or refute asbestos content.

6.0 LIMITATIONS

The information and recommendations detailed in this report were carried out by trained professional and technical staff in accordance with generally accepted environmental and industrial hygiene work practices and procedures. Recommendations provided in this report have been generated in accordance with current regulations, accepted industry guidelines and practices. These regulations, guidelines and practices are considered acceptable as of the date of this report.

In preparation of this report, Safetech Environmental Limited (Safetech) relied on information supplied by others including testing services provided by independent laboratories. Except as expressly set out in this report, Safetech has not made any independent verification of this information provided by independent entities. The collection of samples at the location noted was consistent with the scope of work agreed-upon with the person or entity to whom this report is addressed and the information obtained concerning prior site investigations. As conditions between samples may vary, the potential remains for the presence of unknown additional contaminants for which there were no known indicators. Conclusions are based on site conditions at the time of inspection and can only be extrapolated to an undefined limited area around inspected locations. The extent of the limited area depends on building construction and conditions. Safetech cannot warrant against undiscovered environmental liabilities.

If any information becomes available that differs from the findings in this report, we request that we be notified immediately to reassess the conclusions provided herein.

No other person or entity is entitled to use or rely upon this report without the express written consent of Safetech Environmental Limited and the person or entity to who it is addressed. Any use that a third party makes of this report, or any reliance based on conclusions and recommendations made, are the responsibility of such third parties. Safetech accepts no responsibility for damages suffered by third parties as a result of actions based on this report.

Should you require any further information, please contact our office.

Sincerely,

Safetech Environmental Limited



Per: Alyssa Nagy, B.Sc.,
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Attached

Appendix A: Asbestos Management Database
Appendix B: Figures
Appendix C: Tables

Appendix A

Asbestos Management Database

For Tender Purpose

	School Name	Legend:	Notes:
	Grand River Collegiate Institute	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - material sampled VC - Visually Confirmed - material not sampled, deemed NF - Non-Friable F - Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965 Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
Structure										
	Original 1965 Building	Structure	Deck	Steel	-	Non ACM	-	-	-	-
	Original 1965 Building	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
	Original 1965 Building	Structure	Spray-applied Fire Proofing	Off-white	F	ACM	SL	S02,31682-S01 to 31682-S07	21-Dec-09	5% -6.8% Chrysotile
	Original 1965 Building	Structure	Spray-applied Fire Proofing	Tinted Blue (2010 onwards)	-	Non ACM	-			
	Original 1965 Building	Facade	Spandrel	Metal	-	Non ACM	-	-	-	-
	Original 1965 Building	Facade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
	Original 1965 Building	Overhangs	Plaster	White Textured Plaster	NF	ACM	SL	S01ABC	06-Nov-18	0.5% Chrysotile
	Original 1965 Building	Roof	Roofing Materials	R-A 2008, R-B 2008, R-C 2008, R-D 1995, R-E 2020, R-F 1995, R-G 2023, R-G4 2019, R-G5 2019, R-H 2023, R-I 2020, R-J 1995, R-K 2020, R-L 2002						
	Original 1965 Building	Windows	Interior Aluminum Frames	Grey	NF	ACM	SL	S05F, S02A (Nov 18)	13-Apr-18 , 6-Nov-18	10%, 0.5% Chrysotile
	Original 1965 Building	Windows	Interior Aluminum Frames	Black Sealant - Tech Wing	-	Non ACM	SL	S03ABC	06-Nov-18	ND
	Original 1965 Building	Windows	Exterior Frames	White Sealant	-	Non ACM	SL	S05B	13-Apr-18	ND
	Original 1965 Building	Garage Door	Exterior Frames	White Sealant	-	Non ACM	SL	S05C	13-Apr-18	ND
	Original 1965 Building	Door Spandrel	Exterior Frames	Black	-	Non ACM	SL	S05E	13-Apr-18	ND
	Original 1965 Building	Doors	Exterior Frames	Black	-	Non ACM	SL	S05D	13-Apr-18	ND
	Original 1965 Building	Ceiling	Mastic CT 1 x 1 (cellulose)	Brown	-	Non ACM	HM	S01ABCD	13-Apr-18	ND
	Original 1965 Building	Floor	Floor Tile Mastic	Black	NF	ACM	SL	S04	13-Apr-18	0.5% -2% Chrysotile
Basement										
	B-1 Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
	B-1 Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
	B-1 Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
	B-1 Corridor	Ceiling	Ceiling Tile 2 x 4	Bumpy Pinhole (1999)	-	Non ACM	-	-	-	-
	B-1 Corridor	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S20	21-Dec-09	ND
	B-1 Corridor	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
	B-1 Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
	B-1 Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
	B-101 Classroom	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	-
	B-101 Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	Space Renovated 2017-2018
	B-101 Classroom	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	Space Renovated 2017-2018
	B-101A Washroom	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	Space Renovated 2017-2018
	B-101A Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	Space Renovated 2017-2018
	B-101A Washroom	Ceiling	Ceiling Tile 2 x 4	White Textured Pinhole (2019)	-	-	-	-	-	Space Renovated 2017-2018
	B-101A Washroom	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	Space Renovated 2017-2018
	B-101B Washroom	Floor	Floor Tile 12x12	Beige Oatmeal	-	Non ACM	SL	S17abc	21-Dec-09	Space Renovated 2017-2018

	School Name	Legend:	Notes:
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	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965		
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
B-101B	Washroom	Wall	Concrete Block	-	-	Non ACM	-	-	-	Space Renovated 2017-2018
B-101B	Washroom	Ceiling	Ceiling Tile 2 x 4	White Textured Pinhole (2019)	-	-	-	-	-	Space Renovated 2017-2018
B-101B	Washroom	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	Space Renovated 2017-2018
B-101C	Washroom	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	Space Renovated 2017-2018
B-101C	Washroom	Wall	Concrete Block	-	-	Non ACM	-	-	-	Space Renovated 2017-2018
B-101C	Washroom	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	Space Renovated 2017-2018
B-102	Room	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	-
B-102	Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-102	Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S20	21-Dec-09	ND
B-102	Room	Ceiling	Textured Plaster	Plaster	-	Non ACM	SL	S18a, S01D	21-Dec-09, 18-Jan-18	ND
B-102	Room	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
B-103	Custodial Room	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	-
B-103	Custodial Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-103	Custodial Room	Ceiling	Textured Plaster	Plaster	-	Non ACM	HM	S18	21-Dec-09	ND
B-103	Custodial Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
B-103A	Storage Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B-103A	Storage Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-103A	Storage Room	Ceiling	Textured Plaster	Plaster	-	Non ACM	HM	S18	21-Dec-09	ND
B-103A	Storage Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
B-103A	Storage Room	Piping	Pipe Insulation	High Density Foam under Canvas Wrap	-	Non ACM	-	-	-	-
B-103B	Storage Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B-103B	Storage Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-103B	Storage Room	Ceiling	Textured Plaster	Plaster	-	Non ACM	SL	S18b	21-Dec-09	ND
B-103B	Storage Room	Deck	Concrete	-	-	Non ACM	-	-	-	-
B-103B	Storage Room	Piping	Pipe Insulation	High Density Foam under Canvas Wrap	-	Non ACM	-	-	-	-
B-103C	Storage Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B-103C	Storage Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-103C	Storage Room	Ceiling	Textured Plaster	Plaster	-	Non ACM	SL	S01B	18-Jan-18	ND
B-103C	Storage Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
B-103C	Storage Room	Piping	Pipe Insulation	High Density Foam under Canvas Wrap	-	Non ACM	-	-	-	-
B-104	Room	Floor	Laminate	Faux Wood	-	Non ACM	-	-	-	-
B-104	Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-104	Room	Ceiling	Ceiling Tile 2 x 4	White Textured Pinhole (2019)	-	Non ACM	-	-	-	-
B-104	Room	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
B-105	Boiler Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B-105	Boiler Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-105	Boiler Room	Wall	Textured Plaster	Plaster	-	Non ACM	SL	S01F	18-Jan-18	ND
B-105	Boiler Room	Ceiling	Textured Plaster	Plaster	-	Non ACM	SL	S18e, S01A	12/21/2009, 01/18/201	ND

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	Date Built:		
	Original: 1965		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
B-105	Boiler Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
B-105	Boiler Room	Piping	Pipe Fitting	Fibreglass / PVC	-	Non ACM	-	-	-	-
B-105A	Storage Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B-105A	Storage Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-105A	Storage Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S20	21-Dec-09	ND
B-105A	Storage Room	Ceiling	Textured Plaster	Plaster	-	Non ACM	HM	S18	21-Dec-09	ND
B-105A	Storage Room	Deck	Spray-applied Fire Proofing	Cellulose (Post 2021)	-	Non ACM	-	-	-	-
B-105B	Pump Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B-105B	Pump Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-105B	Pump Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B-105B	Pump Room	Deck	Spray-applied Fire Proofing	Cellulose (Post 2021)	-	Non ACM	-	-	-	-
B-105B	Pump Room	Piping	Pipe Insulation	High Density Foam under Canvas Wrap	-	Non ACM	-	-	-	-
B-105C	Chiller Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B-105C	Chiller Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-105C	Chiller Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S20	21-Dec-09	ND
B-105C	Chiller Room	Ceiling	Textured Plaster	Plaster	-	Non ACM	HM	S18	21-Dec-09	ND
B-105C	Chiller Room	Deck	Spray-applied Fire Proofing	Cellulose (Post 2021)	-	Non ACM	-	-	-	-
B-105D	Electrical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
B-105D	Electrical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-105D	Electrical Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S20	21-Dec-09	ND
B-105D	Electrical Room	Ceiling	Textured Plaster	Plaster	-	Non ACM	HM	S18	21-Dec-09	ND
B-105D	Electrical Room	Mechanical	Flex Joint	White	NF	ACM	VC	Sample prior to removal /disturbance	-	-
B-105D	Electrical Room	Deck	Spray-applied Fire Proofing	Cellulose (Post 2021)	-	Non ACM	-	-	-	-
B-106	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
B-106	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-106	Storage	Ceiling	Textured Plaster	Plaster	-	Non ACM	HM	S18	21-Dec-09	ND
B-108A	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
B-108A	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-108A	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S20	21-Dec-09	ND
B-108A	Office	Ceiling	Ceiling Tile 2 x 4	White Textured Pinhole (2019)	-	Non ACM	-	-	-	-
B-108A	Office	Deck	Concrete	-	-	Non ACM	-	-	-	-
B108-B	Closet	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
B108-B	Closet	Wall	Concrete	-	-	Non ACM	-	-	-	-
B108-B	Closet	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
B-110	Classroom	Floor	Vinyl Sheet Flooring	Grey (2019)	-	Non ACM	-	-	-	-
B-110	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-110	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S20	21-Dec-09	ND
B-110	Classroom	Ceiling	Ceiling Tile 2 x 4	White Textured Pinhole (2019)	-	Non ACM	-	-	-	-

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	Original: 1965 Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
B-110	Classroom	Deck	Concrete	-	-	Non ACM	-	-	-	-
B-110	Classroom	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
B-110	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
B-110	Classroom	Piping	Pipe Insulation	Foam insulation	-	Non ACM	-	-	-	-
B-110A	Classroom	Floor	Vinyl Sheet Flooring	Grey (2019)	-	Non ACM	-	-	-	-
B-110A	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	SL	S20abc	21-Dec-09	ND
B-110A	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-110A	Classroom	Ceiling	Ceiling Tile 2 x 4	White Textured Pinhole (2019)	-	Non ACM	-	-	-	-
B-110A	Classroom	Deck	Concrete	-	-	Non ACM	-	-	-	-
B-112	Change Room/Storage	Floor	Floor Tile 12x12	Beige Oatmeal	-	Non ACM	HM	S17	21-Dec-09	ND
B-112	Change Room/Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
B-112	Change Room/Storage	Wall	Textured Plaster	Plaster	-	Non ACM	HM	S18	21-Dec-09	ND
B-112	Change Room/Storage	Ceiling	Textured Plaster	Plaster	-	Non ACM	SL	S18c	21-Dec-09	ND
903	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
903	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
903	Stairwell	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
903	Stairwell	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S20	21-Dec-09	ND
905	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
905	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
905	Stairwell	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
905	Stairwell	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S20	21-Dec-09	ND
906	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
906	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
906	Stairwell	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
906	Stairwell	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S20	21-Dec-09	ND
909	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
909	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
909	Stairwell	Ceiling	Textured Plaster	Plaster	-	Non ACM	SL	S01B	18-Jan-18	ND
909	Stairwell	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
909	Stairwell	Piping	Pipe Insulation	High Density Foam under Canvas Wrap	-	Non ACM	-	-	-	-
Level 1										
1-1	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
1-1	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-1	Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
1-1	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-1	Corridor	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND

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	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
1-1A	Stage Landing	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
1-1A	Stage Landing	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-1A	Stage Landing	Ceiling	Ceiling Tile 2 x 2	Fibreglass	-	Non ACM	-	-	-	-
1-1A	Stage Landing	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	-	-	-	-
1-100	Classroom	Floor	Floor Tile 9x9	Green	NF	ACM	HM	S09ABC	21-Dec-09	1.3% Chrysotile
1-100	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-100	Classroom	Wall	Drywall	Drywall Joint Compound (Post 2008)	-	Non ACM	-	-	-	-
1-100	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-100	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-102	Classroom	Floor	Floor Tile 9x9	Blue, White & Black	NF	ACM	HM	S04ABC	21-Dec-09	1.5% Chrysotile
1-102	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-102	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-102	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-104	Classroom	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
1-104	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-104	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-104	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-104	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-106	Classroom	Floor	Floor Tile 9x9	Beige	NF	ACM	HM	32523-GRCI-FT-S03ABC	21-Dec-09	1.3% Chrysotile
1-106	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-106	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-106	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-106	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-108	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
1-108	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-108	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-108	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-108	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-110	Classroom	Floor	Floor Tile 12x12	White & blue	-	Non ACM	SL	S10ABC	21-Dec-09	ND
1-110	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-110	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-110	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-110	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-112	Classroom	Floor	Floor Tile 9x9	Blue, White & Black	NF	ACM	HM	S04ABC	21-Dec-09	1.5% Chrysotile
1-112	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-112	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-112	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-112	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-

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	Grand River Collegiate Institute	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - material sampled VC - Visually Confirmed - material not sampled, deemed NF - Non-Friable F - Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965 Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
1-112A	Office	Floor	Floor Tile 9x9	Blue, White & Black	-	ACM	HM	S04ABC	21-Dec-09	1.5% Chrysotile
1-112A	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-112A	Office	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-112A	Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-112A	Office	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-113	Storage	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
1-113	Storage	Wall	Concrete	-	-					
1-113	Storage	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-113	Storage	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-114	Classroom	Floor	Floor Tile 9x9	Light Red	-	ACM	HM	32523-GRCI-FT-S08ABC	21-Dec-09	1.8% Chrysotile
1-114	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-114	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-114	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-114	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-114	Classroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-115	Girls Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
1-115	Girls Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-115	Girls Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
1-115	Girls Washroom	Ceiling	Ceiling Tile 2 x 2	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-115	Girls Washroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-116	Classroom	Floor	Floor Tile 9x9	Beige	-	ACM	HM	32523-GRCI-FT-S03ABC	21-Dec-09	1.3% Chrysotile
1-116	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-116	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-116	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-116	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-116	Classroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-117	Classroom	Floor	Floor Tile 9x9	Light Red	NF	ACM	HM	32523-GRCI-FT-S08ABC	21-Dec-09	1.8% Chrysotile
1-117	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-117	Classroom	Wall	Drywall	Drywall Joint Compound (Post 2008)	-	Non ACM	-	-	-	-
1-117	Classroom	Wall	Plaster	Plaster	-	Non ACM	SL	S03ABC	21-Dec-09	ND
1-117	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-117	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-117A	Learning Services Office	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
1-117A	Learning Services Office	Wall	Drywall	Drywall Joint Compound (Post 2008)	-	Non ACM	-	-	-	-
1-117A	Learning Services Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-117A	Learning Services Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-117A	Learning Services Office	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-118	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile

	School Name	Legend:	Notes:
	Grand River Collegiate Institute	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - material sampled VC - Visually Confirmed - material not sampled, deemed NF - Non-Friable F - Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		
	Original: 1965		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
1-118	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-118	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-118	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-118	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-118	Classroom	Ceiling	Drywall	Drywall Joint Compound (Post 2008)	-	Non ACM	-	-	-	-
1-119	Classroom	Floor	Floor Tile 12x12	Brown Cobblestone (Post 2008)	-	Non ACM	-	-	-	-
1-119	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-119	Classroom	Wall	Drywall	Drywall Joint Compound (Post 2008)	-	Non ACM	-	-	-	-
1-119	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-119	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-120	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
1-120	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-120	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-120	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-120	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-120	Classroom	Ceiling	Drywall	Drywall Joint Compound (Post 2008)	-	Non ACM	-	-	-	-
2-1	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
2-1	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-1	Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
2-1	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
2-1	Corridor	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-1	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
2-1A	Hallway	Floor	Floor Tile 12x12	White & blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
2-1A	Hallway	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-1A	Hallway	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-1A	Hallway	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
2-1A	Hallway	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
2-1A	Hallway	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S01ABC	21-Dec-09	2.3% Amosite 0.25% Chrysotile
2-100	Classroom	Floor	Floor Tile 12x12	White & blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
2-100	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-100	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	SL	S02ABC	01-Jan-15	ND
2-100	Classroom	Wall	Plaster	Plaster	-	Non ACM	SL	S01C	01-Jan-15	ND
2-100	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
2-100	Classroom	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S01ABC	21-Dec-09	2.3% Amosite 0.25% Chrysotile
2-100A	Business Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
2-100A	Business Office	Floor	Floor Tile 12x12	White & blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
2-100A	Business Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-100A	Business Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND

	School Name	Legend:	Notes:
	Grand River Collegiate Institute	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - material sampled VC - Visually Confirmed - material not sampled, deemed NF - Non-Friable F - Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965		
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
2-100A	Business Office	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
2-100A	Business Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
2-100A	Business Office	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S01ABC	21-Dec-09	2.3% Amosite 0.25% Chrysotile
2-100B	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
2-100B	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-100B	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-100B	Office	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
2-100B	Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
2-100B	Office	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S01ABC	21-Dec-09	2.3% Amosite 0.25% Chrysotile
2-100C	V&H Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
2-100C	V&H Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-100C	V&H Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-100C	V&H Room	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
2-100C	V&H Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
2-100C	V&H Room	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S01ABC	21-Dec-09	2.3% Amosite 0.25% Chrysotile
2-101	AV Office	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
2-101	AV Office	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	ND
2-101	AV Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-101	AV Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-101	AV Office	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-102	SAC Office	Floor	Floor Tile 12x12	White & blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
2-102	SAC Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-102	SAC Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-102	SAC Office	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
2-102	SAC Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
2-102	SAC Office	Ceiling	Drywall	Drywall Joint Compound (Post 2021)	-	Non ACM	-	-	-	-
2-103	Storage	Floor	Floor Tile 12x12	White & Beige	-	Non ACM	HM	S02ABC	21-Dec-09	ND
2-103	Storage	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
2-103	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-103	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-103	Storage	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-104	Testing Room	Floor	Floor Tile 12x12	White & blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
2-104	Testing Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-104	Testing Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-104	Testing Room	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
2-104	Testing Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
2-104	Testing Room	Ceiling	Drywall	Drywall Joint Compound (Post 2021)	-	Non ACM	-	-	-	-
2-106	Storage	Floor	Floor Tile 12x12	White & blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND

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	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965 Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
2-106	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-106	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-106	Storage	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
2-106	Storage	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
2-106	Storage	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S01ABC	21-Dec-09	2.3% Amosite 0.25% Chrysotile
3-1	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
3-1	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-1	Corridor	Wall	Ceramic Tile	Ceramic Tile	-	Non ACM	-	-	-	-
3-1	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-1	Corridor	Ceiling	Drywall	Drywall Joint Compound (Post 2008)	-	Non ACM	-	-	-	-
3-1	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
3-1A	Hallway	Floor	Concrete	-	-	Non ACM	-	-	-	-
3-1A	Hallway	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-1A	Hallway	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
3-100	Kitchen	Floor	Ceramic Tile	Ceramic Tile	-	Non ACM	-	-	-	-
3-100	Kitchen	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-100	Kitchen	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
3-100	Kitchen	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-100	Kitchen	Ceiling	Ceiling Tile 2 x 2	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-100	Kitchen	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
3-100A	Kitchen Storage/Office	Floor	Ceramic Tile	Ceramic Tile	-	Non ACM	-	-	-	-
3-100A	Kitchen Storage/Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-100A	Kitchen Storage/Office	Ceiling	Drywall	-	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-102	Kitchen Classroom	Floor	Vinyl Sheet Flooring	Grey (2021)	-	Non ACM	-	-	-	-
3-102	Kitchen Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-102	Kitchen Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-102	Kitchen Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-102	Kitchen Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
3-102	Kitchen Classroom	Ceiling	Drywall	Drywall (No Compound)	-	Non ACM	-	-	-	-
3-103	Receiving	Floor	Concrete	-	-	Non ACM	-	-	-	-
3-103	Receiving	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-103	Receiving	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-103	Receiving	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
3-103A	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
3-103A	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-103A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-103A	Storage	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-103A	Storage	Ceiling	Drywall	Drywall Joint Compound (Post 2021)	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
	Grand River Collegiate Institute	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - material sampled VC - Visually Confirmed - material not sampled, deemed NF - Non-Friable F - Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965		
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
3-103C	Custodial Staff Room	Floor	Vinyl Sheet Flooring	Grey (2021)	-	Non ACM	-	-	-	-
3-103C	Custodial Staff Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-103C	Custodial Staff Room	Ceiling	Drywall	Drywall Joint Compound (Post 2021)	-	Non ACM	-	-	-	-
3-103C	Custodial Staff Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
3-103D	Custodial Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
3-103D	Custodial Office	Wall	Drywall	Drywall Joint Compound (Post 2021)	-	Non ACM	-	-	-	-
3-103D	Custodial Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-103D	Custodial Office	Ceiling	Drywall	Drywall Joint Compound (Post 2021)	-	Non ACM	-	-	-	-
3-103E	Washroom	Floor	Vinyl Sheet Flooring	Grey (2021)	-	Non ACM	-	-	-	-
3-103E	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-103E	Washroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-103E	Washroom	Ceiling	Drywall	Drywall Joint Compound (Post 2021)	-	Non ACM	-	-	-	-
3-104	Kitchen Classroom	Floor	Vinyl Sheet Flooring	Grey (2021)	-	Non ACM	HM	S07ABC	21-Dec-09	ND
3-104	Kitchen Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-104	Kitchen Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-104	Kitchen Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-104	Kitchen Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
3-104	Kitchen Classroom	Ceiling	Drywall	Drywall (No Compound)	-	Non ACM	-	-	-	-
3-105	Classroom	Floor	Vinyl Sheet Flooring	Grey Cobblestone	-	Non ACM	HM	S05ABC	21-Dec-09	ND
3-105	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-105	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-105	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-105	Classroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-105	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
3-105A	Storage	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
3-105A	Storage	Wall	Drywall	Drywall Joint Compound (Post 2021)	-	Non ACM	-	-	-	-
3-105A	Storage	Ceiling	Drywall	Drywall Joint Compound (Post 2021)	-	Non ACM	-	-	-	-
3-105A	Storage	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
3-105B	Washroom	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
3-105B	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
3-105B	Washroom	Ceiling	Drywall	Drywall Joint Compound (Post 2021)	-	Non ACM	-	-	-	-
3-105B	Washroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-106	Staff Lounge	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	ND
3-106	Staff Lounge	Wall	Concrete	-	-	Non ACM	-	-		
3-106	Staff Lounge	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
3-106	Staff Lounge	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	SL	S02A	13-Apr-18	5% Amosite
3-106A	Office	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	ND
3-106A	Office	Wall	Concrete	-	-	Non ACM	-	-		

	School Name	Legend:	Notes:
	Grand River Collegiate Institute	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - material sampled VC - Visually Confirmed - material not sampled, deemed NF - Non-Friable F - Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		
	Original: 1965		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
3-106A	Office	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
3-106A	Office	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S01ABC	21-Dec-09	2.3% Amosite 0.25% Chrysotile
3-106C	Washroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	ND
3-106C	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-106C	Washroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
3-106C	Washroom	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S01ABC	21-Dec-09	2.3% Amosite 0.25% Chrysotile
3-106D	Washroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	ND
3-106D	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-106D	Washroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
3-106D	Washroom	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	SL	S02A	13-Apr-18	5% Amosite
3-107	Special Needs Classroom	Floor	Vinyl Sheet Flooring	Grey Cobblestone	-	Non ACM	SL	S05ABC	21-Dec-09	ND
3-107	Special Needs Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-107	Special Needs Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	SL	S08ABC	21-Dec-09	ND
3-107	Special Needs Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-107	Special Needs Classroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-109	Office	Floor	Floor Tile 9x9	Blue, White & Black	NF	ACM	HM	S04ABC	21-Dec-09	1.5% Chrysotile
3-109	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-109	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-109	Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-109	Office	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-109	Office	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
3-111	Classroom	Floor	Floor Tile 9x9	Beige	NF	ACM	HM	32523-GRCI-FT-S03ABC	21-Dec-09	1.3% Chrysotile
3-111	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-111	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-111	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-111	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
3-112	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
3-112	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-112	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
3-112	Washroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-112	Washroom	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
3-113	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
3-113	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-113	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-113	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-113	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
3-114	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
3-114	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
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	Date Built:		
	Original: 1965		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
3-114	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-114	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-114	Classroom	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
3-115	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	SL	S02ABC	21-Dec-09	<0.25 Chrysotile
3-115	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-115	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-115	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-115	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
3-116	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
3-116	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-116	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-116	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-117	Classroom	Floor	Floor Tile 9x9	Grey & White	NF	ACM	SL	S01ABC	21-Dec-09	1.1% Chrysotile
3-117	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-117	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-117	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-117	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
4-1	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
4-1	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-1	Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
4-1	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
4-1	Corridor	Ceiling	Drywall	Drywall Joint Compound (Post 2008)	-	Non ACM	-	-	-	-
4-1	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
4-1A	Main Foyer	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
4-1A	Main Foyer	Wall	Wood	-	-	Non ACM	-	-	-	-
4-1A	Main Foyer	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
4-1A	Main Foyer	Ceiling	Textured Finish	-	-	Non ACM	HM	S13ABCDE	21-Dec-09	ND
4-103	Cafeteria	Floor	Floor Tile 12x12	White & beige & yellow & blue	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
4-103	Cafeteria	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-103	Cafeteria	Wall	Textured Finish	-	-	Non ACM	SL	S13ABCDE	21-Dec-09	ND
4-103	Cafeteria	Ceiling	Textured Finish	-	-	Non ACM	SL	S13ABCDE	21-Dec-09	ND
4-103A	Stage	Floor	Wood	Wood	-	Non ACM	-	-	-	-
4-103A	Stage	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-103A	Stage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
4-103C	Custodial	Floor	Floor Tile 9x9	Beige	NF	ACM	HM	32523-GRCI-FT-S03ABC	21-Dec-09	1.3% Chrysotile
4-103C	Custodial	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-103C	Custodial	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
4-105	Servery	Floor	Ceramic Tile	Ceramic Tile	-	Non ACM	-	-	-	-

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	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965 Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
4-105	Servery	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
4-105	Servery	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-105	Servery	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2024)	-	Non ACM	-	-	-	-
4-105	Servery	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
4-106	Duct Shaft	Floor	Concrete	-	-	Non ACM	-	-	-	-
4-106	Duct Shaft	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-107	Tuck Shop	Floor	Floor Tile 9x9	Light Red	NF	ACM	SL	32523-GRCI-FT-S08ABC	21-Dec-09	1.8% Chrysotile
4-107	Tuck Shop	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-107	Tuck Shop	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
4-107A	Storage	Floor	Floor Tile 9x9	Light Red	NF	ACM	HM	32523-GRCI-FT-S08ABC	21-Dec-09	1.8% Chrysotile
4-107A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-107A	Storage	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-1	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
5-1	Corridor	Wall	Brick	-	-	Non ACM	-	-	-	-
5-1	Corridor	Wall	Ceramic Tile	-	-	-	-	-	-	-
5-1	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2010)	-	Non ACM	-	-	-	-
5-1	Corridor	Ceiling	Drywall	Drywall Joint Compound (Post 2008)	-	Non ACM	-	-	-	-
5-1A	Hallway	Floor	Laminate	Grey / Brown	-	Non ACM	-	-	-	-
5-1A	Hallway	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-1A	Hallway	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
5-1A	Hallway	Ceiling	Drywall	Drywall Joint Compound (Post 2008)	-	Non ACM	-	-	-	-
5-1B	Hallway	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
5-1B	Hallway	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-1B	Hallway	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-1B	Hallway	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-1C	Hallway	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
5-1C	Hallway	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-1C	Hallway	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-1C	Hallway	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-1D	Corridor	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
5-1D	Corridor	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-1D	Corridor	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-1E	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
5-1E	Corridor	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
5-1E	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-1E	Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
5-1E	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2010)	-	Non ACM	-	-	-	-
5-1E	Corridor	Ceiling	Drywall	Drywall Joint Compound (Post 2008)	-	Non ACM	-	-	-	-

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	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965		
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
5-1F	Hallway	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
5-1F	Hallway	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-1F	Hallway	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-1H	Hallway	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
5-1H	Hallway	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-1H	Hallway	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-103A	Staff Washroom	Floor	Laminate	-	-	Non ACM	-	-	-	-
5-103A	Staff Washroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-103A	Staff Washroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-103B	Staff Washroom	Floor	Laminate	-	-	Non ACM	-	-	-	-
5-103B	Staff Washroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-103B	Staff Washroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-101	VP Office	Floor	Laminate	-	-	Non ACM	-	-	-	-
5-101	VP Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-101	VP Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-101	VP Office	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-102	Custodial	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
5-102	Custodial	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-102	Custodial	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-103	Vice Principal Office	Floor	Laminate	-	-	Non ACM	-	-	-	-
5-103	Vice Principal Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-103	Vice Principal Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-103	Vice Principal Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
5-103	Vice Principal Office	Ceiling	Drywall	Drywall (No Compound)	-	Non ACM	-	-	-	-
5-105	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
5-105	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-105	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-105	Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
5-105	Office	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-105A	Records Storage	Floor	Carpet	-	-	Non ACM	-	-	-	-
5-105A	Records Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-105A	Records Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-105A	Records Storage	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
5-105A	Records Storage	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-105B	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
5-105B	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-105B	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-105B	Office	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND

	School Name	Legend:	Notes:
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	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965		
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
5-105C	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
5-105C	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-105C	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-105C	Office	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-105D	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
5-105D	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-105D	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-105D	Office	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-105E	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
5-105E	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-105E	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-105E	Office	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-105F	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
5-105F	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-105F	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-105F	Office	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-105G	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
5-105G	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-105G	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-105G	Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
5-105H	Optimist Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
5-105H	Optimist Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-105H	Optimist Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-105H	Optimist Room	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-105I	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
5-105I	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-105I	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-105I	Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
5-105I	Office	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-107	Staff Room	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
5-107	Staff Room	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-107	Staff Room	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-107B	Staff Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
5-107B	Staff Washroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-107B	Staff Washroom	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-109	Office	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
5-109	Office	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-109	Office	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND

	School Name	Legend:	Notes:
	Grand River Collegiate Institute	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - material sampled VC - Visually Confirmed - material not sampled, deemed NF - Non-Friable F - Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		
	Original: 1965		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
5-109A	Staff Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
5-109A	Staff Washroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-109A	Staff Washroom	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-111	Office	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
5-111	Office	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-111	Office	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-113	Office	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
5-113	Office	Wall	Plaster	Plaster	-	Non ACM	SL	S08C	21-Dec-09	ND
5-113	Office	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	SL	S09ABC	21-Dec-09	ND
5-113A	Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
5-113A	Office	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-113A	Office	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-113B	Office	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
5-113B	Office	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-113B	Office	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-113E	Work Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
5-113E	Work Room	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-113E	Work Room	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
5-113F	Work Room	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
5-113F	Work Room	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-113F	Work Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
5-115	Storage Room	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
5-115	Storage Room	Wall	Plaster	Plaster	-	Non ACM	SL	S08AB	21-Dec-09	ND
5-115	Storage Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-115	Storage Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
5-117	Cardio Room	Floor	Vinyl Sheet Flooring	Yellow, Blue (Post 2008)	-	Non ACM	-	-	-	-
5-117	Cardio Room	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-117	Cardio Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-117	Cardio Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
5-117	Cardio Room	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile
5-117A	Cardio Room	Floor	Vinyl Sheet Flooring	Yellow, Blue (Post 2008)	-	Non ACM	-	-	-	-
5-117A	Cardio Room	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-117A	Cardio Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
5-117A	Cardio Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
5-117A	Cardio Room	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile
5-117B	Storage	Floor	Floor Tile 9x9	Light Red	-	ACM	HM	32523-GRCI-FT-S08ABC	21-Dec-09	1.8% Chrysotile
5-117B	Storage	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
5-117B	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
	Grand River Collegiate Institute	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - material sampled VC - Visually Confirmed - material not sampled, deemed NF - Non-Friable F - Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		
	Original: 1965		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
5-117B	Storage	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile
5-118	Seminar Room	Floor	Floor Tile 12x12	White & blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
5-118	Seminar Room	Wall	Drywall	Drywall Joint Compound (2000)	-	Non ACM	-	-	-	-
5-118	Seminar Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
5-118	Seminar Room	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
5-119	Seminar Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
5-119	Seminar Room	Wall	Drywall	Drywall Joint Compound (2000)	-	Non ACM	-	-	-	-
5-119	Seminar Room	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
5-120	Seminar Room	Floor	Floor Tile 12x12	White & blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
5-120	Seminar Room	Wall	Drywall	Drywall Joint Compound (2000)	-	Non ACM	-	-	-	-
5-120	Seminar Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
5-120	Seminar Room	Deck	Metal Pan	Steel	-	Non ACM	-	-	-	-
6-1	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-1	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-1	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2010)	-	Non ACM	-	-	-	-
6-1	Corridor	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
6-100	Main Office	Floor	Laminate	-	-	Non ACM	-	-	-	-
6-100	Main Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
6-100	Main Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-100	Main Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
6-100	Main Office	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
6-100A	Principal's Office	Floor	Laminate	-	-	Non ACM	-	-	-	-
6-100A	Principal's Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
6-100A	Principal's Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-100A	Principal's Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2000)	-	Non ACM	-	-	-	-
6-100A	Principal's Office	Ceiling	Drywall	Drywall (No Compound)	-	Non ACM	-	-	-	-
6-100B	Washroom	Floor	Laminate	-	-	Non ACM	-	-	-	-
6-100B	Washroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
6-100B	Washroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
6-100C	VP Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
6-100C	VP Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
6-100C	VP Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-100C	VP Office	Ceiling	Ceiling Tile 1 x 1	Medium Fissure Random Pinhole	-	Non ACM	HM	S09ABC	21-Dec-09	ND
6-100D	Vault	Not Inspected								
6-100E	Office	Floor	Laminate	-	-	Non ACM	-	-	-	-
6-100E	Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
6-100E	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-100E	Office	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND

	School Name	Legend:	Notes:
	Grand River Collegiate Institute	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - material sampled VC - Visually Confirmed - material not sampled, deemed NF - Non-Friable F - Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965 Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
6-101	Copy Room	Floor	Floor Tile 9x9	Light Red	NF	ACM	HM	32523-GRCI-FT-S08ABC	21-Dec-09	1.8% Chrysotile
6-101	Copy Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-101	Copy Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
6-101	Copy Room	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile
6-103	Office	Floor	Floor Tile 9x9	Light Red	-	ACM	HM	32523-GRCI-FT-S08ABC	21-Dec-09	1.8% Chrysotile
6-103	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-103	Office	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	SL	S02F	13-Apr-18	5% Amosite
6-103	Office	Deck	Concrete	-	-	Non ACM	-	-	-	-
6-103A	Storage	Floor	Floor Tile 9x9	Light Red	NF	ACM	HM	32523-GRCI-FT-S08ABC	21-Dec-09	1.8% Chrysotile
6-103A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-103A	Storage	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
6-106	Girls Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-106	Girls Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
6-106	Girls Washroom	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
6-106A	Boys Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-106A	Boys Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
6-106A	Boys Washroom	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
7-1	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
7-1	Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
7-1	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2010)	-	Non ACM	-	-	-	-
7-1	Corridor	Ceiling	Drywall	Drywall Joint Compound (Post 2008)	-	Non ACM	-	-	-	-
7-100	Classroom	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	-
7-100	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-100	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-100	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
7-100	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
7-101	Gym 1	Floor	Wood	-	-	Non ACM	-	-	-	-
7-101	Gym 1	Wall	Concrete	Concrete	-	Non ACM	-	-	-	-
7-101	Gym 1	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
7-101A	Storage Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
7-101A	Storage Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-101A	Storage Room	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile
7-101B	Office	Floor	Concrete	-	-	Non ACM	-	-	-	-
7-101B	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-101B	Office	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
7-101C	Office	Floor	Floor Tile 9x9	Beige	NF	ACM	HM	32523-GRCI-FT-S03ABC	21-Dec-09	1.3% Chrysotile
7-101C	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-101C	Office	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile

	School Name	Legend:	Notes:
	Grand River Collegiate Institute	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - material sampled VC - Visually Confirmed - material not sampled, deemed NF - Non-Friable F - Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		
	Original: 1965		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
7-101D	Office	Floor	Floor Tile 9x9	Beige	NF	ACM	HM	32523-GRCI-FT-S03ABC	21-Dec-09	1.3% Chrysotile
7-101D	Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-101D	Office	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile
7-101E	Office	Floor	Concrete	Concrete	-	Non ACM	-	-	-	-
7-101E	Office	Wall	Concrete	Concrete	-	Non ACM	-	-	-	-
7-101E	Office	Ceiling	Concrete	Concrete	-	Non ACM	-	-	-	-
7-101F	Storage Room	Floor	Concrete	Concrete	-	Non ACM	-	-	-	-
7-101F	Storage Room	Wall	Concrete	Concrete	-	Non ACM	-	-	-	-
7-101F	Storage Room	Ceiling	Concrete	Concrete	-	Non ACM	-	-	-	-
7-102	Classroom	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	-
7-102	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-102	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-102	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
7-102	Classroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-102	Classroom	Piping	Rain Water Leader	Transite	NF	ACM	VC	Sample prior to removal/disturbance	-	-
7-104	Classroom	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	-
7-104	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-104	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-104	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
7-104	Classroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-106	Change Room	Floor	Terrazzo	Terrazzo	-	Non ACM	-	-	-	-
7-106	Change Room	Wall	Concrete Block	-	-	Non ACM	-	-	-	-
7-106	Change Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-108	Custodial	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
7-108	Custodial	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-108	Custodial	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-110	PhysEd Office	Floor	Vinyl Sheet Flooring	Blue (Post 2018)	-	Non ACM	-	-	-	-
7-110	PhysEd Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-110	PhysEd Office	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile
7-110B	Washroom	Floor	Vinyl Sheet Flooring	Blue (Post 2018)	-	Non ACM	-	-	-	-
7-110B	Washroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-110B	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-110B	Washroom	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
8-1	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
8-1	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-1	Corridor	Ceiling	Ceiling Tile 2 x 2	Short Fissure Random Pinhole (2010)	-	Non ACM	-	-	-	-
8-1	Corridor	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
8-1	Corridor	Deck	Spray-applied Fire Proofing	Off-white	F	ACM	HM	S02,31682-S01 to 31682-S07	21-Dec-09	5% -6.8% Chrysotile

	School Name	Legend:	Notes:
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	Date Built:		
	Original: 1965		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
8-1	Corridor	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
8-100	Team Change Room	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
8-100	Team Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-100	Team Change Room	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-100A	Shower Room	Floor	Ceramic Tile	Ceramic Tile	-	Non ACM				
8-100A	Shower Room	Wall	Ceramic Tile	Ceramic Tile	-	Non ACM				
8-100A	Shower Room	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-101	Gym Store	Floor	Floor Tile 9x9	Beige	NF	ACM	HM	32523-GRCI-FT-S03ABC	21-Dec-09	1.3% Chrysotile
8-101	Gym Store	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-101	Gym Store	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-102	Gym 2	Floor	Wood	-	-	Non ACM	-	-	-	-
8-102	Gym 2	Wall	Concrete	Concrete	-	Non ACM	-	-	-	-
8-102	Gym 2	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
8-102	Gym 2	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
8-103	Change Room	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
8-103	Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-103	Change Room	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-103A	Change Room Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
8-103A	Change Room Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-103A	Change Room Washroom	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-103B	Change Room Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
8-103B	Change Room Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-103B	Change Room Washroom	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-104	Gym 3	Floor	Wood	-	-	Non ACM	-	-	-	-
8-104	Gym 3	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-104	Gym 3	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
8-104	Gym 3	Piping	Rain Water Leader	Transite	NF	ACM	VC	Sample prior to removal/disturbance	-	-
8-104A	Instructor's Office	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
8-104A	Instructor's Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-104A	Instructor's Office	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile
8-104B	Instructor's Office	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
8-104B	Instructor's Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-104B	Instructor's Office	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile
8-104C	Instructor Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
8-104C	Instructor Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-104C	Instructor Washroom	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-104D	Instructor Shower	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
8-104D	Instructor Shower	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
	Grand River Collegiate Institute	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - material sampled VC - Visually Confirmed - material not sampled, deemed NF - Non-Friable F - Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965		
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
8-104D	Instructor Shower	Ceiling	Ceramic Tile	-	-	Non ACM	-	-	-	-
8-104E	Instructor Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
8-104E	Instructor Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-104E	Instructor Washroom	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-104F	Instructor Shower	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
8-104F	Instructor Shower	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
8-104F	Instructor Shower	Ceiling	Ceramic Tile	-	-	Non ACM	-	-	-	-
8-104G	Storage	Floor	Floor Tile 9x9	Beige	NF	ACM	HM	32523-GRCI-FT-S03ABC	21-Dec-09	1.3% Chrysotile
8-104G	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-104G	Storage	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-104H	Instructor Office	Floor	Floor Tile 9x9	Grey & White	NF	ACM	SL	S01ABC	21-Dec-09	1.1% Chrysotile
8-104H	Instructor Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-104H	Instructor Office	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-105	Team Change Room	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
8-105	Team Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-105	Team Change Room	Wall	Ceramic Tile	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-105	Team Changeroom	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-105B	Shower Room	Floor	Ceramic Tile	Ceramic Tile	-	Non ACM				
8-105B	Shower Room	Wall	Ceramic Tile	Ceramic Tile	-	Non ACM				
8-105B	Shower Room	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-105C	Change Room Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
8-105C	Change Room Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-105C	Change Room Washroom	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-106	Team Change Room	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
8-106	Team Change Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-106	Team Change Room	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-106B	Shower Room	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
8-106B	Shower Room	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
8-106B	Shower Room	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
8-106C	Change Room Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
8-106C	Change Room Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
8-106C	Change Room Washroom	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC	21-Dec-09	ND
T-1	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
T-1	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-1	Corridor	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-1	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2010)	-	Non ACM	-	-	-	-
T-1	Corridor	Ceiling	Drywall	Drywall Joint Compound (Post 2008)						
T-1	Corridor	Piping	Rain Water Leader	Horsehair	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
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	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965		
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
T-1A	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
T-1A	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-1A	Corridor	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-1A	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2010)	-	Non ACM	-	-	-	-
T-101	Art Room	Floor	Wood	-	-	Non ACM	-	-	-	-
T-101	Art Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-101	Art Room	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-101	Art Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-101	Art Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
T-102	Classroom	Floor	Floor Tile 9x9	Beige	NF	ACM	HM	32523-GRCI-FT-S03ABC	21-Dec-09	1.3% Chrysotile
T-102	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-102	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
T-102	Classroom	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile
T-102A	Workroom	Floor	Floor Tile 9x9	Beige	NF	ACM	HM	32523-GRCI-FT-S03ABC	21-Dec-09	1.3% Chrysotile
T-102A	Workroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-102A	Workroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
T-102A	Workroom	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile
T-103	Art Room	Floor	Floor Tile 9x9	Green	NF	ACM	HM	S09ABC	21-Dec-09	1.3% Chrysotile
T-103	Art Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-103	Art Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
T-103	Art Room	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile
T-104	Exterior Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
T-104	Exterior Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-104	Exterior Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
T-105	Drama Storage	Floor	Floor Tile 9x9	Green	NF	ACM	HM	S09ABC	21-Dec-09	1.3% Chrysotile
T-105	Drama Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-105	Drama Storage	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
T-105	Drama Storage	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S07ABC	21-Dec-09	1.3% Amosite 0.25% Chrysotile
T-106	Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
T-106	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
T-106	Washroom	Ceiling	Ceiling Tile 2 x 2	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
T-106	Washroom	Ceiling	Drywall	Drywall (No Compound)	-	Non ACM	-	-	-	-
T-107	Theater Arts	Floor	Wood	-	-	Non ACM	-	-	-	-
T-107	Theater Arts	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-107	Theater Arts	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-107	Theater Arts	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-107	Theater Arts	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
T-108	Career Centre	Floor	Floor Tile 12x12	Pink Cobblestone	-	Non ACM	SL	S03ABC	21-Dec-09	ND

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	Date Built:		
	Original: 1965		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
T-108	Career Centre	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-108	Career Centre	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
T-108	Career Centre	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	SL	S02B	13-Apr-18	5% Amosite
T-109	Music Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
T-109	Music Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-109	Music Room	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-109	Music Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-109	Music Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
T-109A	Music Practice Room	Floor	Carpet	-	-	-	-	-	-	-
T-109A	Music Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109A	Music Practice Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109B	Music Practice Room	Floor	Carpet	-	-	-	-	-	-	-
T-109B	Music Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109B	Music Practice Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109C	Music Practice Room	Floor	Carpet	-	-	-	-	-	-	-
T-109C	Music Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109C	Music Practice Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109D	Music Practice Room	Floor	Carpet	-	-	-	-	-	-	-
T-109D	Music Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109D	Music Practice Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109E	Music Practice Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
T-109E	Music Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109E	Music Practice Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109F	Music Practice Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
T-109F	Music Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109F	Music Practice Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109G	Music Practice Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
T-109G	Music Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109G	Music Practice Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109H	Music Practice Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
T-109H	Music Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109H	Music Practice Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109I	Music Practice Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
T-109I	Music Practice Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-109I	Music Practice Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-110	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
T-110	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-110	Storage	Deck	Steel Deck	-	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
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	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965 Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
T-110	Storage	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-112	Custodial	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
T-112	Custodial	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-112	Custodial	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
T-114	Classroom	Floor	Floor Tile 9x9	Light Red	NF	ACM	HM	32523-GRCI-FT-S08ABC	21-Dec-09	1.8% Chrysotile
T-114	Classroom	Floor	Carpet	-	-	Non ACM	-	-	-	-
T-114	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-114	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
T-114	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
T-116	Classroom	Floor	Wood	-	-	Non ACM	-	-	-	-
T-116	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-116	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-116	Classroom	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
T-116	Classroom	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-116	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
T-117	Classroom	Floor	Wood	-	-	Non ACM	-	-	-	-
T-117	Classroom	Floor	Floor Tile 9x9	Brown & White	-	ACM	HM	S04ABC	21-Dec-09	1.5 Chrysotile
T-117	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-117	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-117	Classroom	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
T-117	Classroom	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-117	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-117	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
T-117A	Storage/Office	Floor	Wood	-	-	Non ACM	-	-	-	-
T-117A	Storage/Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-117A	Storage/Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-117A	Storage/Office	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
T-117A	Storage/Office	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-117A	Storage/Office	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-117A	Storage/Office	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
T-117B	Storage	Floor	Wood	-	-	Non ACM	-	-	-	-
T-117B	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-117B	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-117B	Storage	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
T-117B	Storage	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-117B	Storage	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-117C	Storage	Floor	Wood	-	-	Non ACM	-	-	-	-
T-117C	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
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	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965 Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
T-117C	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-117C	Storage	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
T-117C	Storage	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-117C	Storage	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-117D	Storage	Floor	Wood	-	-	Non ACM	-	-	-	-
T-117D	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-117D	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-117D	Storage	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
T-117D	Storage	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-117D	Storage	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-118	Classroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
T-118	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-118	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-118	Classroom	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
T-118	Classroom	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-118	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-118	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
T-118A	Edit Room	Floor	Floor Tile 12x12	White & Blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
T-118A	Edit Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-118A	Edit Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-118A	Edit Room	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
T-118A	Edit Room	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-118A	Edit Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-119	Art Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
T-119	Art Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-119	Art Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-119	Art Room	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
T-119	Art Room	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-119	Art Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-119	Art Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
T-119A	Kiln	Not Inspected								
T-120	Classroom	Floor	Concrete	-	-	Non ACM	-	-	-	-
T-120	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-120	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-120	Classroom	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
T-120	Classroom	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-120	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-120	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile

	School Name	Legend:	Notes:
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	Date Built:		
	Original: 1965		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
T-120A	Dark Room	Floor	Floor Tile 12x12	White & Blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
T-120A	Dark Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-120A	Dark Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-120A	Dark Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-120A	Dark Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-121	TV Studio	Floor	Floor Tile 9x9	Grey	NF	ACM	HM	S09ABC	21-Dec-09	1.3 Chrysotile
T-121	TV Studio	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-121	TV Studio	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
T-121	TV Studio	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S01ABC	21-Dec-09	2.3% Amosite 0.25% Chrysotile
T-121A	Storage	Floor	Wood	-	-	Non ACM	-	-	-	-
T-121A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-121A	Storage	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-122	Paint Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
T-122	Paint Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-122	Paint Storage	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
T-123	Classroom	Floor	Wood	-	-	Non ACM	-	-	-	-
T-123	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-123	Classroom	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-123	Classroom	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-123	Classroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
T-123A	Storage	Floor	Floor Tile 9x9	Green	NF	ACM	HM	S09ABC	21-Dec-09	1.3 Chrysotile
T-123A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-123A	Storage	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-123A	Storage	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-124	Cyclone	Not Inspected								
T-125	Computer Lab	Floor	Mastic Tile 12x12	White & Blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
T-125	Computer Lab	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-125	Computer Lab	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-125	Computer Lab	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
T-125	Computer Lab	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-125	Computer Lab	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
T-125A	Computer Lab Edit	Floor	Mastic Tile 12x12	White & Blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
T-125A	Computer Lab Edit	Wall	Concrete	-	-	Non ACM	-	-	-	-
T-125A	Computer Lab Edit	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
T-125A	Computer Lab Edit	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
T-125A	Computer Lab Edit	Ceiling	Fibreboard	-	-	Non ACM	-	-	-	-
T-125A	Computer Lab Edit	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
901	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-

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	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965 Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
901	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
901	Stairwell	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
902	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
902	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
902	Stairwell	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
903	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
903	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
903	Stairwell	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
904	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
904	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
904	Stairwell	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
905	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
905	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
905	Stairwell	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
906	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
906	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
906	Stairwell	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
907	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
907	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
907	Stairwell	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
908	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
908	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
908	Stairwell	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
910	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
910	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
910	Stairwell	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
Level 2										
1-2	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
1-2	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-2	Corridor	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-2	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-2	Corridor	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-2	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
1-200	Study Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
1-200	Study Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-200	Study Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND

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	Original: 1965 Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
1-200	Study Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-200	Study Room	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-200A	Study Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
1-200A	Study Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-200A	Study Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-200A	Study Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-200A	Study Room	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-204	Study Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
1-204	Study Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-204	Study Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-204	Study Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-204	Study Room	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-204A	Study Room	Floor	Carpet	-	-	Non ACM	-	-	-	-
1-204A	Study Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-204A	Study Room	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-204A	Study Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-204A	Study Room	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-206	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
1-206	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-206	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-206	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-206	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-208	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
1-208	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-208	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-208	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-208	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-210	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
1-210	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-210	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-210	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-210	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-212	Staff Office	Floor	Floor Tile 9x9	Brown & White	-	ACM	HM	S04ABC	21-Dec-09	1.5 Chrysotile
1-212	Staff Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-212	Staff Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-212	Staff Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-212	Staff Office	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-214	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile

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	Addition(s): 2002, 2018		

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1-214	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-214	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-214	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-214	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-216	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
1-216	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-216	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-216	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-216	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-217	Classroom	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	-
1-217	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-217	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-217	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-217	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-217	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-218	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
1-218	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-218	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-218	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-218	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-219	Classroom	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	-
1-219	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-219	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-219	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-219	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-219	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-220	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
1-220	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-220	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-220	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-220	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
1-221	Classroom	Floor	Floor Tile 9x9	Light Red	NF	ACM	HM	32523-GRCI-FT-S08ABC	21-Dec-09	1.8 Chrysotile
1-221	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
1-221	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
1-221	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
1-221	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
1-221	Classroom	Ceiling	Ceiling Tile 1 x 1	Long Fissure	NF	ACM	SL	S03A	13-Apr-18	5% Amosite
2-2	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-

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	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965		
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
2-2	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-2	Corridor	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-2	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
2-2	Corridor	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-2	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
2-200	Gallery - Cafetorium	Floor	Concrete	-	-	Non ACM	-	-	-	-
2-200	Gallery - Cafetorium	Wall	Concrete Block	-	-	Non ACM	-	-	-	-
2-200	Gallery - Cafetorium	Deck	Concrete	-	-	Non ACM	-	-	-	-
2-201	Fan Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
2-201	Fan Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-201	Fan Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
2-201A	Fan Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
2-201A	Fan Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-201A	Fan Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-201A	Fan Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
2-201A	Fan Room	Piping	Pipe Fitting	PVC	-	Non ACM	-	-	-	-
2-201A	Fan Room	Ducting	Flex Joint	-	NF	ACM	VC	Sample prior to removal/disturbance	-	-
2-203	Girls Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
2-203	Girls Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-203	Girls Washroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-203	Girls Washroom	Ceiling	Ceiling Tile 2 x 2	Fibreglass	-	Non ACM	-	-	-	-
2-203	Girls Washroom	Ceiling	Drywall	Drywall (No Compound)	-	Non ACM	-	-	-	-
2-205	Fly Gallery	Floor	Concrete	-	-	Non ACM	-	-	-	-
2-205	Fly Gallery	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-205	Fly Gallery	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-206	Boy's Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
2-206	Boy's Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
2-206	Boy's Washroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
2-206	Boy's Washroom	Ceiling	Ceiling Tile 2 x 2	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
2-206	Boy's Washroom	Ceiling	Drywall	Drywall (No Compound)	-	Non ACM	-	-	-	-
3-2	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
3-2	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-2	Corridor	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-2	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
3-2	Corridor	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-2	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
3-2A	Hallway	Floor	Mastic Tile 12x12	White & blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
3-2A	Hallway	Wall	Concrete	-	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
	Grand River Collegiate Institute	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - material sampled VC - Visually Confirmed - material not sampled, deemed NF - Non-Friable F - Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965 Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
3-2A	Hallway	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-2A	Hallway	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-2A	Hallway	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	SL	S02C	13-Apr-18	5% Amosite
3-201	Storage	Floor	Floor Tile 9x9	Green with white streaks	NF	ACM	HM	S09ABC	21-Dec-09	1.3% Chrysotile
3-201	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-201	Storage	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	HM	S02C	13-Apr-18	5% Amosite
3-202	Classroom	Floor	Floor Tile 9x9	Beige (Tan with Brown and White Streaks)	NF	ACM	HM	S03ABC	21-Dec-09	1.3% Chrysotile
3-202	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-202	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-202	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-202	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
3-203	Classroom	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	-
3-203	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-203	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-203	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
3-203	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-203	Classroom	Ceiling	Ceiling Tile 1 x 1	Long Fissure	NF	ACM	HM	S05ABC	21-Dec-09	1.5% Amosite 0.25% Chrysotile
3-204	Classroom	Floor	Floor Tile 9x9	Light Red	NF	ACM	HM	32523-GRCI-FT-S08ABC	21-Dec-09	1.8 Chrysotile
3-204	Classroom	Floor	Floor Tile 9x9	Green with white streaks	NF	ACM	HM	S09ABC	21-Dec-09	1.3% Chrysotile
3-204	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-204	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-204	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
3-207	Classroom	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	-
3-207	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-207	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-207	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
3-207	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-207	Classroom	Ceiling	Ceiling Tile 1 x 1	Long Fissure	NF	ACM	HM	S05ABC	21-Dec-09	1.5% Amosite 0.25% Chrysotile
3-208	Staff Office	Floor	Mastic Tile 12x12	White & blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
3-208	Staff Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-208	Staff Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-208	Staff Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-208	Staff Office	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	SL	S02C	13-Apr-18	5% Amosite
3-208A	Staff Office	Floor	Mastic Tile 12x12	White & blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
3-208A	Staff Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-208A	Staff Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-208A	Staff Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-208A	Staff Office	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	SL	S02C	13-Apr-18	5% Amosite

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	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965		
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
3-208B	Staff Office	Floor	Mastic Tile 12x12	White & blue	-	Non ACM	HM	S10ABC	21-Dec-09	ND
3-208B	Staff Office	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-208B	Staff Office	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-208B	Staff Office	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-208B	Staff Office	Ceiling	Ceiling Tile 1 x 1	Large & Small Hole	NF	ACM	SL	S02C	13-Apr-18	5% Amosite
3-209	Storage	Floor	Floor Tile 9x9	Light Red	NF	ACM	HM	32523-GRCI-FT-S08ABC	21-Dec-09	1.8 Chrysotile
3-209	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-209	Storage	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-209	Storage	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
3-209	Storage	Ceiling	Ceiling Tile 1 x 1	Long Fissure	NF	ACM	HM	S05ABC	21-Dec-09	1.5% Amosite 0.25% Chrysotile
3-210	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
3-210	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-210	Mechanical Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
3-210	Mechanical Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
3-210	Mechanical Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
3-210	Mechanical Room	Piping	Pipe Insulation	Mag Block	F	ACM	HM	1680.330-03	June, 1990	25-50% Amosite, >75% Chrysotile
3-210	Mechanical Room	Ducting	Flex Joint	-	NF	ACM	VC	Sample prior to removal/disturbance	-	-
3-211	Classroom	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	-
3-211	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-211	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-211	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
3-211	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-211	Classroom	Ceiling	Ceiling Tile 1 x 1	Long Fissure	NF	ACM	HM	S05ABC	21-Dec-09	1.5% Amosite 0.25% Chrysotile
3-213	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
3-213	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-213	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-213	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
3-213	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-213	Classroom	Ceiling	Ceiling Tile 1 x 1	Long Fissure	NF	ACM	HM	S05ABC	21-Dec-09	1.5% Amosite 0.25% Chrysotile
3-214	Science Classroom	Floor	Floor Tile 12x12	Grey Cobblestone (2016)	-	Non ACM				
3-214	Science Classroom	Floor	Floor Tile 12x12	Black Cobblestone (2016)	-	Non ACM				
3-214	Science Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-214	Science Classroom	Wall	Drywall	Drywall Joint Compound (2016)	-	Non ACM				
3-214	Science Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
3-214	Science Classroom	Deck	Steel Deck	Tinted Spray-applied fireproofing (2016)	-	Non ACM	-	-	-	-
3-216	Storage/Prep Room	Floor	Floor Tile 12x12	Grey Cobblestone (2016)	-	Non ACM				
3-216	Storage/Prep Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-216	Storage/Prep Room	Wall	Drywall	Drywall Joint Compound (2016)	-	Non ACM				

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	Date Built:		
	Original: 1965		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
3-216	Storage/Prep Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
3-216	Storage/Prep Room	Deck	Steel Deck	Tinted Spray-applied fireproofing (2016)	-	Non ACM	-	-	-	-
3-217	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
3-217	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-217	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-217	Classroom	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
3-217	Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
3-217	Classroom	Ceiling	Ceiling Tile 1 x 1	Long Fissure	NF	ACM	HM	S05ABC	21-Dec-09	1.5% Amosite 0.25% Chrysotile
3-218	Science Classroom	Floor	Floor Tile 12x12	Grey Cobblestone (2016)	-	Non ACM				
3-218	Science Classroom	Floor	Floor Tile 12x12	Black Cobblestone (2016)	-	Non ACM				
3-218	Science Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-218	Science Classroom	Wall	Drywall	Drywall Joint Compound (2016)	-	Non ACM				
3-218	Science Classroom	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
3-218	Science Classroom	Deck	Steel Deck	Tinted Spray-applied fireproofing (2016)	-	Non ACM	-	-	-	-
3-219	Classroom	Floor	Floor Tile 12x12	White & beige	-	Non ACM	HM	S02ABC	21-Dec-09	<0.25 Chrysotile
3-219	Classroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
3-219	Classroom	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
3-219	Classroom	Ceiling	Ceiling Tile 1 x 1	Cellulose	-	Non ACM	-	-	-	-
4-2	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
4-2	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-2	Corridor	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
4-2	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
4-2	Corridor	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
4-2	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
4-201	Boy's Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
4-201	Boy's Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
4-201	Boy's Washroom	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
4-202	Projection Room	Floor	Floor Tile 9x9	Light Red	NF	ACM	HM	32523-GRCI-FT-S08ABC	21-Dec-09	1.8 Chrysotile
4-202	Projection Room	Wall	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
4-202	Projection Room	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
4-202	Projection Room	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
4-203	Lecture Hall	Floor	Floor Tile 9x9	Brown & White	NF	ACM	HM	S11ABC	21-Dec-09	0.75 Chrysotile
4-203	Lecture Hall	Wall	Concrete	-	-	Non ACM	-	-	-	-
4-203	Lecture Hall	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
6-2	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-2	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-2	Corridor	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
6-2	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
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	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965		
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
6-2	Corridor	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
6-2	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
6-200	Girl's Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
6-200	Girl's Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
6-200	Girl's Washroom	Ceiling	Plaster	Plaster	-	Non ACM	HM	S03ABC, S12ABCDE	21-Dec-09	ND
6-201	Fitness Room - Gym & 2	Floor	Concrete	-	-	Non ACM	-	-	-	-
6-201	Fitness Room - Gym & 2	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-201	Fitness Room - Gym & 2	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
6-201A	Gallery - Gym 1 & 2	Floor	Concrete	-	-	Non ACM	-	-	-	-
6-201A	Gallery - Gym 1 & 2	Wall	Concrete	-	-	Non ACM	-	-	-	-
6-201A	Gallery - Gym 1 & 2	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
7-2	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
7-2	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-2	Corridor	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-2	Corridor	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
7-2	Corridor	Ceiling	Drywall	Drywall (No Compound)	-	Non ACM	-	-	-	-
7-2	Corridor	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
7-200	Kitchen	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
7-200	Kitchen	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-200	Kitchen	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-200	Kitchen	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
7-200	Kitchen	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-202	Kitchen	Floor	Ceramic Tile	-	-	Non ACM	-	-	-	-
7-202	Kitchen	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
7-202	Kitchen	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-202	Kitchen	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-202	Kitchen	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (2016)	-	Non ACM	-	-	-	-
7-202	Kitchen	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-204	Laundry	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	-
7-204	Laundry	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-204	Laundry	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-204	Laundry	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-
7-204	Laundry	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-206	Servery	Floor	Vinyl Sheet Flooring	Grey (Post 2021)	-	Non ACM	-	-	-	-
7-206	Servery	Floor	Floor Tile 12x12	Brown Cobblestone	-	Non ACM	HM	S07ABC	21-Dec-09	ND
7-206	Servery	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-206	Servery	Wall	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-206	Servery	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-

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	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965		
	Addition(s): 2002, 2018		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
7-206	Servery	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
7-207	Custodial Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
7-207	Custodial Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-207	Custodial Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
7-207	Custodial Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
7-207	Custodial Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
7-207	Custodial Room	Piping	Pipe Insulation	Mag Block	F	ACM	HM	1680.330-03	June, 1990	25-50% Amosite, >75% Chrysotile
7-207A	Mechanical Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
7-207A	Mechanical Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
7-207A	Mechanical Room	Ceiling	Concrete	-	-	Non ACM	-	-	-	-
7-207A	Mechanical Room	Piping	Pipe Insulation	Fibreglass insulation	-	Non ACM	-	-	-	-
7-207A	Mechanical Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1680.330-01	June, 1990	>75% Chrysotile
7-207A	Mechanical Room	Piping	Pipe Insulation	Mag Block	F	ACM	HM	1680.330-03	June, 1990	25-50% Amosite, >75% Chrysotile
7-207A	Mechanical Room	Ducting	Flex Joint	-	NF	ACM	VC	Sample prior to removal/disturbance	-	-
901	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
901	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
901	Stairwell	Wall	Brick	-	-	Non ACM	-	-	-	-
901	Stairwell	Ceiling	Ceiling Tile 2 x 2	Fibreglass	-	Non ACM				
901	Stairwell	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
902	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
902	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
902	Stairwell	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
902	Stairwell	Ceiling	Ceiling Tile 2 x 2	Fibreglass	-	Non ACM				
902	Stairwell	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
903	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
903	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
903	Stairwell	Ceiling	Ceiling Tile 2 x 2	Fibreglass	-	Non ACM				
903	Stairwell	Ceiling	Drywall	Drywall Joint Compound	-	Non ACM	HM	S08ABCDE	21-Dec-09	ND
904	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
904	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
904	Stairwell	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
904	Stairwell	Ceiling	Ceiling Tile 2 x 2	Fibreglass	-	Non ACM				
904	Stairwell	Ceiling	Ceiling Tile 1 x 1	Fibreglass	-	Non ACM				
905	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
905	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
905	Stairwell	Ceiling	Ceiling Tile 1 x 1	Fibreglass	-	Non ACM				
906	Stairwell	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
906	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
906	Stairwell	Ceiling	Ceiling Tile 2 x 4	Short Fissure Random Pinhole (1990)	-	Non ACM	-	-	-	-

	School Name	Legend:	Notes:
	Grand River Collegiate Institute	HM - Homogenous Material - homogeneous with previously sampled material SL - Sample Location - material sampled VC - Visually Confirmed - material not sampled, deemed NF - Non-Friable F - Friable	All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.
	Date Built:		Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.
	Original: 1965		
	Addition(s): 2002, 2018		

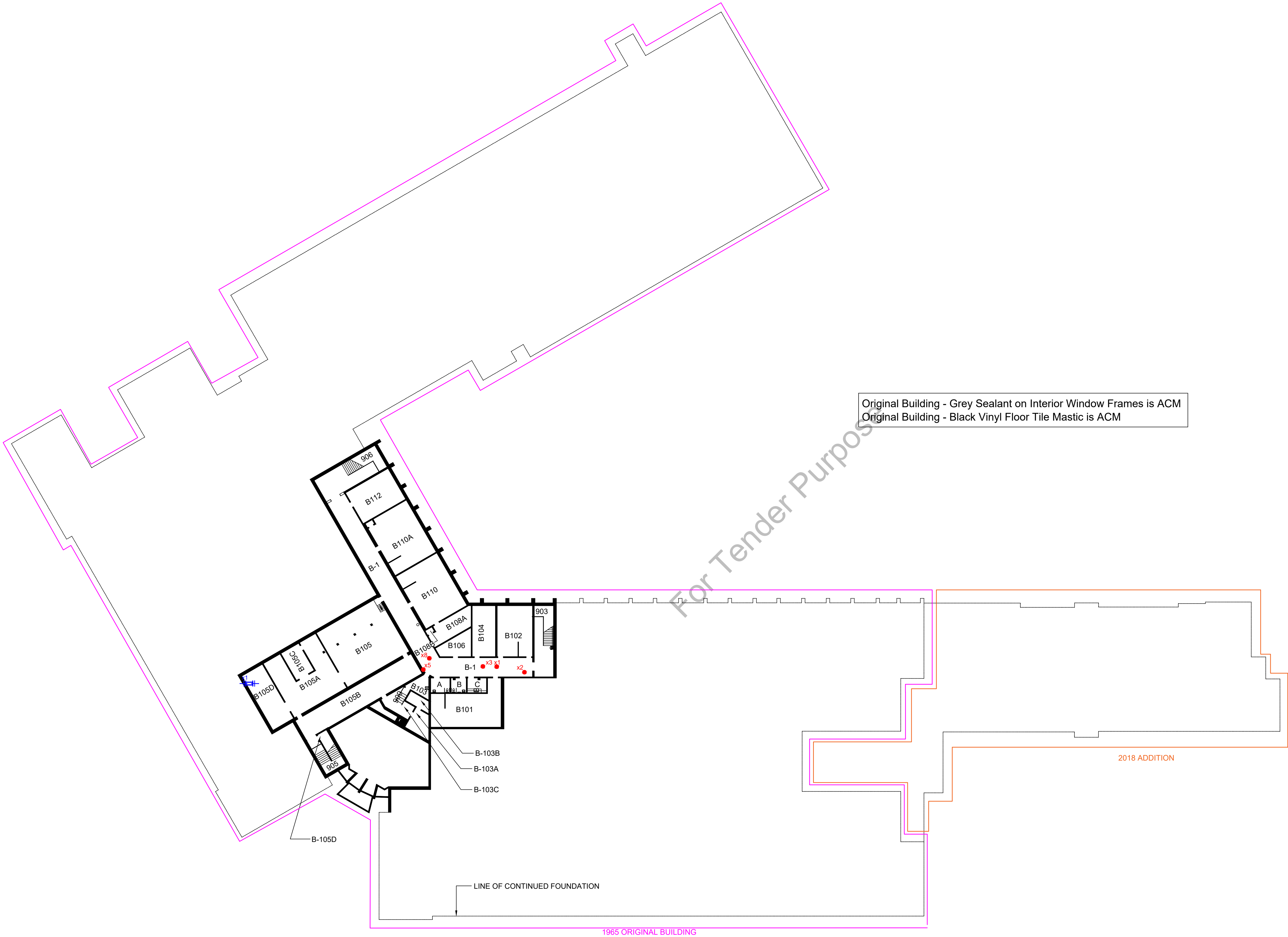
WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
906	Stairwell	Ceiling	Ceiling Tile 1 x 1	Fibreglass	-	Non ACM				
907	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
907	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
907	Stairwell	Deck	Steel Deck	-	-	Non ACM	-	-	-	-
908	Stairwell	Floor	Concrete	-	-	Non ACM	-	-	-	-
908	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
908	Stairwell	Deck	Steel Deck	-	-	Non ACM	-	-	-	-

Summary of Potential ACM Hidden or Not Assessed										
	Throughout Building	Not Inspected	Not Inspected	Wall Cavity Insulation						
	Throughout Building	Not Inspected	Not Inspected	Door Core Insulation						

Appendix B

Figures

For Tender Purpose



- NOTES:**
1. ALL DRAWINGS TO BE REFERENCED WITH THE ASSOCIATED REPORT. LOCATIONS AND QUANTITIES ARE APPROXIMATE.
 2. ALL KNOWN OR SUSPECT ASBESTOS-CONTAINING MATERIALS AND/OR DESIGNATED MATERIALS ARE NOT DEPICTED ON THIS DRAWING. REFER TO THE REPORT FOR A COMPLETE LIST OF IDENTIFIED MATERIALS.
 3. THIS FIGURE IS COLOUR DEPENDENT, PHOTOCOPIES MAY LATER INTERPRETATION OF THE FIGURE. ALWAYS REFER TO ORIGINAL DRAWINGS AND REPORT.
 4. FIXED REFERENCE NUMBERS FOR ROOMS AND/OR AREAS HAVE BEEN PROVIDED BY WRDSB AS PART OF THEIR ESTABLISHED SCHOOL IDENTIFICATION NUMBERING SYSTEM.
 5. INACCESSIBLE ROOMS ARE CONTROLLED BY ENOVA POWER, AND ARE THEREFORE NOT ACCESSIBLE TO SURVEYORS AT THE TIME OF ASSESSMENT.
 6. ASBESTOS-CONTAINING FIREPROOFING, AS WELL AS FIREPROOFING DEBRIS IS PRESENT ON CONCEALED STRUCTURAL BEAMS, ABOVE SECONDARY CEILINGS THROUGHOUT THE BUILDING.

Legend

13 Fixed Reference Number for Room/Area

No Access

Post 1986 Construction

Asbestos-Containing Materials (ACM):

- Vinyl Floor Tile
- Vinyl Sheet Flooring
- Ceiling Tile
- Ceiling Tile (Located Above Drop Ceiling)
- Friable Soft Textured Ceiling
- Non-Friable Hard Textured Ceiling
- Spray-On Fire Proofing
- Trowel Applied Fire Proofing
- Transite (Asbestos Cement) Paneling
- Duct Insulation
- Pipe Fitting Insulation w/ Quantity
- Pipe Insulation (Vertical and Horizontal)
- Transite (Asbestos Cement) Pipe (Vertical and Horizontal)
- Duct Expansion Joints w/ Quantity
- Friable Debris



CLIENT

WATERLOO REGION
DISTRICT SCHOOL BOARD

PROJECT

2025 ASBESTOS
AUDIT UPDATE

DRAWING

GRAND RIVER
COLLEGIATE
INSTITUTE
BASEMENT

Project Manager	J.J.G.	Date	March 2025
Design By	WRDSB	Project No.	2-3240073
Drawn By	J.M.	Drawing No.	
Scale	N.T.S.		AS-01



- NOTES:**
1. ALL DRAWINGS TO BE REFERENCED WITH THE ASSOCIATED REPORT, LOCATIONS AND QUANTITIES ARE APPROXIMATE.
 2. ALL KNOWN OR SUSPECT ASBESTOS-CONTAINING MATERIALS AND/OR DESIGNATED MATERIALS ARE NOT DEPICTED ON THIS DRAWING. REFER TO THE REPORT FOR A COMPLETE LIST OF IDENTIFIED MATERIALS.
 3. THIS FIGURE IS COLOUR DEPENDENT. PHOTOCOPIES MAY LATER INTERPRETATION OF THE FIGURE. ALWAYS REFER TO ORIGINAL DRAWINGS AND REPORT.
 4. FIXED REFERENCE NUMBERS FOR ROOMS AND/OR AREAS HAVE BEEN PROVIDED BY WRDSB AS PART OF THEIR ESTABLISHED SCHOOL IDENTIFICATION NUMBERING SYSTEM.
 5. INACCESSIBLE ROOMS ARE CONTROLLED BY ENOVA POWER, AND ARE THEREFORE NOT ACCESSIBLE TO SURVEYORS AT THE TIME OF ASSESSMENT.
 6. ASBESTOS-CONTAINING FIREPROOFING, AS WELL AS FIREPROOFING DEBRIS IS PRESENT ON CONCEALED STRUCTURAL BEAMS, ABOVE SECONDARY DRYWALL CEILINGS THROUGHOUT THE BUILDING.

Legend

13 Fixed Reference Number for Room/Area

No Access

Post 1986 Construction

- Asbestos-Containing Materials (ACM):**
- Vinyl Floor Tile
 - Vinyl Sheet Flooring
 - Ceiling Tile
 - Ceiling Tile (Located Above Drop Ceiling)
 - Friable Soft Textured Ceiling
 - Non-Friable Hard Textured Ceiling
 - Spray-On Fire Proofing
 - Trowel Applied Fire Proofing
 - Transite (Asbestos Cement) Paneling
 - Duct Insulation
 - Pipe Fitting Insulation w/ Quantity
 - Pipe Insulation (Vertical and Horizontal)
 - Transite (Asbestos Cement) Pipe (Vertical and Horizontal)
 - Duct Expansion Joints w/ Quantity
 - Friable Debris



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DISTRICT SCHOOL BOARD

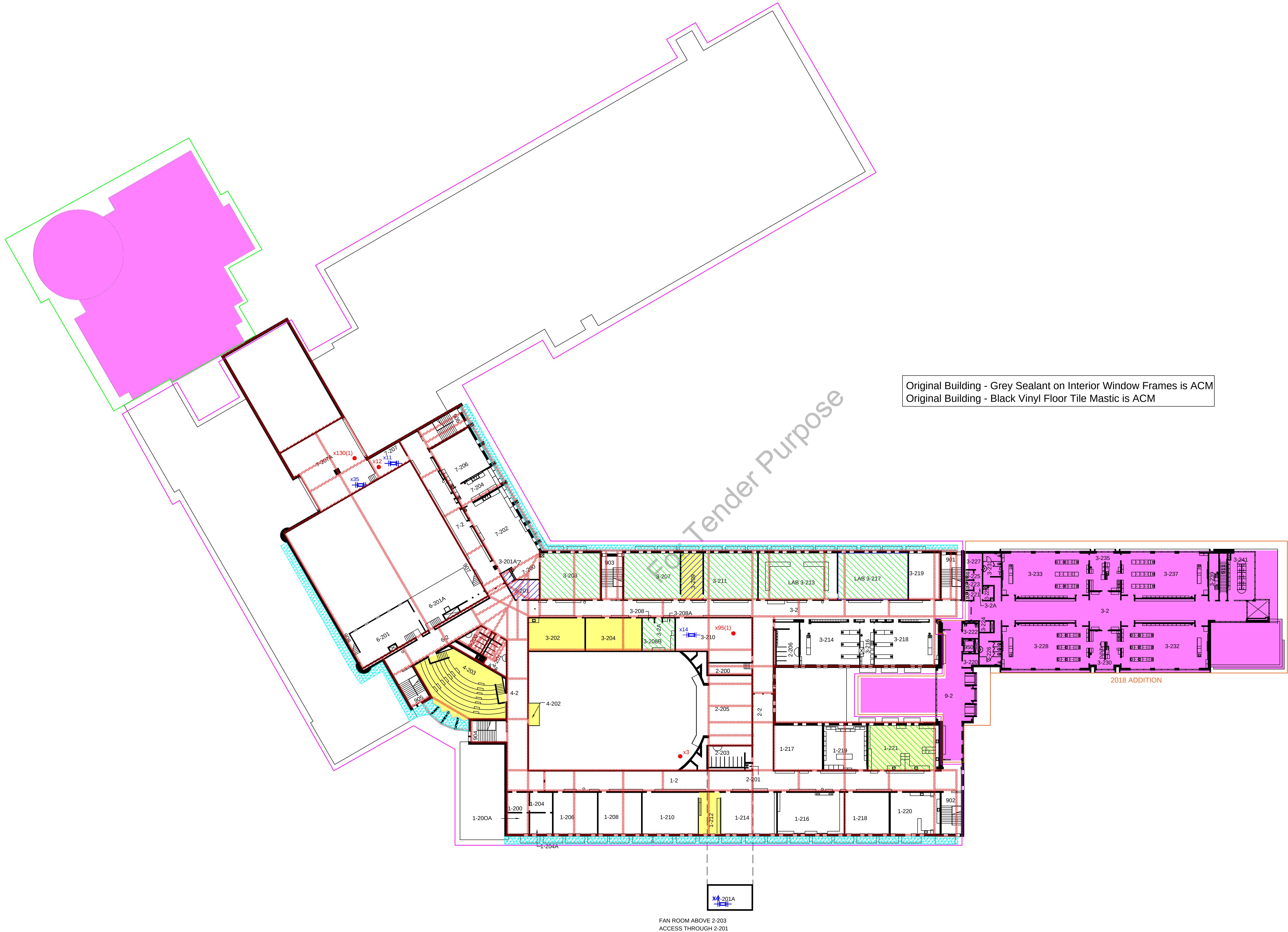
PROJECT

2025 ASBESTOS
AUDIT UPDATE

DRAWING

GRAND RIVER
COLLEGIATE
INSTITUTE
LEVEL ONE

Project Manager	J.J.G.	Date	March 2025
Design By	WRDSB	Project No.	2-3240073
Drawn By	J.M.	Drawing No.	
Scale	N.T.S.		AS-02



- NOTES:**
1. ALL DRAWINGS TO BE REFERENCED WITH THE ASSOCIATED REPORT, LOCATIONS AND QUANTITIES ARE APPROXIMATE.
 2. ALL KNOWN OR SUSPECT ASBESTOS-CONTAINING MATERIALS AND/OR DESIGNATED MATERIALS ARE NOT DEPICTED ON THIS DRAWING. REFER TO THE REPORT FOR A COMPLETE LIST OF IDENTIFIED MATERIALS.
 3. THIS FIGURE IS COLOUR DEPENDENT, PHOTOCOPIES MAY LATER INTERPRETATION OF THE FIGURE. ALWAYS REFER TO ORIGINAL DRAWINGS AND REPORT.
 4. FIXED REFERENCE NUMBERS FOR ROOMS AND/OR AREAS HAVE BEEN PROVIDED BY WRDSB AS PART OF THEIR ESTABLISHED SCHOOL IDENTIFICATION NUMBERING SYSTEM.
 5. INACCESSIBLE ROOMS ARE CONTROLLED BY ENOVA POWER, AND ARE THEREFORE NOT ACCESSIBLE TO SURVEYORS AT THE TIME OF ASSESSMENT.
 6. ASBESTOS-CONTAINING FIREPROOFING, AS WELL AS FIREPROOFING DEBRIS IS PRESENT ON CONCEALED STRUCTURAL BEAMS, ABOVE SECONDARY DRYWALL CEILINGS THROUGHOUT THE BUILDING.

Legend

13 Fixed Reference Number for Room/Area

No Access

Post 1986 Construction

Asbestos-Containing Materials (ACM):

- Vinyl Floor Tile
- Vinyl Sheet Flooring
- Ceiling Tile
- Ceiling Tile (Located Above Drop Ceiling)
- Friable Soft Textured Ceiling
- Non-Friable Hard Textured Ceiling
- Spray-On Fire Proofing
- Trowel Applied Fire Proofing
- Transite (Asbestos Cement) Paneling
- Duct Insulation
- Pipe Fitting Insulation w/ Quantity
- Pipe Insulation (Vertical and Horizontal)
- Transite (Asbestos Cement) Pipe (Vertical and Horizontal)
- Duct Expansion Joints w/ Quantity
- Friable Debris

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**WATERLOO REGION
DISTRICT SCHOOL BOARD**

PROJECT
**2025 ASBESTOS
AUDIT UPDATE**

DRAWING
**GRAND RIVER
COLLEGIATE
INSTITUTE
LEVEL TWO**

Project Manager	J.J.G.	Date	March 2025
Design By	WRDSB	Project No.	2-3240073
Drawn By	J.M.	Drawing No.	
Scale	N.T.S.		AS-03

Appendix C

Tables

For Tender Purpose

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY

Sample #	Location	Material Description	Asbestos Content (%)	Fibre Type	Is Material ACM
2009 Asbestos Audit Update					
32523-GRCI-S01a	1161	1' x 1' Ceiling Tile - Large and Small Pinhole	0.25	Chrysotile	Yes
32523-GRCI-S01b			2.3	Amosite	
32523-GRCI-S01c			NA	-	Yes
32523-GRCI-S02a	1150	1' x 1' Ceiling Tile Mastic	NA	-	Yes
32523-GRCI-S02b			ND	-	No
32523-GRCI-S02c			ND	-	No
32523-GRCI-S03a	1013	Wall Plaster	ND (layer 1)	-	No
32523-GRCI-S03b			ND (layer 2)	-	No
32523-GRCI-S03c			ND (layer 1)	-	No
32523-GRCI-S04a	2056	Duct Parging	ND (layer 1)	-	No
32523-GRCI-S04b	2056		ND (layer 2)	-	No
32523-GRCI-S04c	2057		ND (layer 1)	-	No
32523-GRCI-S05a	2053	1' x 1' Ceiling Tile - Long Fissure	0.25	Chrysotile	Yes
32523-GRCI-S05b			1.5	Amosite	
32523-GRCI-S05c			ND (layer 2)	-	Yes
32523-GRCI-S06a	Fan Rm.	Texture Coat Finish - Along Ladder Entrance	NA	-	Yes
32523-GRCI-S06b			ND	-	No
32523-GRCI-S06c			ND	-	No
32523-GRCI-S07a	1076	1' x 1' Ceiling Tile - Large and Small Pinhole	0.25	Chrysotile	Yes
32523-GRCI-S07b			1.3	Amosite	
32523-GRCI-S07c			NA	-	Yes
32523-GRCI-S08a	1121	Wall Plaster	NA	-	Yes
32523-GRCI-S08b	1121		ND (layer 1)	-	No
32523-GRCI-S08c	1120		ND (layer 2)	-	No
32523-GRCI-S09a	1120	1' x 1' Ceiling Tile - Medium Fissure Random Pinhole	ND	-	No
32523-GRCI-S09b			ND	-	No
32523-GRCI-S09c			ND	-	No
32523-GRCI-S10a	1099	2' x 2' Ceiling Tile - Medium & Small Fissure	ND	-	No
32523-GRCI-S10b			ND	-	No
32523-GRCI-S10c			ND	-	No
32523-GRCI-FT-S01a	1035	9"x9" Floor Tile - Grey and White	1.1	Chrysotile	Yes
32523-GRCI-FT-S01b			NA	-	Yes
32523-GRCI-FT-S01c			NA	-	Yes
32523-GRCI-FT-S02a	1036	12"x12" Floor Tile - White and Beige	<0.25	Chrysotile	Yes
32523-GRCI-FT-S02b			ND	-	Yes
32523-GRCI-FT-S02c			ND	-	Yes
32523-GRCI-FT-S03a	1038	9"x9" Floor Tile - Beige	1.3 (layer 1)	Chrysotile	Yes
32523-GRCI-FT-S03b			ND (layer 2)	-	Yes
32523-GRCI-FT-S03c			ND	-	Yes
32523-GRCI-FT-S04a	1039	9"x9" Floor Tile - Blue, white and black	1.5	Chrysotile	Yes
32523-GRCI-FT-S04b			NA	-	Yes
32523-GRCI-FT-S04c			NA	-	Yes

Table 3 - Sample Summary Table - Grand River CI

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY

Sample #	Location	Material Description	Asbestos Content (%)	Fibre Type	Is Material ACM
32523-GRCI-FT-S05a	1040	Vinyl Sheet Flooring - Grey Cobblestone	ND (layer 1) ND (layer 2)	-	No
32523-GRCI-FT-S05b			ND (layer 1) ND (layer 2)	-	No
32523-GRCI-FT-S05c			ND (layer 1) ND (layer 2) ND (layer 3)	-	No
32523-GRCI-FT-S06a	1040	12"x12" Floor Tile - Mint Green with black streaks	ND (layer 1) ND (layer 2)	-	No
32523-GRCI-FT-S06b			ND (layer 1) ND (layer 2)	-	No
32523-GRCI-FT-S06c			ND (layer 1) ND (layer 2)	-	No
32523-GRCI-FT-S07a	1031	12"x12" Floor Tile - Brown Cobblestone	ND (layer 1) ND (layer 2)	-	No
32523-GRCI-FT-S07b			ND (layer 1) ND (layer 2)	-	No
32523-GRCI-FT-S07c			ND	-	No
32523-GRCI-FT-S08a	1050	9"x9" Floor Tile - Light Red	1.8 (layer 1) ND (layer 2)	Chrysotile	Yes
32523-GRCI-FT-S08b			NA (layer 1) ND (layer 2)	-	Yes
32523-GRCI-FT-S08c			NA (layer 1) ND (layer 2)	-	Yes
32523-GRCI-FT-S09a	1010	9"x9" Floor Tile - Green	1.3 (layer 1) ND (layer 2)	Chrysotile	Yes
32523-GRCI-FT-S09b			ND	-	Yes
32523-GRCI-FT-S09c			ND	-	Yes
32523-GRCI-FT-S10a	1005	12"x12" Floor Tile - White and blue	ND (layer 1) ND (layer 2)	-	No
32523-GRCI-FT-S10b			ND (layer 1) ND (layer 2)	-	No
32523-GRCI-FT-S10c			ND (layer 1) ND (layer 2)	-	No
32523-GRCI-FT-S11a	2016	9"x9" Floor Tile - Brown and white	0.75 (layer 1) ND (layer 2)	Chrysotile	Yes
32523-GRCI-FT-S11b			NA (layer 1) ND (layer 2)	-	Yes
32523-GRCI-FT-S11c			NA (layer 1) ND (layer 2)	-	Yes
32523-GRCI-FT-S12a	1149	12"x12" Floor Tile - Pink cobblestone	ND	-	No
32523-GRCI-FT-S12b			ND	-	No
32523-GRCI-FT-S12b			ND	-	No
S01a	1034	12"x12" Floor Tile - Brown and dense fleck	ND	-	No
S01b			ND	-	No
S01c			ND	-	No
S02a	1045	Firespray	5-10	Chrysotile	Yes
S02b			NA	-	Yes
S02c			NA	-	Yes
S03a	1019	2' x 2' Ceiling Tile - Long Fissure Random Pinhole	0.5-5.0	Amosite	Yes
S03b			NA	-	Yes
S03c			NA	-	Yes
S04a	1032	12"x12" Floor Tile - Beige Dense Fleck	ND	-	No
S04b			ND	-	No
S04c			ND	-	No
S05a	1032	Ceiling Tile Mastic	ND	-	No
S05b			ND	-	No
S05c			ND	-	No
S06a	1042	Vinyl Sheet Flooring - Grey	ND	-	No
S06b			ND	-	No
S06c			ND	-	No

Table 3 - Sample Summary Table - Grand River CI

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY

Sample #	Location	Material Description	Asbestos Content (%)	Fibre Type	Is Material ACM
S07a	1042	1' x 1' Ceiling Tile - Long Fissure	10-25	Amosite	Yes
S07b			NA	-	Yes
S07c			NA	-	Yes
S08a	1043	Drywall Joint Compound	ND	-	No
S08b			ND	-	No
S08c			ND	-	No
S08d	1041		ND	-	No
S08e			ND	-	No
S09b	1039	9"x9" Floor Tile - Grey/white/dark grey	ND	-	No
S09c			ND	-	No
S10a	1020	12"x12" Floor Tile - Grey & White	ND	-	No
S10b			<0.5	Chrysotile	Yes
S10c			ND	-	No
S11a	1030	1' x 1' Ceiling Tile - Large & Medium Pinhole	10-25	Amosite	Yes
S11b			NA	-	Yes
S11c			NA	-	Yes
S12a	First Floor	Plaster	ND	-	No
S12b			ND	-	No
S12c			ND	-	No
S12d			ND	-	No
S12e			ND	-	No
S13a	1019	Texture Coat - Wall/Ceiling	ND	-	No
S13b			ND	-	No
S13c			ND	-	No
S13d			ND	-	No
S13e			ND	-	No
S14a	1019	12"x12" Floor Tile - Blue	ND	-	No
S14b			ND	-	No
S14c			ND	-	No
S15a	1019	12"x12" Floor Tile - Yellow	ND	-	No
S15b			ND	-	No
S15c			ND	-	No
S16a	1058	9"x9" Floor Tile - Beige and White	ND	-	No
S16b			ND	-	No
S16c			ND	-	No
32523-GRCl - S17a	0011	12"x12" Floor Tile - Beige Oatmeal	ND	-	No
32523-GRCl - S17b			ND	-	No
32523-GRCl - S17c			ND	-	No
32523-GRCl - S18a	0009	Texture Coat - Ceiling	ND	-	No
32523-GRCl - S18b			ND	-	No
32523-GRCl - S18c			ND	-	No
32523-GRCl - S18d			ND	-	No
32523-GRCl - S18e			ND	-	No
32523-GRCl - S19a	0006	1' x 1' Ceiling Tile - Medium Fissure Pinhole	2.8	Amosite	Yes
32523-GRCl - S19b			ND	-	Yes
32523-GRCl - S19c			ND	-	Yes
32523-GRCl - S20a	0003	Drywall Joint Compound	ND	-	No
32523-GRCl - S20b			ND	-	No
32523-GRCl - S20c			ND	-	No
32523-GRCl - S21a	0015	Boiler Breaching	50	Chrysotile	Yes
32523-GRCl - S21b			NA	-	Yes
32523-GRCl - S21c			NA	-	Yes
32523-GRCl - S22a	0015	Pipe Wrap - Orange Wrap	ND	-	No
32523-GRCl - S22b			ND	-	No
32523-GRCl - S22c			ND	-	No
31682-3-213-S01a	213	Firespray - Grey Cementitious	Trace	Chrysotile	Yes
31682-3-213-S01b			Trace	Chrysotile	Yes
31682-3-213-S01c			Trace	Chrysotile	Yes
31682-S01-2014	2014	Firespray - Off-white	5.2	Chrysotile	Yes
31682-S02	2nd Floor Locker	Firespray - Off-white	6.8	Chrysotile	Yes
31682-S03-2054	2054	Firespray - Off-white	5.7	Chrysotile	Yes
31682-S04-1011	1011	Firespray - Off-white	5.5	Chrysotile	Yes
31682-S05-1159	1159	Firespray - Off-white	6.7	Chrysotile	Yes
31682-S06-1096	1096	Firespray - Off-white	6.0	Chrysotile	Yes
31682-S07-1046	1046	Firespray - Off-white	5.8	Chrysotile	Yes
2012 Asbestos Audit Update					
S.01A – Mortar	Corridor 3	Brick Mortar - Grey	ND	-	No
S.01B – Mortar			ND	-	No
S.01C – Mortar			ND	-	No
2014 Asbestos Audit Update					
Boiler Refractory 1			ND	-	No

Table 3 - Sample Summary Table - Grand River CI

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY

Sample #	Location	Material Description	Asbestos Content (%)	Fibre Type	Is Material ACM
Boiler Refractory 2	0017	Brick Refractory	ND	-	No
Boiler Refractory 3			ND	-	No
Boiler Insulation 1	0017	Insulation	15-30	Chrysotile	Yes
Boiler Insulation 2			NA	-	Yes
Boiler Insulation 3			NA	-	Yes
2015 Additional Sampling					
S01A	1026 (3-114)	Wall Plaster (white skim coat)	ND	-	No
S01A	1026 (3-114)	Wall Plaster (grey plaster)	ND	-	No
S01B	1027 (3-116)	Wall Plaster (white skim coat)	ND	-	No
S01B	1027 (3-116)	Wall Plaster (grey plaster)	ND	-	No
S01C	1022 (2-100)	Wall Plaster (white skim coat)	ND	-	No
S01C	1022 (2-100)	Wall Plaster (grey plaster)	ND	-	No
S02A	1022 (2-100)	Drywall Joint Compound	ND	-	No
S02B	1022 (2-100)	Drywall Joint Compound	ND	-	No
S02C	1022 (2-100)	Drywall Joint Compound	ND	-	No
2016 Additional Sampling					
S01A	unknown	Dust Collector Insulation	70	Chrysotile	Yes
S01B	unknown	Dust Collector Insulation	NA	-	Yes
S01C	unknown	Dust Collector Insulation	NA	-	Yes
2017 Additional Sampling					
S01A-1039	1039 (3-109)	Plaster	ND	-	No
S01B-1039	1039 (3-109)	Plaster	ND	-	No
S01C-1039	1039 (3-109)	Plaster	ND	-	No
2018 Additional Sampling					
S01A	0017 (B105)	Plaster Ceiling	ND	-	No
S01A	0017 (B105)	Plaster Ceiling	ND	-	No
S01B	0015 (B103C)	Plaster Ceiling	ND	-	No
S01B	0015 (B103C)	Plaster Ceiling	ND	-	No
S01C	0005 (B108A)	Plaster Ceiling	ND	-	No
S01C	0005 (B108A)	Plaster Ceiling	ND	-	No
S01D	0009 (B102)	Plaster Ceiling	ND	-	No
S01D	0009 (B102)	Plaster Ceiling	ND	-	No
S01E	0006 (B108)	Plaster Ceiling	ND	-	No
S01E	0006 (B108)	Plaster Ceiling	ND	-	No
S01F	0017 (B105)	Plaster Wall	ND	-	No
S01F	0017 (B105)	Plaster Wall	ND	-	No
S01A-T-116	1152 (T116)	Insulation (Black Paper)	ND	-	No
S01B-T-116	1152 (T116)	Insulation (Black Paper)	ND	-	No
S01C-T-116	1152 (T116)	Insulation (Black Paper)	ND	-	No
S01A	0017 (B105)	Boiler Insulation	3	Amosite	Yes
S01B	0017 (B105)	Boiler Insulation	NA	-	Yes
S01C	0017 (B105)	Boiler Insulation	NA	-	Yes
2018 Asbestos Audit Update					
S01A	1038 (3-111)	1'x1' Ceiling Tile Mastic	ND	-	No
S01B	1150 (T-114)	1'x1' Ceiling Tile Mastic	ND	-	No
S01C	1081	1'x1' Ceiling Tile Mastic	ND	-	No
S01D	1037	1'x1' Ceiling Tile Mastic	ND	-	No
S02A	1030	1'x1' Ceiling Tile Medium and Large Holes	5	Amosite	Yes
S02B	1149	1'x1' Ceiling Tile Medium and Large Holes	5	Amosite	Yes
S02C	2023	1'x1' Ceiling Tile Medium and Large Holes	5	Amosite	Yes
S02D	1125	1'x1' Ceiling Tile Medium and Large Holes	5	Amosite	Yes
S02E	1081	1'x1' Ceiling Tile Medium and Large Holes	5	Amosite	Yes
S03A	2015	1'x1' Ceiling Tile Medium Fissure Pinhole	5	Amosite	Yes
S03B	2048*	1'x1' Ceiling Tile Medium Fissure Pinhole	5	Amosite	Yes
S03C	2053	1'x1' Ceiling Tile Medium Fissure Pinhole	5	Amosite	Yes
S04A	1035	Black Floor Tile Mastic	ND	-	No
S04B	1037	Black Floor Tile Mastic	0.5	Chrysotile	Yes
S04C	1018	Black Floor Tile Mastic	2	Chrysotile	Yes
S04D	1145	Black Floor Tile Mastic	2	Chrysotile	Yes
S04E	2021	Black Floor Tile Mastic	2	Chrysotile	Yes
S05A	Exterior 1164	Window sealant (white)	ND	-	No
S05B	Exterior 1041	Window sealant (white)	ND	-	No
S05C	Exterior 1164	Garage Door Sealant (Brown/grey)	ND	-	No
S05D	Exterior 1105	Exit Door Sealant (Grey)	ND	-	No
S05E	Exterior 1044	Door Spandrel Sealant (Grey)	ND	-	No
S05F	Interior 1045	Corridor Glazing Sealant (Grey)	10	Chrysotile	Yes
S06A	1034	2'x2' Ceiling Tile Medium Fissure Pinhole	0.5/1	Amosite/Chrysotile	Yes
S06B	1034	2'x2' Ceiling Tile Medium Fissure Pinhole	0.5/1	Amosite/Chrysotile	Yes
S06C	1034	2'x2' Ceiling Tile Medium Fissure Pinhole	0.5/1	Amosite/Chrysotile	Yes
S01A (Nov 2018)	901 (exterior)	Overhang Hard Texture Plaster	0.5	Chrysotile	Yes
S01B (Nov 2018)	903 (exterior)	Overhang Hard Texture Plaster	0.5	Chrysotile	Yes
S01C (Nov 2018)	906 (exterior)	Overhang Hard Texture Plaster	0.5	Chrysotile	Yes

Table 3 - Sample Summary Table - Grand River CI

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY

Sample #	Location	Material Description	Asbestos Content (%)	Fibre Type	Is Material ACM
S02A (Nov 2018)	4-1A (Lobby)	Glazing Sealant - Grey	0.5	Chrysotile	Yes
S02B (Nov 2018)	903	Glazing Sealant - Grey	ND	-	No
S02C (Nov 2018)	S-11	Glazing Sealant - Grey	ND	-	No
S03A (Nov 2018)	T-1 Tech Exit	Glazing Sealant - Black	ND	-	No
S03B (Nov 2018)	T-1 Tech Exit	Glazing Sealant - Black	ND	-	No
S03C (Nov 2018)	T-1 Tech Exit	Glazing Sealant - Black	ND	-	No

NA: Not Analyzed due to stop positive method **ND:** No asbestos fibres detected above the laboratory minimum detection limit * **incorrectly labeled on Chain of Custody as 1065**

A bulk material sample containing 0.5% or more asbestos therefore establishes that material as asbestos-containing. In accordance with Table 1 of O. Reg. 278/05, a minimum number of samples for the material to be classified as non asbestos. A homogeneous material is defined by O. Reg. 278/05 "as material that is uniform in colour and texture". Homogeneous samples are identified by an alphabetical suffix to sample names to represent multiple samples of a homogeneous material. When a homogeneous material is analysed it is determined to be asbestos-containing upon the first positive detection of asbestos equal to or greater than 0.5%. Subsequent samples of the same material are therefore not analysed. Some bulk samples are comprised of multiple layers and as such will require multiple analysis. In such cases each layer is isolated at the laboratory and analysed individually to determine asbestos content. As a result the laboratory may report additional samples beyond the submitted number of samples or include multiple analyses as subsets within a sample.

Appendix 01 35 34B– Lead Report- NOT APPLICABLE

01 42 00 – References

1.0 GENERAL

1.1. SECTION INCLUDES

- .1 References and standards.
- .2 Standards producing industry organizations and their addresses.

1.2. RELATED SECTIONS

- .1 Section 01 61 00 – Product Requirements.
- .2 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3. REFERENCES

- .1 For Products or quality specified by association, trade, or other references or consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- .2 Conform to reference standard by Ontario Building Code except where a specific date is established or required by code.
- .3 Obtain copies of standards where required by product specification sections.
- .4 Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Consultant shall be altered from the Contract Documents by mention or inference otherwise, in any reference document.

1.4. STANDARDS

- .1 The following associations and organizations are cited in specification sections. Acronym, name, address, and Internet URL addresses are as follows:
- .2 Canadian Organizations:
 - .1 Street, Suite 616, Ottawa, ON K1P 5G4; URL: <http://www.acec.ca>.
 - .2 **AWMAC** - Architectural Woodwork Manufacturers Association of Canada, 516-4 Street West, High River, AB T1V 1B6; URL: <http://www.awmac.com>.
 - .3 **Canada Green Building Council**, 330 - 55 rue Murray Street, Ottawa, ON. K1N5M3; Tel: 613-241-1184, Fax: 613-241-5750; URL: <http://www.cagbc.org>.
 - .4 **CCA** - Canadian Construction Association, 75 Albert St., Suite 400, Ottawa, ON K1P 5E7; URL: <http://www.cca-acc.com>.
 - .5 **CCDC** – Canadian Construction Documents Committee, Refer to ACEC, CCA, CSC or RAIC; URL: <http://www.CCDC.org>.
 - .6 **CGA** - Canadian Gas Association, 20 Eglinton Avenue West, Suite 1305, Toronto, ON M4R 1K8; URL: <http://www.cga.ca..>

- .7 **CGSB** - Canadian General Standards Board, Place du Portage, Phase III, 6B1, 11 Laurier Street, Hull, QC K1A 0S5; URL: <http://w3.pwgsc.gc.ca/cgsb>.
- .8 **CISC** - Canadian Institute of Steel Construction, 201 Consumers Road, Suite 300, Willowdale, ON M2J 4G8; URL: <http://www.cisc-icca.ca>.
- .9 **CLA** - Canadian Lumbermen's Association, 27 Goulburn Avenue, Ottawa, ON K1N 8C7; URL: <http://www.cla-ca.ca>.
- .10 **CNLA** - Canadian Nursery Landscape Association, RR #4, Stn. Main, 7856 Fifth Street, Milton, ON L9T 2X8; URL: <http://www.canadanursery.com>.
- .11 **CRCA** - Canadian Roofing Contractors Association, 155 Queen Street, Suite 1300, Ottawa, ON K1P 6L1; URL: <http://www.roofingcanada.com>.
- .12 **CSA** - Canadian Standards Association International, 178 Rexdale Blvd., Toronto, ON M9W 1R3; URL: <http://www.csa-international.org>.
- .13 **CSC** - Construction Specifications Canada, 120 Carlton Street, Suite 312, Toronto, ON M5A 4K2; URL: <http://www.csc-dcc.ca>.
- .14 **CSDMA** - Canadian Steel Door Manufacturers Association, One Yonge Street, Suite 1801, Toronto, ON M5E 1W7; URL: <http://www.csdma.org>.
- .15 **CSPI** - Corrugated Steel Pipe Institute, 652 Bishop Street N, Unit 2A, Cambridge, ON N3H 4V6; URL: <http://www.cspi.ca>.
- .16 **CSSBI** - Canadian Sheet Steel Building Institute, 652 Bishop St. N., Unit 2A, Cambridge, ON N3H 4V6; URL: <http://www.cssbi.ca>.
- .17 **CUFCA** - Canadian Urethane Foam Contractor's Association, Box 3214, Winnipeg, MB R3C 4E7; URL: <http://www.cufca.ca>.
- .18 **CWC** - Canadian Wood Council, 1400 Blair Place, Suite 210, Ottawa, ON K1J 9B8; URL: <http://www.cwc.ca>.
- .19 **EC** - Environment Canada, Conservation and Protection, Inquiry Centre, 351 St. Joseph Blvd, Hull, QC K1A 0H3; URL: <http://www.ec.gc.ca>.
- .20 **EFC** - Electro Federation of Canada, 5800 Explorer Drive, Suite 200, Mississauga, ON L4W 5K9; URL: <http://www.electrofed.com>.
- .21 **MPI** - The Master Painters Institute, 4090 Graveley Street, Burnaby, BC V5C 3T6; URL: <http://www.paintinfo.com>.
- .22 **NABA** - National Air Barrier Association, PO Box 2747, Winnipeg, MB R3C 4E7; URL: <http://www.naba.ca>.
- .23 **NLGA** - National Lumber Grades Authority, 406-First Capital Place, 960 Quayside Drive, New Westminster, BC V3M 6G2; URL: <http://www.nlga.org>.
- .24 **NRC** - National Research Council, Building M-58, 1200 Montreal Road, Ottawa, ON K1A 0R6; URL: <http://www.nrc.gc.ca>.

- .25 **QPL** - Qualification Program List, c/o Canadian General Standards Board, Place du Portage, Phase III, 6B1, 11 Laurier Street, Hull, QC K1A 1G6; URL: <http://www.pwgsc.gc.ca/cgsb>.
- .26 **RAIC** - Royal Architectural Institute of Canada, 55 Murray Street, Suite 330, Ottawa, ON K1N 5M3; URL: <http://www.raic.org>.
- .27 **SCC** - Standards Council of Canada, 270 Albert Street, Suite 2000, Ottawa, ON K1P 6N7; URL: <http://www.scc.ca>.
- .28 **TTMAC** - Terrazzo, Tile and Marble Association of Canada, 30 Capston Gate, Unit 5 Concord, ON L4K 3E8; URL: <http://www.ttmac.com>.
- .29 **ULC** - Underwriters' Laboratories of Canada, 7 Crouse Road, Toronto, ON M1R 3A9; URL: <http://www.ulc.ca>.
- .3 USA Organizations:
 - .1 **AA** - Aluminum Association, 900 19th Street N.W., Washington, DC 20006; URL: <http://www.aluminum.org>.
 - .2 **AASHTO** - American Association of State Highway and Transportation Officials, 444 N Capitol Street N.W., Suite 249, Washington, DC 20001; URL: <http://www.aashto.org>.
 - .3 **AHA** - American Hardboard Association, 1210W Northwest Hwy, Palatine, IL 60067; URL: <http://www.hardboard.org>.
 - .4 **AITC** - American Institute of Timber Construction, 7012 S. Revere Parkway, Suite 140, Englewood, CO 80112; URL: <http://www.aitc-glulam.org>.
 - .5 **AMCA** - Air Movement and Control Association Inc., 30 West University Drive, Arlington Heights, IL 60004-1893; URL: <http://www.amca.org>.
 - .6 **ANSI** - American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036; URL: <http://www.ansi.org>.
 - .7 **APA** - The Engineered Wood Association, P.O. Box 11700, Tacoma, WA 98411-0700; URL: <http://www.apawood.org>.
 - .8 **API** - American Petroleum Institute, 1220 L St. Northwest, Washington, DC 20005-4070; URL: <http://www.api.org>.
 - .9 **ARI** - Air Conditioning and Refrigeration Institute, 4100 N Fairfax Drive, Suite 200, Arlington, VA 22203; URL: <http://www.ari.org>.
 - .10 **ASHRAE** - American Society of Heating, Refrigeration and Air-Conditioning Engineers, 1791 Tullie Circle NE, Atlanta, GA 30329; URL: <http://www.ashrae.org>.
 - .11 **ASME** - American Society of Mechanical Engineers, ASME Headquarters, 3 Park Avenue, New York, NY 10016-5990; URL: <http://www.asme.org>.

- .12 **ASTM International**, 100 Barr Harbor Drive West, Conshohocken, PA 19428-2959; URL: <http://www.astm.org>.
- .13 **AWCI** - Association of the Wall and Ceiling Industries International, 803 West Broad Street, Suite 600 , Falls Church, VA 22046; URL: <http://www.awci.org>.
- .14 **AWPA** - American Wire Producer's Association, 801 N Fairfax Street, Suite 211, Alexandria, VA 22314-1757; URL: <http://www.awpa.org>.
- .15 **AWPA** - American Wood Preservers' Association, P.O. Box 5690, Granbury TX 76049-0690; URL: <http://www.awpa.com>
- .16 **AWS** - American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126; URL: <http://www.amweld.org>.
- .17 **AWWA** - American Water Works Association, 6666 W. Quincy Avenue, Denver, CO 80235; URL: <http://www.awwa.org>.
- .18 **EIMA** - EIFS Industry Manufacturer's Association, 3000 Corporate Center Drive, Suite 270, Morrow, GA 30260; URL: <http://www.eima.com>.
- .19 **ISAP** - International Society for Asphalt Paving, 400 Selby Avenue, Suite 1, St. Paul, MN 55102; URL: <http://www.asphalt.org>.
- .20 **IEEE** - Institute of Electrical and Electronics Engineers, IEE Corporate Office, 3 Park Avenue, 17th Floor, New York, NY 10016-5997; URL: <http://www.ieee.org>
- .21 **MSS** - Manufacturers Standardization Society of the Valve and Fittings Industry, 127 Park Street, N.E., Vienna, VA 22180-4602; URL: <http://www.mss-hq.com>.
- .22 **NAAMM** - National Association of Architectural Metal Manufacturers, 8 South Michigan Avenue, Suite 1000, Chicago, IL 60603; URL: <http://www.naamm.org>.
- .23 **NEMA** - National Electrical Manufacturers Association, 1300 N 17th Street, Suite 1847, Rosslyn, VA 22209; URL: <http://www.nema.org>.
- .24 **NFPA** - National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101 Quincy, MA 02269-9101; URL: <http://www.nfpa.org>.
- .25 **NFSA** - National Fire Sprinkler Association, P.O. Box 1000, Patterson, NY 12563; URL: <http://www.nfsa.org>.
- .26 **NHLA** - National Hardwood Lumber Association, 6830 Raleigh-La Grange Road, Memphis, TN 38184-0518; URL: <http://www.natlhardwood.org>.
- .27 **NSPE** - National Society of Professional Engineers, 1420 King Street, Alexandria, VA 22314-2794; URL: <http://www.nspe.org>.
- .28 **PCI** - Prestressed Concrete Institute, 209 W. Jackson Blvd., Suite 500, Chicago, IL 60606-6938; URL: <http://www.pci.org>.

- .29 **PEI** - Porcelain Enamel Institute, PO Box 920220, Norcross, GA 30010; URL: <http://www.porecelainenamel.com>.
- .30 **SSPC** - The Society for Protective Coatings, 40 24th Street, 6th Floor, Pittsburgh, PA 15222-4656; URL: <http://www.sspc.org>.
- .31 **TPI** - Truss Plate Institute, 583 D'Onofrio Drive, Suite 200, Madison, WI 53719; URL: <http://www.tpinst.org>.
- .32 **UL** - Underwriters' Laboratories, 333 Pfingsten Road, Northbrook, IL60062-2096; URL: <http://www.ul.com>.

END OF SECTION

01 45 00 – Quality Control

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 Section 01 21 00 - Allowances.
- .2 Section 01 78 10 – Closeout Submittals and Requirements
- .3 Section 01 79 00 – Demonstration and Training
- .4 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2. REFERENCES

- .1 **ISO/IEC 17025-2005** - General Requirements for the Competence of Testing and Calibration Laboratories.
- .2 **SCC** (Standards Council of Canada).

1.3. INSPECTION BY AUTHORITY

- .1 Allow Authorities Having Jurisdiction access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection whenever portions of the Work are designated for special tests, inspections or approvals, either when described in the Contract Documents or when required by law in the Place of the Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

1.4. REVIEW BY CONSULTANT

- .1 Consultant may order any part of the Work to be reviewed or inspected if Work is suspected to be not in accordance with Contract Documents.
- .2 If, upon review such work is found not in accordance with Contract Documents, correct such Work and pay the cost of additional review and correction.
- .3 If such Work is found in accordance with Contract Documents, The owner will pay the cost of review and replacement.

1.5. INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection and Testing Agencies will be engaged by Contractor for the purpose of inspecting and testing portions of Work.
- .2 The Board may, at their discretion, request that the Consultant direct the Contractor to engage independent inspecting and or testing agencies to review or test the Work.
- .3 Allocate Costs for inspections and testing to Section 01 21 00.
- .4 Provide equipment required for executing inspection and testing by appointed agencies.
- .5 Employment of inspection and testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .6 If defects are revealed during inspection and/or testing, the appointed agency will request additional inspection and testing to ascertain the full degree of defect. Correct defects and irregularities as advised by the Consultant at no cost to the Owner. Contractor shall pay costs directly to the inspection agency for retesting and re-inspection.

1.6. ACCESS TO WORK

- .1 Allow inspection and testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Cooperate to provide reasonable access and facilities for such access.

1.7. CONTRACTOR RESPONSIBILITIES

- .1 Notify appropriate agency minimum 48 hours in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.8. DUTIES & AUTHORITY OF TESTING AGENCY

- .1 Testing agency is expected to do the following:
 - .1 Act in a professional and unprejudiced basis and carry out inspection and testing functions to establish compliance with requirements of Contract Documents.

- .2 Check work as it progresses and prepare reports stating results of tests and conditions of work and state in each report whether specimens tested conform to requirements of Contract Documents, specifically noting deviations.
- .3 Distribute reports as follows
 - .1 Consultant
 - .2 Owner
 - .3 Contractor
- .2 Testing agency is not authorized to amend or release any requirements of Contract Documents, nor to approve or accept any portion of work.

1.9. REJECTED WORK

- .1 The Contractor shall remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by the Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, the Owner may choose to accept the condition. The difference in value between Work performed and that called for by Contract Documents shall be deducted from the Contract value via Change Order. The amount of this change shall be determined by the Consultant. The Contractor shall warrant the work performed for the time period specified as if it were performed in accordance with the Contract Documents.

1.10. TESTING OF EXCAVATION & BACKFILL

- .1 The Consultant must approve all Sample and fill tests prior to purchase.
- .2 In coordination with the Consultant and Contractor, inspect and test backfill and fill to ensure the degree of compaction specified has been obtained.
- .3 Inspect excavation at required levels in regard to bearing values for footings, foundations and floor slabs.
- .4 Authorization and calculation of extra excavation work, if required, due to unsatisfactory bearing shall be adjusted by Unit Price.

1.11. CONCRETE STRENGTH TESTS

- .1 Review the proposed concrete mix design and check test if considered necessary.

- .2 Obtain representative samples of fresh concrete for each mix design of concrete placed in any one day as directed by the Consultant.
- .3 Make standard slump tests.
- .4 Mould three (3) standard 150mm diameter cylindrical test specimens from each sampling of fresh concrete. Store specimens as per best practice while they are on the site. Cure all cylinders in the laboratory under standard moisture and temperature conditions. Compression test one of the cylinders at 7 days and the remaining two at 28 days after sampling. Each concrete cylinder test report shall contain the specific location of concrete represented by sample, design strength, aggregate size, admixtures used, date, hour and temperature at time of sampling, percentage air content, unit weight and test strength of cylinder.
- .5 When concrete is placed under the conditions of "Cold Weather Requirements" make one additional cylinder; store it in a heated enclosure for 24 hours and then store it on the job site in a place protected from disturbance and off the ground. Compressive test this cylinder 7 days after sampling.
- .6 Determine the air content of air entrained standard weight concrete.
- .7 Determine the air content and unit weight of light weight concrete by the volumetric method.
- .8 Additional testing required because of changes in materials or proportions of the mix requested by the Contractor as well as any extra testing of concrete or materials occasioned by their failure to meet specification requirements or testing of the structure or performance of the structure, including load testing, shall be carried out at the Contractor's expense.

1.12. INSPECTION OF STRUCTURAL STEEL

- .1 Ensure all steel has mill test reports that comply with the Specification prior to purchase.
- .2 Inspect fabrication of steel in the plant.
- .3 Inspect erection work at site including fit-up, placing, plumbing, levelling, temporary bracing, field cutting and alterations.
- .4 Shop and field inspect welded and bolted connections and painting.
- .5 High strength bolts - the installation and testing of bolts shall conform to the requirements of CSA S16-1969. Check one representative connection in ten by torque testing every bolt, and check each bolt in every connection with a tap of hammer for soundness. Enforce requirements of connection type.
- .6 Examine visually all welded joints for inclusions, porosity, lack of fusion penetration or even contour, undercuts and cracks. Root passes shall be checked for penetration

and cracks from the back of the joint. Any suspect welds shall be checked ultrasonically.

1.13. INSPECTION OF METAL DECK

- .1 Check deck for gauge, type and protective coating thickness to ensure compliance with Specification.
- .2 Inspect erection work at the site including anchorage.

1.14. INSPECTION AND TESTING OF PAVING

- .1 Testing shall be carried out in three stages as described below by means of sufficient site visits to ensure satisfactory results but in no case less than three site visits.
- .2 Test within 16 hours from time called to do so by the Contractor, since paving is a critical item at the end of the project.
- .3 Stage One:
 - .1 Visual inspection and compaction tests of subsoil.
- .4 Stage Two:
 - .1 Inspection of granular sub-base (after each layer is placed or after the last layer is placed and compacted).
 - .2 On site density tests.
 - .3 Verify thickness of various levels. (Minimum of 4 checks shall be done on thickness in a paved area of 250m² or less, and 1 additional check for each additional 250m² or part thereof).
 - .4 Laboratory tests: moisture content and grading of materials.
- .5 Stage Three:
 - .1 Inspection of asphalt installation.
 - .2 Checking of thickness and density of material and checking suitability of equipment used.
- .6 Standard Proctor Test shall be carried out for all projects.
- .7 Further, grain size analysis and Marshall test shall be carried out if visual inspection is not satisfactory or, if there is reason to suspect materials supplied are not acceptable.
- .8 All laboratory tests shall be performed according to A.S.T.M. methods, latest revisions
- .9 Paving Contractor shall obtain from their supplier grading tables of materials used and submit them to the testing laboratory for approval. The paving contractor shall ensure material delivered complies with grading tables.

- .10 Be responsible for all approvals given to the Paving Contractor. At completion of the paving project, inform the Consultant all tests were performed according to the Specifications and the Contractor's performance has been approved.
- .11 The Consultant will not entertain any credits for work either not performed or incorrectly performed by the contractor. If thicknesses or consistencies of sub-base are not as specified, or if asphaltic material is not as specified, then the Contractor shall remove the same at their expense and provide proper specified materials.

1.15. BUILDING THERMOGRAPHIC SCAN

- .1 Upon completion of the Work, the Consultant and/or Owner may arrange for an independent agency to carry out a thermographic scan of the building to determine acceptability of thermal performance of the building envelope.
- .2 Consultant, prior to start of construction work, will designate a sample area of the building to include a portion of exterior wall and roof.
- .3 Consultant will implement a special inspection program for this sample area to be carried out as construction progresses. Contractor shall not cover any completed work until notifying the Consultant and receiving acceptance of completed work. Contractor shall remove and replace any work which is installed in contravention of this requirement.
- .4 Results of a thermographic scan of the entire building will be evaluated and compared to those of the sample area to determine acceptance or rejection of any part of the building envelope.
- .5 Contractor shall carry out remedial work as required to bring the quality of any rejected portion of the building envelope to that of the sample area. Contractor shall pay for costs of any follow-up thermographic scans required to determine acceptability of remedial work. This procedure shall be repeated until all parts of the building envelope have been accepted.

1.16. TESTS AND MIX DESIGNS

- .1 Furnish test results and mix designs as may be requested.
- .2 The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Consultant and may be authorized as recoverable.

1.17. MOCK-UP

- .1 Prepare mock-up for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.

- .2 Prepare mock-ups for Consultants review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.
- .3 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .4 If requested, Consultant will assist in preparing a schedule fixing dates for preparation.
- .5 Remove mock-up at conclusion of Work or when acceptable to the Consultant. Repair any damage and clean-up at place of mock-up.
- .6 Approved mock-up may remain as part of Work.

1.18. EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical and electrical systems to the consultant.
- .2 Refer to Sections 01.78.10 and 01.79.00 for definitive requirements.

END OF SECTION

01 51 00 – Temporary Utilities

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 Section 01 52 00 - Construction Facilities.
- .2 Section 01 53 00 - Temporary Construction.
- .3 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2. INSTALLATION AND REMOVAL

- .1 Provide temporary utilities controls in order to execute work expeditiously.
- .2 Location of temporary facilities shall be subject to the Consultant's approval.
- .3 Salvage and assist in recycling products for potential reuse wherever possible.
- .4 Remove temporary facilities from the site when directed by the Consultant.

1.3. DEWATERING

- .1 Provide temporary drainage and pumping facilities to keep excavations and the site free from standing water. Provide necessary pumps (including spare pumps) and temporary drainage for keeping the Work free of water throughout the construction period. Locate sumps away from foundation elements. Control grading around excavation to prevent surface water from draining into excavation and from damaging adjoining property.

1.4. WATER SUPPLY

- .1 Provide continuous supply of potable water for construction use until such time as permanent municipal water supply is available.
- .2 Hose extensions to be provided by subcontractors requiring them.
- .3 For New Builds, arrange for connection with the appropriate utility company and pay all costs for installation, maintenance, removal, and usage costs until occupancy has been achieved.
- .4 For Additions and renovations the contractor can use existing Board service unless noted otherwise.

1.5. TEMPORARY HEATING AND VENTILATION

- .1 Provide temporary heating required during construction period, including unit rental costs, maintenance.

- .2 Provide temporary heating fuel, if not already available on site, until such time as a permanent natural gas line is installed, and thereafter fuel costs shall be borne by the Board. The Contractor shall provide all connections and piping between the permanent fuel source and the heating appliance(s).
- .3 Provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - .5 Provide adequate ventilation to meet health regulations for a safe working environment.
- .4 Maintain temperatures of minimum:
 - .1 10 degrees C in areas where construction is in progress, until takeover by the Board. Contractor to ensure temporary enclosures remain sealed and penetrations are repaired or closed in a timely fashion.
 - .2 16 degrees C in areas where finishes are in progress.
 - .3 16 degrees C in building once it is enclosed.
 - .4 Refer to other Sections for intermittent heating requirements up to 21 degrees C. Provide insulated tarp enclosures for openings as required to enclose the building after completion of main building shell components and roof.
 - .5 If the Contractor fails to ensure the temporary enclosures remained sealed (including temp doors when not in use) the Consultant and or the Board shall require the contractor to pay 40% of that months usage charge
- .5 Use forced hot air heaters. Open-flame type heaters or salamanders are not permitted. Ventilate direct fired heating units to the outside.
- .6 Uniformly distribute heat to avoid hot and cold areas and to prevent excessive drying.
- .7 Early heating of the building shell will be required to expedite interior finishing to meet the project schedule.
- .8 Ventilating:
 - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into the atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in a manner that will not result in harmful exposure to persons.

- .4 Ventilate storage spaces containing hazardous or volatile materials.
- .5 Ventilate temporary sanitary facilities.
- .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .7 Provide minimum 1 air change per hour for enclosed areas receiving architectural finishes.
- .8 Do not allow excessive build-up of moisture inside the building.
- .9 The permanent mechanical systems for the new building, when installed in safe operating conditions, may be used for temporary heating or cooling if approved in writing by the Consultant, without penalty to the warranty.
- .10 Follow the requirements of "Temporary Use of New Permanent Services and Equipment" if the permanent heating system installed under the contract is intended to be used for temporary heating during the construction.
- .11 Provide competent persons to operate and maintain permanent systems for the duration of temporary use period.
- .12 Perform required repairs and maintenance immediately after each inspection. Pay for operating costs. Upon termination of temporary use period, services and equipment shall be inspected, tested, adjusted, fitters replaced, balanced, cleaned and lubricated.
- .13 Permanent services and equipment shall be turned over to the Owner in new and perfect operating condition.
- .14 Use of permanent systems and equipment as temporary facilities shall not affect the guarantee conditions and guarantee period for such systems and equipment. Make due allowance to ensure Owner will receive full benefits of the equipment manufacturer's warranty from the date of Substantial Performance.
- .15 Ensure date of Substantial Performance of the Work and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Consultant.
- .16 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform with applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct-fired combustion units to outside.
- .17 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.6. TEMPORARY POWER AND LIGHT

- .1 Provide temporary electrical service and system including lighting and power system for use by all Sections.
- .2 Contractor will provide a source for, and pay the costs of temporary power during construction for temporary lighting and operating of power tools until such time as a permanent source is available.
- .3 Contractor to ensure that the use of power from a source provided by the Board shall not exceed the capacity of the current use required for the operation of any existing facility.
- .4 Install and maintain temporary electrical service and systems in accordance with Construction Safety Association's "Temporary Wiring Standards on Construction Sites", the Ontario Electrical Code and other authorities having jurisdiction.
- .5 Provide at least one temporary panel on each floor with service capacity suitable for construction requirements and to authorities and utilities approval.
- .6 Provide temporary wiring with lighting to all areas of each floor to provide adequate lighting.
 - .1 Lighting levels must be maintained at a minimum of 10 foot candles, or to suit the particular location or operation, whichever is greater.
 - .2 Do not use materials of the temporary service in permanent installation.
 - .3 Increase lighting levels equivalent to the final requirements when finishing operations are underway.
- .7 Extension cords, lights, etc., required by various subcontractors and run from above outlet positions will be supplied and maintained by the party or parties requiring the same.
- .8 Follow requirements of "Temporary Use of New Permanent Services and Equipment" if electrical power and lighting systems installed under the contract are intended to be used for temporary electricity and lighting during the construction.
- .9 Electrical power and lighting systems installed under this contract can be used for construction provided damages are made good and all lamps that have been used for more than two months are replaced with new lamps.
- .10 For New Builds, arrange for connection with the appropriate utility company and pay all costs for installation, maintenance, removal and usage costs until occupancy has been achieved.
- .11 For Additions and renovations the contractor can use existing Board service unless noted otherwise.

- .12 Provide and pay for temporary power for electric cranes and other equipment requiring temporary power in excess of above noted requirements.

1.7. TEMPORARY COMMUNICATION FACILITIES

- .1 Contractor to provide and pay for temporary Phone, e-mail and printer hook up, for the duration of contract until completion for use by the contractor.
- .2 The site superintendent is to have email access and a printer on site.

END OF SECTION

01 53 00 – Temporary Construction Facilities

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 Section 01 51 00 - Temporary Utilities.
- .2 Section 01 35 23 – Health and Safety
- .3 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2. INSTALLATION AND REMOVAL

- .1 Provide temporary construction facilities in order to execute work expeditiously.
- .2 Remove temporary facilities from the site when directed by the Consultant.

1.3. PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

1.4. PROTECTION OF SURROUNDING WORK

- .1 Provide protection for finished and partially finished Work from damage.
- .2 Provide necessary cover and protection.
- .3 Be responsible for damage incurred due to lack of or improper or inappropriate protection.

1.5. ROOF AND STRUCTURE PROTECTION

- .1 Ensure no part of Work or existing structures are subjected to a load, which will endanger its safety or will cause permanent deformation.
- .2 The Contractor when indicated by the Board Contact or Consultant shall provide roof protection. Ensure all precautions are taken to avoid liability for roof damage.
- .3 Typical roof protection shall consist of a layer of 1 inch rigid foam insulation set directly on the roof surface and a layer of 19 mm (3/4 inch) plywood in all places under scaffold legs, ladder legs and in areas of foot traffic or falling debris.

1.6. WORK SITE ENCLOSURE & SAFETY BARRIERS

- .1 Erect and maintain for the duration of the work:

- .1 a minimum 1800 mm high chain link fence or self-supporting, heavy duty, interconnected fence panels (commonly referred to as Insta-fence) for a temporary site enclosure (hoarding) completely around perimeter of work site,
 - .2 any temporary posts shall be completely removed by the contractor prior to occupancy,
 - .3 under no circumstance shall t-bar posts be used on board property
 - .4 any additional safety devices including full hoarding as required and noted on the drawings, to protect the students, staff, public and private property from injury and damage,
 - .5 any additional requirements as regulated by authorities having jurisdiction, local by-laws and zoning.
- .2 The Contractor is to assume full responsibility for any injury or damage caused due to failure to comply with Paragraph 1 above.
 - .3 Any hazardous conditions identified outside of the main fenced area will be barricaded with a fence complying to the above.
 - .4 Provide lockable truck entrance gate/gates and at least one (1) pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys with restricted availability, in the project office.
 - .5 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.
 - .6 Provide barriers around trees and plants designated to remain.
 - .7 Protect from damage by equipment and construction procedures.

1.7. TREE PROTECTION

- .1 Protect all existing trees to remain from damage during construction period. Make good, at Contractor's expense, trees damaged during construction.
- .2 Confine movement of heavy equipment, storage of same, and storage of materials to a predetermined area. Do not store materials or place equipment over root systems of any existing trees to remain.
- .3 Install fencing or approved equal at limits of drip line of existing trees to remain unless directed otherwise. Where this case is not practical, and only if approved by the Consultant, the trunks shall be protected with an approved tree guard.
- .4 No rigging cables shall be wrapped around or installed in trees. Do not flush concrete trucks or cement mixing machines over root systems or near trees. Flush concrete trucks or cement mixing machines in areas approved by the Consultant.
- .5 Areas where root systems of trees are exposed directly adjacent to a structure will be backfilled with good loam only.

- .6 Whenever excavating is required within branch spread of trees that are to remain, the contractor shall contact the consultant for direction prior to the start of work.
- .7 If any existing tree to remain is injured and does not survive the following year, it will, as determined by the Board, be removed in its entirety and be replaced with a tree of similar size and value, as directed by the Consultant.
- .8 Should the destroyed tree be of such a size or shape that it cannot be feasibly replaced, the Contractor shall compensate the Owner for the minimum sum of five thousand dollars (\$5,000.00) per destroyed tree.

1.8. GUARD RAILS AND BARRIERS

- .1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stairwells, open edges of floors and roofs.
- .2 Erect and maintain for the duration of the Work, safety devices and barricades including hoarding, as required, to protect the staff, students, public and private property, from injury and damage.
- .3 The Contractor is to ensure that all requirements from authorities having jurisdiction and all requirements from the Owner are met.
- .4 The Contractor is to assume full responsibility for any damage caused due to his failure to comply with paragraph 2 above.
- .5 Hazardous conditions on the exterior shall be fenced.

1.9. WEATHER ENCLOSURES

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

1.10. DUST TIGHT BARRIERS

- .1 Provide dust tight barriers and screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.
- .3 Where required, adjust air handling units to eliminate migration of dust.

1.11. SCAFFOLDING

- .1 Erect scaffolding independent of walls and use in such a manner limiting interference with other work. When not in use, move scaffolding as necessary to permit installation of other work. Construct and maintain scaffolding in a rigid, secure and safe manner. Remove it promptly when no longer required. Protect the surface on which scaffolding is bearing.

1.12. SHORING, BRACING, PILING

- .1 Provide shoring, bracing, piling, sheeting and sheet piling and underpinning required to support soil banks, existing work and property in accordance with Construction Safety Act and other applicable regulations. Maintain shoring until the building is strong enough and sufficiently braced to withstand pressure of backfilling. Make construction aids free of permanent work so they may be removed entirely when no longer required, without damaging the Work. Locate construction aids so adequate room is left for damp-proofing foundation walls, laying substructure drainage and other work.
- .2 Shoring and false work over one tier in height shall be designed and shall bear the stamp of a registered professional engineer, having experience in this field.

1.13. HOISTING

- .1 Provide, operate and maintain services required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.
- .2 Machinery shall be operated by qualified operator.

1.14. OVERHEAD LIFTING

- .1 Any condition requiring the use of a crane or lifting device over a Board structure must follow the requirements of Health and Safety Section 01 35 23, Paragraph 1.15 Overhead Lifting.

1.15. ELEVATORS/LIFTS

- .1 When elevators/lifts are to be used by construction personnel, provide protective coverings for finish surfaces of elevator cabs and entrances.
- .2 Co-ordinate use of elevator cabs with Consultant and the Board.

1.16. USE OF THE WORK

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with Products.

- .2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.17. CONSTRUCTION PARKING

- .1 Construction personnel vehicle parking, to be confined to the work site enclosure, or.
- .2 Parking will be permitted on site only where and if it does not disrupt the employees of the place of work as directed by the Board
- .3 Permission to park vehicles on site does not imply any liability or responsibility for safe keeping of vehicles and contents thereof by the School Board.

1.18. ACCESS TO SITE

- .1 Provide and maintain adequate access to the project site.
- .2 Build and maintain temporary roads where necessary and provide snow removal within the area of work, and access to the work, during the period of Work. The area shall be restored to the satisfaction of the Board at the completion of the project.
- .3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.
- .4 Clean roadways and taxi areas where used by Contractor's equipment.

1.19. SECURITY

- .1 The Contractor shall ensure the security of the work site, contents, and built structures for the duration of the project.
- .2 The Contractor shall be responsible to provide and pay for security personnel to guard the site and contents of the site after working hours and during holidays as required.
- .3 Notify the Board of the use of security guards or systems.
- .4 The Board shall not be responsible for the loss, theft, or vandalism.

1.20. OFFICES

- .1 Provide and maintain, until completion of Contract, for Contractor's use, a temporary office, large enough to accommodate site administrative activities and site meetings, complete with light, heat, air conditioning, ventilation, table and chairs. Do not store materials in the office area; keep clean and tidy.
- .2 Provide a clearly marked and fully stocked first-aid case in a readily available location.

- .3 Subcontractors may provide their own offices as necessary. Direct location of these offices.

1.21. EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds and platforms for storage of tools, equipment and materials.
- .2 Review storage areas on site with the Consultant. Store materials and equipment to ensure preservation of quality of product and fitness for the Work. Store materials and equipment on wooden platforms or other hard, clean surfaces, raised above the ground or in water tight storage sheds of sufficient size for storage of materials and equipment which might be damaged by storage in the open. Locate stored materials and equipment to facilitate prompt inspection.
- .3 Store packaged materials and equipment undamaged, in their original wrappings or containers, with manufacturer's labels and seals intact.
- .4 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.
- .5 Storage sheds required by subcontractors shall be provided by them.

1.22. SANITARY FACILITIES

- .1 Provide weatherproof temporary toilet/sanitary facilities for the work force in accordance with governing regulations and ordinances.
- .2 Service temporary toilet/sanitary facilities as required by authorities but not less than weekly.
- .3 Post notices and take such precautions as required by local health authorities.
- .4 The use of existing washroom facilities is not allowed unless specifically approved by the Board. The Contractor will be required to clean and maintain the existing washrooms to Board standards.
- .5 Except where connected to the municipal sewer system, periodically remove wastes from Site.
- .6 Keep toilet/sanitary facilities clean and sanitary and protect from freezing.
- .7 Keep sanitary facilities clean and fully stocked with the necessary supplies at all times.

END OF SECTION

01 54 00 – Materials and Equipment

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 This section describes requirements applicable to all Sections within Divisions 02 to 49

1.2. PRODUCT AND MATERIAL QUALITY

- .1 Products, materials, equipment and articles referred to as “Products”; throughout the specifications incorporated in the Work, shall be new, not damaged or defective, and of the best quality, compatible with specifications for the purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Defective products will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is a precaution against oversight or error. Remove and replace defective products at own expense, and be responsible for delays and expenses caused by rejections.
- .3 Should any dispute arise as to the quality or fitness of products, the decision rests strictly with the Board contact, based upon requirements of the Contract Documents.
- .4 Current Material Safety Data Sheets shall be on file with the successful Contractor and shall be provided to the Board contact upon request, within twenty-four (24) hours.
- .5 Material safety data sheets are not required for products currently WHMIS exempt.

1.3. EQUIPMENT/TOOL MATERIALS STORAGE, HANDLING, AND PROTECTION

- .1 Handle and store products in a manner to prevent damage, adulterations, deterioration, and soiling, and in accordance with manufacturer’s instructions.
- .2 Store packaged or bundled products in original and undamaged condition, with manufacturer’s seals and labels intact.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Provide and maintain tools, equipment and materials in a clean and orderly condition. Board tools, ladders, lifts, power cords, flashlights etc. are not to be used.
- .5 Materials are to be stored in a manner to cause the least interference with Work activities.
- .6 The Contractor shall determine with the Board contact, prior to ordering materials, those locations that are suitable for receiving and storage of materials and equipment.

- .7 All materials and equipment shall be kept in a secure area, at Contractor's expense, or removed from the job site when Work is not actually in progress.
- .8 Vehicles, trailers or other similar apparatus may not be stored or parked overnight at site without written authorization from Board contact. Written requests are to be forwarded directly to the Board contact.
- .9 Approval for parking does not imply any liability or responsibility for safe keeping by the Board.
- .10 The Contractor may use the existing electrical and water services, as required, for the Work, and the costs of these services shall be borne by the Board.

1.4. WORKMANSHIP

- .1 Workmanship shall be the best quality, executed by Workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Consultant if required Work is such as to make it impractical to produce required results.
- .2 Do not employ any unfit persons or anyone unskilled in their required duties.
- .3 Decisions as to the quality or fitness of Workmanship in cases of dispute rest solely with the Board contact, whose decision is final.
- .4 All Contractor personnel are restricted to the job site and necessary access routes. No personnel shall visit other areas or buildings without specific authorization.
- .5 The Contractor shall make their own arrangements for emergency treatment of accidents.
- .6 Any accidents shall be reported immediately to the Board contact.
- .7 The Contractor agrees to hold the Board harmless of any and all liability of every nature and description, which may be suffered through bodily injuries, involving deaths of any persons, by reasons of negligence of the Contractor, his agents, employees, or his Subcontractors.
- .8 The Contractor shall supply constant on-site supervision in the form of a Project Superintendent. The Project Superintendent shall have within their authority to negotiate minor changes regarding scheduling, manpower and equipment.

1.5. MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise indicated in the specifications, install, apply or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

1.6. TOOLS OF THE TRADE

- .1 The Board will not pay the Awarded Bidder a fee for tools and equipment that are considered "tools of the trade" that are required to perform the work in this Tender or any change orders.

1.7. EXISTING EQUIPMENT

- .1 Contractor shall demolish and dispose of all existing equipment specified to be removed and or replaced including obsolete services not being reused. The Board shall have first rights of refusal on all demolished equipment and or parts and the Contractor shall provide a minimum of (5) working days notice prior to disposal of the equipment, parts, or equipment and set aside same in a suitable location to be recovered by Board technicians.

END OF SECTION

01 61 00 – Product Requirements

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 This section describes requirements applicable to all Sections within Divisions 02 to 49.
- .2 Section 01 31 00 – Project Managing and Coordination

1.2. TERMINOLOGY

- .1 New: Produced from new materials.
- .2 Renewed: Produced or rejuvenated from an existing material to like-new condition to serve a new or existing service.
- .3 Defective: A condition determined exclusively by the Consultant.

1.3. PRODUCT QUALITY

- .1 The term 'new' in the following paragraph does not exclude re-manufactured products that have some or all of the materials recycled from other sources. Preference in recycling is for post-consumer recycled materials.
- .2 Products, materials, equipment, parts or assemblies (referred to as Products) incorporated in Work:
- .3 New Product, not damaged or defective, of best quality (compatible with specification requirements) for purpose intended. If requested, provide evidence as to type, source and quality of Products provided.
- .4 Defective Products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective Products at own expense and be responsible for delays and expenses caused by rejection.
- .5 Should any dispute arise as to the quality or fitness of Products, decision rests strictly with Consultant.
- .6 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout the building.

1.4. AVAILABILITY

- .1 Immediately upon receipt of the Board's Purchase Order, review Product delivery requirements and anticipate foreseeable supply delays for any items.

- .2 Immediately upon receipt of the Board's Purchase Order the Contractor shall issue Purchase Orders and or Contracts to all Sub-trades. Provide proof to the Consultant and the Board within 3 days. The Subcontractors shall identify in writing any delivery issues within 14 days of receiving the Contractor's purchase order or contract. The Schedule noted in 01-31 00 1.7.1 shall incorporate all deliveries and installation.
- .3 If delays in supply of Products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .4 In the event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves the right to substitute more readily available Products of similar character, at no increase in Contract Price or Contract Time.

1.5. STORAGE AND PROTECTION

- .1 Store and protect Products in accordance with manufacturers' written instructions.
- .2 Store with seals and labels intact and legible.
- .3 Store sensitive Products in weather tight, climate controlled, enclosures in an environment favourable to Product.
- .4 For exterior storage of fabricated Products, place on sloped supports above ground.
- .5 Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.
- .6 Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- .7 Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- .8 Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.6. TRANSPORTATION AND HANDLING

- .1 Transport and handle Products in accordance with manufacturer's written instructions.
- .2 Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.
- .3 Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.
- .4 Suitably pack, crate and protect products during transportation to site to preserve their quality and fitness for the purpose intended.

- .5 Store products in original, undamaged condition with manufacturer's labels and seals intact until they are being incorporated into completed work.
- .6 Protect materials from damage by extreme temperatures or exposure to the weather.

1.7. EXISTING UTILITIES

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

1.8. MANUFACTURER'S WRITTEN INSTRUCTIONS

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

1.9. QUALITY OF WORK

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Consultant and or Board reserves right to require dismissal from site any workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.
- .4 Products, materials, systems and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the applicable manufacturer's printed directions.

- .5 Where specified requirements are in conflict with manufacturer's written directions, follow manufacturer's directions. Where specified requirements are more stringent than manufacturer's directions, comply with specified requirements.

1.10. COORDINATION

- .1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.
- .3 Contractor is responsible to ensure suppliers or distributors of materials specified or alternatives accepted, which he intends to use, have materials with original schedule, and similarly it shall be the responsibility of all subcontractors and suppliers to so inform the Contractor.
- .4 Contractor shall contact Consultant immediately upon receipt of information indicating materials or items, will not be available on time, in accordance with the latest approved schedule, and similarly it shall be the responsibility of all subcontractors and suppliers to so inform the Contractor.
- .5 The above, in no way releases the Contractor, or their subcontractors and suppliers of their responsibility for ensuring timely ordering of materials and items required, including the necessary expediting, to complete the Work as scheduled in accordance with the Contract Documents including temp accommodations and or materials to ensure occupancy date is achieved.

1.11. CONCEALMENT

- .1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- .2 Before installation, inform the Consultant if there is interference. Install as directed by the Consultant at no additional cost to the Board.

1.12. REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.13. LOCATION OF FIXTURES

- .1 Inform Consultant of conflicting installation. Install as directed.

1.14. FASTENINGS - EQUIPMENT

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use Type 304 or 316 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.15. PROTECTION OF WORK IN PROGRESS

- .1 Prevent overloading of any part of the Project.
- .2 Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated, without written approval of the Consultant.

END OF SECTION

01 70 00 – Examination and Preparation

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2. REFERENCES

- .1 Owner's identification of existing survey control points and property limits.

1.3. SUBMITTALS

- .1 Submit name and address of Surveyor to Consultant.
- .2 On request of Consultant, submit documentation to verify accuracy of field engineering work.
- .3 Submit certificate signed by surveyor certifying that elevations and locations of completed Work conforms with Contract Documents.

1.4. QUALIFICATIONS OF SURVEYOR

- .1 Qualified registered land surveyor, licensed to practice in the Place of the Work.

1.5. SURVEY REFERENCE POINTS

- .1 Existing base horizontal and vertical control points are designated on Drawings.
- .2 Locate, confirm and protect control points prior to starting site Work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to the Consultant.
- .4 Report to Consultant when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5 Require the surveyor to replace control points in accordance with original survey control.

1.6. SURVEY REQUIREMENTS

- .1 Establish existing and new permanent bench marks on site, referenced to established benchmarks by survey control points.
- .2 Record locations, with horizontal and vertical data in Project Record Documents.
- .3 Establish lines and levels, locate and lay out, by instrumentation.
- .4 Establish pipe invert elevations.
- .5 Stake batter boards

- .6 Establish foundation and floor elevations.
- .7 Establish lines and levels for mechanical and electrical work.

1.7. SUBSURFACE CONDITIONS

- .1 Promptly notify Consultant in writing if discovered surface or subsurface conditions at Place of Work differ materially from those indicated in Contract Documents.
- .2 Advise the Consultant of a reasonable assumption of probable conditions when determined.
- .3 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work.

1.8. EXAMINATION

- .1 The Contractor is expected to be totally familiar with site conditions and shall assume full responsibility for the cost involved in repairing any damage to the building, site and services, city property, adjacent buildings, etc., during general construction, regardless of the extent of the damage.
- .2 Inspect existing conditions, including elements or adjacent Work subject to irregularities, damage, movement, including Work during cutting and patching.
- .3 The Contractor shall provide all equipment necessary to make a full and detailed site evaluation. This shall include but not be limited to ladders, flashlights and hand tools.
- .4 The Contractor expressly agrees that conditions above existing suspended acoustic ceilings, but below fixed structure, unless obscured by an additional ceiling above, shall be considered exposed conditions for the purposes of making findings under the provisions of the Contract. There shall be no claims for extra costs for extra Work in these areas.
- .5 After uncovering, inspect conditions affecting performance of the Work.
- .6 Beginning of cutting or patching means acceptance of existing conditions.

1.9. PREPARATION

- .1 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of the project from damage.
- .2 Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.

1.10. EXISTING SERVICES

- .1 Before commencing work, establish location and extent of service lines in the area of Work and notify the Consultant of findings.

- .2 Remove abandoned service lines running through existing and new structures. Cap or seal lines at cut-off points as directed by the Consultant.

1.11. LOCATION OF EQUIPMENT AND FIXTURES

- .1 Inform Consultant of conflicting installations, install as directed.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Consultant of impending installation and obtain approval for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by Consultant.

1.12. SURVEY RECORD

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.
- .3 Record locations of maintained, re-routed and abandoned service lines.

END OF SECTION

01 73 30 – Execution and Cutting and Patching

1.0 GENERAL

1.1. RELATED SECTIONS

- .4 Section 01 32 00 - Construction Progress Documentation: Submittals and scheduling.
- .5 Section 01 61 00 - Product Requirements.
- .6 Section 01 70 00 – Examination and Preparation
- .7 Individual Product Specification Sections:
 - .1 Cutting and patching incidental to work of the section.
 - .2 Advance notification to other sections of openings required in Work of those sections.

1.2. SUBMITTALS

- .8 Submit written request in advance of cutting or alteration which affects:
 - .1 Structural integrity of any element of Project.
 - .2 Integrity of weather exposed or moisture resistant element.
 - .3 Efficiency, maintenance, or safety of any operational element.
 - .4 Visual qualities of sight exposed elements.
 - .5 Work of Owner or separate contractor.
- .9 Include in request:
 - .1 Identification of Project.
 - .2 Location and description of affected Work.
 - .3 Necessity for cutting or alteration.
 - .4 Description of proposed Work and Products to be used.
 - .5 Alternatives to cutting and patching.
 - .6 Effect on work of Owner or separate contractor.
 - .7 Written permission of affected separate contractor.
 - .8 Date and time work will be executed.

1.3. TOLERANCES

- .10 Monitor fabrication and installation tolerance control of Products to produce acceptable Work.
- .11 Do not permit tolerances to accumulate beyond effective or practical limits.
- .12 Comply with manufacturers' tolerances. In case of conflict between manufacturers' tolerances and Contract Documents, request clarification from the Consultant before proceeding.

- .13 Adjust Products to appropriate dimensions; position and confirm tolerance acceptability, before permanently securing Products in place.

2.0 PRODUCTS

2.1. MATERIALS

- .1 Primary Products: Those required for original installation.
- .2 Product Substitution: For any proposed change in materials, submit a request for substitution described in Section 01 33 00.

3.0 EXECUTION

3.1. EXAMINATION

- .1 Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering existing Work, assess conditions affecting performance of work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.

3.2. PREPARATION

- .1 Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of the Project from damage.
- .2 Provide protection from elements for areas which may be exposed by uncovering work.
- .3 Maintain excavations free of water.

3.3. CUTTING

- .1 Execute cutting and fitting as needed to complete the Work. Prior to any cutting and or coring of concrete floors the contractor shall confirm the area is free of services or rebar. Notify the Consultant of any interferences.
- .2 Uncover work to install improperly sequenced work.
- .3 Remove and replace defective or non-conforming work.
- .4 Remove samples of installed work for testing for Hazardous materials.
- .5 Provide openings in the Work for penetration of mechanical and electrical work.
- .6 Employ experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- .7 Cut rigid materials using a masonry saw or core drill. Pneumatic tools are not allowed without prior approval.

- .8 Do all cutting, patching, and making good, to leave a finished condition and to make the several parts of the work come together properly. Coordinate work to keep cutting and patching to a minimum.
- .9 Make cuts with clean, true, smooth edges. Fit unit to tolerance established by test standard practice for applicable work. Make patches invisible in the final assembly.
- .10 Cutting shall be done in a manner to keep patching to minimum. Obtain Consultant's approval of method to be used to conceal new mechanical and electrical services before beginning cutting. Chasing of concrete surfaces is not permitted.
- .11 Cutting or coring of any structural concrete is to be reviewed and approved by the Consultant.
- .12 Do not endanger any work by cutting, digging or otherwise altering, and do not cut nor alter any load bearing element without written authorization by Consultant. Provide bracing, shoring and temporary supports as required to keep construction safely supported at all times
- .13 Any cost caused by omission or ill-timed work shall be borne by the party responsible thereof.
- .14 Regardless of which Section of work is responsible for any portion of cutting and patching, in each case tradesmen qualified in work being cut and patched shall be employed to ensure it is correctly done.

3.4. PATCHING

- .1 Execute patching to complement adjacent Work.
- .2 Fit Products together to integrate with other Work.
- .3 Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- .4 Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.
- .5 Restore work with new Products in accordance with requirements of Contract Documents.
- .6 Fit work with adequate support to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .7 At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with firestop material.
- .8 Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to the nearest intersection or natural break. For an assembly, refinish the entire unit.
- .9 Complete and tightly fit all construction to pipes, ducts and conduits which pass through construction to completely prevent the passage of air.

- .10 Patching and making good shall be done by trade specialists in material to be treated, and shall be made undetectable in finished work when viewed from a distance of 1.5m under normal lighting.

END OF SECTION

01 74 00 – Cleaning and Waste Management

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 Common Work by All Trades
- .2 This section describes requirements applicable to all Sections within Divisions 02 to 49.
- .3 Conduct cleaning and disposal operations to comply with local ordinances and environmental protection legislation.
- .4 Store volatile wastes in covered metal containers, and remove them from premises at the end of each working day.
- .5 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

2.0 PRODUCTS

2.1. CLEANING PRODUCTS

- .1 Cleaning Agents and Materials: Low VOC content wherever possible. The Consultant and the Board shall be notified prior to use of any exception.

3.0 EXECUTION

3.1. CLEANING DURING CONSTRUCTION

- .1 Maintain the Work in tidy condition, free from accumulation of waste products and debris, other than that caused by the Owner or other Contractors.
- .2 Remove waste material and debris from the work areas and deposit in a waste container at the end of each working day.
- .3 Vacuum clean interior areas prior to the start of finishing work. Maintain areas free of dust and other contaminants during finishing operations.
- .4 Individual Subcontractors are responsible for the daily clean-up and removal of debris related to, or generated by, their own work. The overall responsibility for project cleanliness rests with the Contractor.
- .5 The Contractor shall be responsible for snow removal within the construction area.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Wherever possible recycle materials
- .8 Containers:

- .1 Provide adequate number and sizes of on-site garbage and recycling containers within designated work site as required for collection of waste materials and debris on a daily basis.
- .2 Provide additional waste containers when the extent of work warrants.
- .3 Provide and use clearly marked, separate bins for recycling.
- .9 Dispose of waste materials and debris at registered waste disposal and recycling facility.
- .10 Remove oily rags, waste and other hazardous substances from premises at close of each day, or more often when required.
- .11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

3.2. WASTE MANAGEMENT

- .1 Audit, separate and dispose of construction waste generated by new construction or by demolition of existing structures in whole or in part, in accordance with Ontario Regulations 102/94 and 103/94 made under the Environmental Protection Act.
- .2 Containers:
 - .1 Provide adequate number and sizes of on-site garbage and recycling containers within designated work site as required for collection of waste materials and debris on a daily basis.
 - .2 Provide additional waste containers when the extent of work warrants.
 - .3 Provide and use clearly marked, separate bins for recycling.
- .3 Fires, and burning of rubbish or waste on site is strictly prohibited.
- .4 Burying of rubbish or waste materials on site is strictly prohibited.
- .5 Disposal of waste or volatile materials such as mineral spirits, oil, gasoline or paint thinner into ground, waterways, or sewer systems is prohibited.
- .6 Empty waste containers on a regular basis to prevent contamination of site and adjacent properties by wind-blown dust or debris

3.3. PREPARATION FOR FINAL CLEANING

- .1 Prior to final cleaning the General Contractor shall:
 - .1 remove all surplus products, tools, construction machinery and equipment not required for the performance of remaining work, and thereafter remove any remaining materials, equipment, waste and debris,
 - .2 replace all filters installed on any equipment in operation in the area of work,
 - .3 remove all paint spots or overspray from all affected surfaces, and

3.4. FINAL CLEANING PRIOR TO ACCEPTANCE: INTERIOR

- .1 Prior to applying for Substantial Performance of the Work, or, prior to Owner occupancy of the building or portion of the building affected by the Work, whichever comes first, conduct full and complete final cleaning operations for the areas to be occupied.
- .2 Final cleaning operations shall be performed by an experienced professional cleaning company, possessing equipment and personnel sufficient to perform full building cleaning operations. Contractors "broom cleaning" is not acceptable as a "Final Clean". The cleaning contractor shall:
 - .1 clean interiors of all millwork and surfaces of any furniture and equipment present,
 - .2 use only cleaning materials recommended by the manufacturer of the surface to be cleaned,
 - .3 remove all stains, spots, scuff marks, dirt, dust, remaining labels, adhesives or other surface imperfections,
 - .4 clean and polish all glass and mirrors and remove remaining manufacturer's and safety "X" labels,
 - .5 clean and polish all finished metal surfaces such as enamelled or stainless steel, chrome, aluminum, brass, and bronze,
 - .6 clean and polish all vitreous surfaces such as plumbing fixtures, ceramic tile, porcelain enamel, or other such materials,
 - .7 clean all ceramic tile surfaces in accordance with the manufacturer's instructions,
 - .8 vacuum, clean and dust behind grilles, louvres and screens,
 - .9 steam clean all unprotected carpets immediately prior occupancy by Owner, and
 - .10 clean all equipment and fixtures to a sanitary condition.
- .3 For any areas to be occupied after the owner's initial occupancy, provide full cleaning operations as outlined above prior to turning over to owner,
- .4 The Board's supplies and equipment must not be used for any cleaning operations including, but not limited to: garbage cans, mops, brooms, rags, ladders, chemicals etc.

3.5. FINAL CLEANING PRIOR TO ACCEPTANCE: EXTERIOR

- .1 For areas affected by construction final exterior cleaning operations shall be performed by the General Contractor or competent Subcontractor. Contractor's "broom cleaning" only is not acceptable.
- .2 Final exterior cleaning shall include:
 - .1 broom clean and wash exterior walkways, steps, and surfaces; rake clean other surfaces of grounds,
 - .2 remove dirt and other disfiguration from exterior surfaces,
 - .3 sweep and wash clean paved areas,
 - .4 replace filters of mechanical equipment for all equipment that was in use during construction,
 - .5 clean all roofs, gutters, downspouts, areaways, drywells, and drainage systems,
 - .6 remove debris and surplus materials from crawl areas and other accessible concealed spaces.
 - .7 remove overspray

END OF SECTION

01 78 10 – Closeout Submittals and Requirements

1.0 GENERAL

1.1. RELATED SECTIONS

- .1 Section 01 78 10 – WRDSB Warranty Card, Appendix 00 41 13A

1.2. TAKE-OVER PROCEDURES

- .1 Take over procedures will be in strict accordance with the requirements as set out in this Section.

1.3. SUBSTANTIAL PERFORMANCE

- .1 Prior to requesting a Substantial Performance deficiency inspection submit 2 hard copies, 1 digital copy of the Operating and Maintenance Manuals for Consultants approval.
- .2 Application for Substantial Performance must include.
 - .1 One (1) electronic copy of inspection and acceptance certificates required from regulatory agencies, including but not limited to.
 - .1 Certificates of Approval of the Work by the local Building Department.
 - .2 Electrical Inspection Certificate of Inspection.
 - .3 Fire Alarm Verification Certificate.
- .3 Advise Consultant in writing, when the project has been substantially completed. If Consultant agrees this stage has been reached, the Consultant shall prepare a complete list of deficiencies and submit copies of this list to Contractor and the Board.

1.4. COMMENCEMENT OF LIEN PERIODS

- .1 The date of publication of the Certificate of Substantial Performance of the Work, provided to the contractor by the Consultant, shall be the date for commencement of the lien period.

1.5. TOTAL PERFORMANCE

- .1 Prior to requesting a final inspection submit written certificate that the following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents and is ready for final inspection
 - .2 Defects have been corrected and deficiencies have been completed.

- .3 Equipment and systems have been tested and are fully operational. Submit two copies of the balancing reports
- .4 Certificates required by the contractor have been submitted.
- .5 Operation of systems have been demonstrated to Owner's personnel.
- .6 Submit Record drawings.
- .7 Submit maintenance materials.
- .8 Provide certified site survey
- .2 When items noted above are completed, request final inspection of Work by consultant, and building inspector. If Work is deemed incomplete by Consultant, complete outstanding items and request re-inspection.

1.6. PAYMENT OF SUBSTANTIAL PERFORMANCE HOLDBACK

- .1 Prior to the release of lien holdback provide one copy of the following by the Contractor and each subcontractor:
 - .1 Statutory Declaration or Declaration of Last supply
 - .2 Workplace Safety and Insurance Board "Certificate of Clearance".
- .2 The Contractor shall submit an application for payment of the holdback amount.
- .3 After the receipt of an application for payment which will include a Statutory Declaration and WSIB Clearance from the, the Consultant will issue a certificate for payment of the holdback amount.

1.7. FINAL PAYMENT

- .1 When the Contractor considers final deficiencies and defects have been corrected and it appears requirements of Contract have been completed, make application for final payment.
- .2 When the Consultant finds the Contractor's application for final payment valid, the Consultant will issue a final certificate of payment
- .3 The Board reserves the right to charge the Contractor for school access card(s) that have not been returned.
- .4 The cost to reprogram or replace the card(s) access system is estimated at \$50.00 (fifty dollars) for each card issued, \$30.00 (thirty dollars) for each keybox key, plus \$35.00 (thirty five dollars) administration fee.

1.8. CLOSEOUT SUBMITTALS

- .1 Prepare instructions and data using personnel experienced in maintenance and operation of described products and submit them to the Consultant for review.
- .2 Copy will be returned to the contractor with the Consultant's comments.

- .3 Revise content of documents as required prior to final submission.
- .4 Two (2) weeks prior to Substantial Performance of the Work, submit to the Consultant, the final copies of operating and maintenance manuals.
- .5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
- .6 If requested, furnish evidence as to type, source and quality of products provided.
- .7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .8 Pay costs of transportation.

1.9. OPERATION AND MAINTENANCE MANUAL FORMAT

- .1 Provide two copies of operating and maintenance data, prepared on 215 X 280mm sheets in printed or typewritten form, contained in 3-ring binders with soft vinyl covers for materials and equipment which require special maintenance or operating procedures.
- .2 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder at the front of each volume.
- .3 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .4 Arrange content by the divisions of the specifications under Section numbers and sequence of Table of Contents.
- .5 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .6 Include the following in each manual:
 - .1 Complete list of subcontractors and suppliers, their addresses and telephone numbers. Provide 24 hour emergency telephone numbers for such subcontractors as Plumbing, Electrical, Sprinklers, Fire System, Heating, etc.
 - .2 Specified warranties for contractor, each subcontractor and supplier.
 - .3 WRDSB Project Asset and Warranty Card, Appendix 00 41 13A
 - .4 Copy of finish hardware list, complete with all amendments and revisions and lock manufacturer's descriptive and service literature.
 - .5 Schedule of paints and coatings. Include sufficient explanation to fully identify each surface with the applicable paint or coating used. Enclose a copy of the colour schedule.
 - .6 Maintenance instructions for finished surfaces.
 - .7 Brochures, cuts of equipment and fixtures.

- .8 Operating and maintenance instructions for equipment.
- .9 Submit copies of letters from manufacturers of equipment and systems indicating their technical representatives have inspected and tested systems and are satisfied with methods of installation, connection and operations. These letters shall state names of persons present at testing, methods used and list of functions performed.
- .10 Submit one complete set of reviewed shop drawings of architectural, structural, mechanical and electrical items, folded to 215 x 280mm size, contained in heavy duty manila envelopes, numbered and labelled. Follow specification format with no more than one Section per envelope, hard copy and PDF.
- .11 Relevant certificates issued by authorities having jurisdiction
- .12 Computer disc or flash drive with all the above documentation in PDF format

1.10. RECORDING ACTUAL SITE CONDITIONS

- .1 Record information on a set of black line opaque drawings, and within the Project Manual.
- .2 Annotate with coloured felt tip marking pens, maintaining separate colours for each major system, for recording changed information.
- .3 Record information concurrently with construction progress. Do not conceal Work of the Project until required information is accurately recorded.
- .4 Contract drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 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 catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.

- .6 Other Documents: Maintain warranties, test reports and samples required by individual specifications sections.

1.11. RECORD (AS-BUILT) DOCUMENTS AND SAMPLES

- .1 Store AS-BUILT documents and samples in the field office apart from documents used for construction. Provide files, racks, and secure storage.
- .2 Label AS-BUILT documents and file in accordance with section number listings in List of Contents of the Project Manual. Label each document AS-BUILT DOCUMENTS in neat, large, printed letters.
- .3 Maintain AS-BUILT documents in clean, dry and legible condition. Do not use as-built documents for construction purposes.
- .4 Keep as-built documents and samples available for inspection by the Consultant.

1.12. RECORD DRAWINGS

- .1 Prior to Substantial Performance of the Work, update the marked up information from the AS-BUILT documents to a master set of drawing.
- .2 Submit one set of completed AS-BUILT documents to the Consultant for review.
- .3 Documents will be returned to the contractor with the Consultant's comments.
- .4 Revise content of documents as required prior to final submission.
- .5 After the review is completed resubmit to the Consultant for Consultant to produce electronic record drawings for the owner to use.

1.13. SPARE PARTS

- .1 Provide spare parts, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in the Maintenance Manual.
- .4 Obtain receipt for delivered products and submit prior to final payment.

1.14. REPLACEMENT (MAINTENANCE) MATERIALS

- .1 Deliver to site, unload and store where directed, replacement (maintenance) materials as required elsewhere in these Specifications. Obtain a signed receipt from the Owner's Representative for delivered materials and include a copy of receipt in Operation and Maintenance manuals.
- .2 Package materials so they are protected from damage and loss of essential properties.
- .3 Label packaged materials for proper identification of contents.

1.15. SPECIAL TOOLS

- .1 Provide special tools, in quantities specified in the individual specification section.
- .2 Provide items with tags identifying their associated function and equipment.
- .3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual

1.16. FINAL SITE SURVEY

- .1 Submit final site survey certificate in accordance with Section 01 70 00, certifying that elevations and locations of completed Work are in conformance Contract Documents.

1.17. WARRANTIES AND BONDS

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Except for items put into use with Owner's permission, leave the date of beginning of time of warranty until the Date of Substantial Performance is determined. The date of Substantial Performance of the Work shall be the date for commencement of the warranty period.
- .4 Verify that documents are in proper form, contain full information, and are notarized.
- .5 Co-execute submittals when required.
- .6 Retain warranties and bonds until time specified for submittals.

END OF SECTION

01 78 40 – Maintenance Requirements

1.0 GENERAL

1.1. SECTION INCLUDES

- .1 Equipment and systems.
- .2 Materials and finishes.
- .3 Spare parts
- .4 Maintenance manuals.
- .5 Special tools.
- .6 Storage, handling and protection.
- .7 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2. RELATED SECTIONS

- .1 Section 01 45 00 - Quality Control.
- .2 Section 01 78 40 – Maintenance Requirements.
- .3 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3. 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
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.

- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide coordination Drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide a list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00.
- .15 Additional requirements: As specified in individual specification sections.

2.0 PRODUCTS

2.1. MATERIALS AND FINISH

- .1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Building Envelope: include copies of drawings of building envelope components, illustrating the interface with similar or dissimilar items to provide an effective air, vapour and thermal barrier between indoor and outdoor environments. Include an outline of requirements for regular inspections and for regular maintenance to ensure that on-going performance of the building envelope will meet the initial building envelope criteria.
- .5 Additional Requirements: as specified in individual specifications sections.

2.2. SPARE PARTS

- .1 Provide spare parts, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in the Maintenance Manual.
- .4 Obtain receipt for delivered products and submit prior to final payment.

2.3. MAINTENANCE MATERIALS

- .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in the Maintenance Manual.
- .4 Obtain receipt for delivered products and submit prior to final payment.

2.4. SPECIAL TOOLS

- .1 Provide special tools, in quantities specified in the individual specification section.
- .2 Provide items with tags identifying their associated function and equipment.
- .3 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in the Maintenance Manual.

3.0 EXECUTION

3.1. DELIVERY TO SITE

- .1 Deliver to place of work and store.
- .2 General Contractor to receive and acknowledge delivery from contractors and subcontractors of all parts and materials assembled for maintenance requirements. Provide a summary inventory list to the Consultant and/or the Board after all materials are gathered and verification of location. Signatures of receipt will not be accepted from anyone except the General Contractor's representative.

3.2. STORAGE, HANDLING AND PROTECTION

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

END OF SECTION

01 79 00 – Demonstration and Training

1.0 GENERAL

1.1. SECTION INCLUDES

- .1 Procedures for demonstration and instruction of Products, equipment and systems to Owner's personnel.
- .2 Seminars and demonstrations.

1.2. RELATED SECTIONS

- .1 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3. DESCRIPTION

- .1 At Substantial Performance, at a time acceptable to Owner and Consultant, but not before operations and maintenance manual have been reviewed and accepted by the consultant; contractor shall give a complete demonstration in the presence of consultant; Sub-consultants, Owner and Owner's personnel of operation and maintenance of systems and equipment once they are 100% complete.
- .2 Owner will provide a list of personnel to receive instructions and will coordinate their attendance at agreed-upon times.

1.4. COMPONENT DEMONSTRATION

- .1 Manufacturer to provide authorized representative to demonstrate operation of equipment and systems.
- .2 Instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.

1.5. SUBMITTALS

- .1 Submit schedule of time and date for demonstration of each item of equipment and each system one (1) week prior to designated dates, for Consultant's approval.
- .2 Submit reports within forty eight (48) after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .3 Give time and date of each demonstration, with a list of persons present.

1.6. CONDITIONS FOR DEMONSTRATIONS

- .1 Equipment has been inspected and put into operation in accordance with manufacturer's instructions and contract requirements.

- .2 Testing, adjusting, and balancing have been performed in accordance with manufacturer's instructions and contract requirements, and equipment and systems are fully operational.
- .3 Provide information packages as required for use in demonstrations and instructions.

2.0 PRODUCTS

2.1. NOT USED

- .1 Not used.

3.0 EXECUTION

3.1. PREPARATION

- .1 Verify that suitable conditions for demonstration and instructions are available.
- .2 Verify that designated personnel are present.
- .3 Prepare agendas and outlines.
- .4 Establish seminar organization.
- .5 Explain component design and operational philosophy and strategy.
- .6 Develop equipment presentations.
- .7 Present system demonstrations.
- .8 Accept and respond to seminar and demonstration questions with appropriate answers.

3.2. PREPARATION OF AGENDAS AND OUTLINES

- .1 Prepare agendas and outlines including the following:
 - .1 Equipment and systems to be included in seminar presentations.
 - .2 Name of companies and representatives presenting at seminars.
 - .3 Outline of each seminar's content.
 - .4 Time and date allocated to each system and item of equipment.
 - .5 Provide a separate agenda for each system.

3.3. SEMINAR ORGANIZATION

- .1 Coordinate content and presentations for seminars.
- .2 Coordinate individual presentations and ensure representatives scheduled to present at seminars are in attendance.

- .3 Arrange for presentation leaders familiar with the design, operation, maintenance and troubleshooting of the equipment and systems. Where a single person is not familiar with all aspects of the equipment or system, arrange for specialists familiar with each aspect.
- .4 Coordinate proposed dates for seminars with Owner and select mutually agreeable dates.

3.4. EXPLANATION OF DESIGN STRATEGY

- .1 Explain design philosophy of each system. Include following information:
 - .1 An overview of how the system is intended to operate.
 - .2 Description of design parameters, constraints and operational requirements.
 - .3 Description of system operation strategies.
 - .4 Information to help in identifying and troubleshooting system problems.

3.5. DEMONSTRATION AND INSTRUCTIONS

- .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment.
- .2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
- .3 Instruct personnel on control and maintenance of sensory equipment and operational equipment associated with maintaining energy efficiency and longevity of service.
- .4 Review contents of manual in detail to explain all aspects of operation and maintenance.
- .5 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

END OF SECTION

DIVISION 02 - EXISTING CONDITIONS

PART 1 - GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 RELATED WORK SPECIFIED ELSEWHERE

- .1 Special Project procedures Section 01 35 13
- .2 Health, Safety and Emergency Procedures Section 01 35 29
- .3 Temporary Facilities & Controls Section 01 50 00
- .4 Facility Environmental Requirements Section 01 81 16

1.2 WORK INCLUDED

- .1 All Work of this Section shall be done in strict accordance with Section 01 35 13 of the Specification, as shown on the Architectural Drawings and as noted in the Demolition Structural Assessment.
- .2 This Section includes the demolition, removal and disposal of components of the existing building. Include all labour, equipment and material required for a complete work.

1.3 QUALIFICATIONS

- .1 Work under this Section shall be performed by a Contractor specializing in this type of work. Furnish evidence of qualifications upon request of the Architect.
- .2 Use only skilled tradesman for Work under this Section.

1.4 MATERIALS FROM DEMOLITION

- .1 The owner will have first right of refusal for all materials and equipment scheduled for demolition or removal from the building and site.
- .2 All materials resulting from demolition work will become the property of the Contractor, with the exception of those materials shown on the Drawings to be relocated, removed, re-used or turned over to the Owner.

1.5 SUBMITTALS

- .1 Prior to the commencement of Work, submit a schedule and a summary of the methods of demolition and type of equipment intended to be used.

1.5 SUBMITTALS (CONT'D)

- .2 Submit detailed shop drawings of all shoring, underpinning and scaffolding to be used in the demolition and removal of beams, lintels, columns and masonry walls.
- .3 Submit in accordance to Section 01 33 00.

1.7 PROTECTION

- .1 Provide, erect and maintain required hoarding, barriers, fencing, sidewalk sheds, catch platforms, lights and other protection around Site before commencing Work. Maintain such areas free of snow, ice, mud, water and debris. Lighting levels shall be equal to that prior to erection.
- .2 Protect existing areas against damage, dust, odours and noise which might occur from falling debris due to the demolition process or other cause. Do not interfere with use of existing areas and maintain free, safe passage to and from same.
- .3 Provide flagmen where necessary or appropriate to provide effective and safe access to Site to vehicular traffic and protection to pedestrian traffic.
- .4 Protect adjacent structures and property against damage which might occur from falling debris or other causes. Repair or replace damage caused from Work of this Section to acceptance of Consultant.
- .5 Do not interfere with use of adjacent structures and Work areas. Maintain free, safe passage to and from adjacent structures and Work areas.
- .6 If movement or settlement occurs, install additional bracing and shoring as necessary and make good damage to acceptance of Consultant.
- .7 Hang tarpaulins where debris and other materials are lowered. Build in around openings with wood and plywood at locations used for removal of debris and materials.
- .8 Prevent debris from blocking surface drainage system, elevators, mechanical, and electrical systems which are required to remain in operation.
- .9 Pay particular attention to prevention of fire and elimination of fire hazards which would endanger Work or adjacent structures and premises.
- .10 Supply, install and maintain legal and necessary barricades, guards, railings, lights, warning signs, security personnel and other safety measures, and fully protect persons and property.
- .11 Precautions shall be taken to prevent movement of existing areas, settlement or damage of adjacent structures, services, walks and pavement. This Contractor shall be responsible for safety and support of existing areas and be liable for any movement, any damage or injury caused thereby, or resulting therefrom.

1.7 **PROTECTION (CONT'D)**

- .12 If at any time, during the course of Demolition Work, the safety of the existing areas appear to be endangered, cease operations and notify the Consultant; and do not proceed with Demolition Work until permission has been granted to do so.
- .13 If movement is caused by negligence or default of the Contractor, he shall be completely responsible to rectify the situation, at no extra cost to the Owner.
- .14 Provide special protection for sensitive finishes being retained, removed and re-installed.
- .15 Do not temporarily fasten hoarding or dust closures to the finished floor, ceiling and /or wall finishes.

PART 2 - PRODUCTS

- 2.1 Not Applicable.

PART 3 - EXECUTION

3.1 **PREPARATION**

- .1 All Bidders shall visit the Site and **thoroughly examine existing conditions** in order to familiarize themselves with the extent of demolition and removal work required to properly execute this portion of the Contract.
- .2 Disconnect electrical and telephone service lines entering areas to be demolished as per rules and regulations of authorities having jurisdiction. Post warning signs on electrical lines and equipment which must remain energized to serve other areas during demolition.
- .3 Disconnect and cap mechanical services in accordance with requirements of local authority having jurisdiction.
 - .1 Natural gas supply lines to be removed by gas company.
 - .2 Remove sewer and water lines and cap to prevent leakage.
 - .3 Remove and cap or dispose other existing underground services.
- .4 Do not disrupt active or energized utilities traversing premises.
- .5 Refer to Mechanical & Electrical drawings and specifications.

3.2 **DEMOLITION**

- .1 Do not start demolition without the approval of the Architect.

3.2 DEMOLITION (CONT'D)

- .2 Do not operate heavy equipment such as front end loader on the floor slab without the approval of the Architect.
- .3 The use of explosives will not be permitted.
- .4 In addition to following the requirements of the Provincial Building Code, carry out demolition in accordance with the requirements of local and Municipal Authorities and the Canadian Construction Safety Code.
- .5 Furnish all labour, materials, tools, plant, scaffolding, chutes and services required or incidental to the completion to the full extent of the Work and to the full intent of the Drawings and Specifications, for the execution of all demolition and protection work specified herein.
- .6 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces and replace same as work progresses.
- .7 At end of each day's work, leave work in safe condition so that no part is in danger of toppling or falling. Protect interiors of parts not to be demolished from exterior elements at all times.
- .8 Demolish in a manner to minimize dusting. Keep dusty materials wetted.
- .9 Demolish masonry and concrete walls in small sections. Carefully remove and lower structural framing and other heavy or large objects.
- .10 Selling or burning materials on Site is not permitted.
- .11 Remove contaminated or dangerous materials from site and dispose of in safe manner to minimize danger at site or at any time during disposal.
- .12 Removal of floor covering material includes adhesives, mortars and grout. Slab to be left ready for installation of new flooring. Grind floor smooth to remove as required. Remove floor covering where new finishes are called for.
- .13 Employ rodent and vermin exterminators to comply with health regulations.
- .14 Perform demolition with extreme care. Confine effects of demolition to those parts which are to be demolished.
- .15 Perform Work and prevent inconvenience to persons outside those parts which are to be demolished.
- .16 Carry out demolition in accordance with the requirements of CSA S350-M.
- .17 Demolish parts of structure to permit remedial Work as indicated on drawings.

3.2 DEMOLITION (CONT'D)

- .18 Do not overload floor or wall with accumulations of material or debris or by other loads.
- .19 At end of day's Work, leave Work in safe condition with no part in danger of toppling or falling.

3.3 REMOVALS

- .1 Carefully remove, store and protect all equipment and materials which are to be salvaged, relocated and re-used from the building using qualified tradesmen.

3.4 CLEANUP AND DISPOSAL

- .1 Clean up the work areas daily to the satisfaction of the Architect.
- .2 Dispose of concrete, steel masonry and debris and other unsalvageable materials off site except where noted otherwise.
- .3 Clear the entire site of all debris at completion of this Contract.

END OF SECTION

DIVISION 03 - CONCRETE

PART 1 - GENERAL

1.1 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- .1 Concrete Formwork and Reinforcing Section 03 10 00
- .2 Cast-In-Place Concrete Section 03 30 00
- .3 Precast Pre-stressed Concrete Section 03 40 00
- .4 Painting (Application of Paint, Urethane and Epoxy Floor Finishes) Section 09 91 00

1.3 QUALITY ASSURANCE

Requirements of Regulatory Agencies

- .1 Applicable Codes and Standards governing the work of this Section.
- .2 Related Standards:
 - .1 CAN/CSA A23.1 Concrete Materials and Methods of Concrete Construction.
 - .2 CAN/CSA A23.2 Methods of Tests for Concrete.
 - .3 ASTM C 260 Air Entraining Admixtures for Concrete.
 - .4 ASTM C 494 Chemical Admixtures for Concrete.
- .3 Except as otherwise specified, placing, finishing, curing, joint cutting, and forming and temperature control of concrete slabs on which surface hardeners are to be applied, shall be in accordance with 1.2.1. and 1.2.2. clauses-2.1 and 2.2.
- .4 Work shall be done by a Firm and by Mechanics with at least five years experience in this type of work and who are members of the Concrete Floor Construction Association.

1.4 SUBMITTALS

- .1 Submit manufacturers' product data, performance criteria and other documentation for each material specified in this section that is proposed for use including, but not limited to following:

1.4 **SUBMITTALS (CONT'D)**

- .1 Admixtures
- .2 Curing Compounds
- .3 Sealing Compounds
- .4 Surface Hardeners
- .5 Joint Filler

PART 2 - PRODUCTS

2.1 **MATERIALS**

- .1 General: use materials specified herein or approved equal as defined in General Requirements.
- .2 **Note:** Refer to Floor Finishes Plan and Schedules for locations of specific applications listed here in.
- .3 Non-Metallic Hardener Manufacturer (Natural Colour):
 - .1 "Sika Emericrete SH" by Sika Canada.
 - .2 Surfex by Euclid Canada.
 - .3 Mastercron FF by BASF.
- .4 Non-Metallic Hardener Manufacturer (Coloured Hardener):
 - .1 "Surflex" Colored by Euclid Canada.
 - .2 Mastercron Colored by Master Builders.
 - .3 Sika Colorplete by Sika Canada.
- .5 Curing, Sealing and Densifier Compound:
 - .1 "Diamond Clear 350" by Euclid Canada.
 - .2 "Kure-N-Seal 25" by BASF.
 - .3 "Sikafloor 3S" by Sika Canada.
- .6 Joint filler for sawn control joints (Interior Application):
 - .1 "Euco 700" or "Euco Quickjoint UVR" by Euclid Canada.

2.1 **MATERIALS (CONT'D)**

- .2 "Load Flex" by Sika Canada.
- .3 Other approved manufacturer.
- .4 Colour of Joint filler to be grey or as selected by the Architect.
- .7 For Concrete Control & Expansion Joints (Exterior application):
 - .1 "Eucolastic 1SL (Self Levelling) by "Euclid Canada.
 - .2 "Eucolastic 2NS" for vertical application by "Euclid Canada".
- .8 Concrete densifier for New and Existing Concrete Floor:
 - .1 "Euco Diamond Hard" by "Euclid Canada".
 - .2 Liqui Hard Ultra" by WR Meadows.
- .9 For Heal and Seal concrete and penetrating shrinkage cracks:
 - .1 "Dural 50" by "Euclid Canada" or "Euco Quick Stitch".
- .10 For Transition Strip for floor (Ramp):
 - .1 "Duraflex Fastpatch", low modulus repair epoxy repair kit by "Euclid Canada".

PART 3 - EXECUTION

3.1 **PREPARATION**

- .1 Examination
 - .1 Before work commences ensure that all preceding work has been completed in accordance with the specifications. Report any deficiencies to the Architects before proceeding with the work.

3.2 **INSTALLATIONS**

.1 **GENERAL**

- .1 **Note:** Refer to Floor Finishes Plan and Schedules for locations of specific applications listed here in.
- .2 Follow manufacturer's instruction for surface preparation, direction for use and precautions/ limitations.

3.2 INSTALLATIONS (CONT'D)

- .3 Unless otherwise specified or directed, all floors concrete within the building shall be finished with a power float and power trowel to finish the surface to a smooth, even finish.
- .2 Floor Finishes: Coordinate compatibility of Concrete Sealer application with paint finishing of Paint, Urethane or Epoxy floor finishes.
- .3 Conform to the requirements of CAN/CSA A23.1&2 Finishing and/or as hereinafter specified.
- .4 Employ a minimum amount of hand trowelling to remove any machine marks after the power trowelling.
- .5 Provide a non-slip, spin trowel finish where directed.
- .6 Secure the Architects approval of finished surfaces before leaving any area.
- .7 Cure and protect the surface of finished floors and roofs in accordance with CAN/CSA A23.1.
- .8 Keep traffic, which would affect and/or otherwise disturb the curing procedures, off the finished surface for a period of seven (7) days minimum.
- .9 Protect exposed concrete finishes against damage until the building is accepted by the Architect.
- .10 Protect floors which are to receive an Architectural finish against contamination by oil, paint or other deleterious materials.
- .11 Floors in rooms with an exposed concrete floor finish noted to receive a non-metallic hardener and curing & sealing compound, shall be applied strictly in accordance with the manufacturer's directions at the rate of 3.9kg/m² - 5.0kg/m² (80 lbs. to 100 lbs. per 100 sq.ft) of surface.
- .12 The selected mineral aggregate for the dry shake shall be applied immediately before power floating begins. As soon as concrete is firm enough to support the weight of workmen and their equipment and NO surface water is present, apply the first shake of material. Treat areas adjacent to walls and columns first. Spread the material evenly by sprinkling at right angles in two passes close to floor level. Do NOT broadcast from the stationary position. Approximately two-thirds of the material shall be broadcast uniformly over the surface. Power floating shall begin immediately after application of the dry shake. Work wall, column and door areas first. After this material is adequately embedded or blended into the surface by power floating, the remaining one-third of the material shall be applied to the surface at right angles to the previous application. During the second application, care should be exercised to apply sufficient material to all areas to secure uniform coverage.
- .13 For Non-Hardened concrete floors, cure finished concrete surfaces with 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 Architectural finishes to be applied later. Apply the compound in strict accordance with the manufacturer's instructions.

3.2 INSTALLATIONS (CONT'D)

- .14 Protect surfaces 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 4 inches and seal the laps. Leave the paper in place for at least seven (7) days.
- .15 Floors in all rooms with an exposed concrete floor finish that are noted to receive a clear urethane coating:
 - .1 Apply in a continuous film by a cold low-pressure sprayer only after slab has cured 28 days minimum.
 - .2 If slab is porous apply a second coat where first coating is inconsistent, with a light sanding between coats.
 - .3 Allow 3-4 hrs. minimum for drying between coats.
 - .4 Apply 2 finish coats "of topcoat" with a light sanding between coats.
 - .5 Allow final application to dry for 48 hrs. prior to the application of heavy traffic.
 - .6 Read and follow the product literature and application instructions.

3.3 FINISHING OF FORMED CONCRETE SURFACE

- .1 Conform to the requirements of Cast-In-Place Concrete: Section 03 30 00, except as hereinafter specified.

END OF SECTION

DIVISION 04 - MASONRY

PART 1 – GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.2 REFERENCE STANDARDS

- .1 ASTM A123/A123M, Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A580/A580M, Stainless Steel Wire.
- .3 ASTM A653/A653M, Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.
- .4 ASTM D2240, Test Method for Rubber Property Durometer Hardness.
- .5 CAN/CSA A179, Mortar and Grout for Unit Masonry.
- .6 CAN/CSA A370, Connectors for Masonry.
- .7 CAN/CSA A371, Masonry Construction for Buildings.
- .8 CAN/CSA A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .9 CAN/CSA G30.3-M, Cold-Drawn Steel Wire for Concrete Reinforcement.
- .10 CAN/CSA G40.18-M, Billet-Steel Bars for Concrete Reinforcement.
- .11 CAN/CSA G40.20-04/G40.21, General Requirements for Rolled or Welded Structural Steel/Structural Quality Steel.
- .12 CAN/CSA S304.1, Design of Masonry Structures.
- .13 CAN/CSA-A165 SERIES-04 - CSA Standards on Concrete Masonry Units
- .14 CAN/CSA-A82-14 - Fired masonry brick made from clay or shale

1.3 RELATED WORK SPECIFIED ELSEWHERE

- .1 Concrete Reinforcement Section 03 10 00
- .2 Supply only of Steel Loose Lintels. Section 05 12 00

1.3 RELATED WORK SPECIFIED ELSEWHERE (CONT'D)

.3	Installations of Hollow Metal Door and Window Frames.	Section 06 10 00
.4	Building Insulation	Section 07 21 00
.5	Air & Vapour Barrier	Section 07 27 00
.6	Sealing of Control and Expansion Joints	Section 07 90 00
.7	Supply Only of Hollow Metal Door and Window Frames.	Section 08 11 13

1.4 SUPERVISION

- .1 Work of this Section shall be executed under the continuous supervision and direction of a competent foreman for each class of work.
- .2 One thoroughly experienced, reliable and competent man shall be in charge of mortar mixing.

1.5 SHOP DRAWINGS

- .1 Consult the approved Shop Drawings to determine the exact location of items to be built into masonry.

1.6 SAMPLES & SUBMISSIONS

- .1 Submit for approval clearly labelled samples of masonry units, reinforcement and accessories to be used in the work. Submit for approval of samples of alternative materials if requested by the Architect.
- .2 All submittals to be in accordance to section 01 33 00.
- .3 Approved sample panel shall establish standard for acceptance or rejection of actual work.
- .4 Submit laboratory test reports certifying compliance of masonry units and mortar ingredients with specifications requirements.

1.7 JOB MOCK-UP

- .1 Construct mock-up panel where directed by Architect.
- .2 Construct mock-up panel of exterior masonry wall construction 4'-0" x 6'-0" min. in size, showing masonry colours, textures, pilasters, recesses, panelling, use of reinforcement, ties, through wall flashing, weep holes, ventilators, jointing, coursing, mortar, sills and workmanship.
- .3 Clean one half of mock-up wall in accordance with cleaning requirements here-in and leave remainder for comparison.

1.7 JOB MOCK-UP(CONT'D)

- .4 Receive acceptance of Mock-Up by Architect before proceeding with masonry installation.
- .5 Mock-up may remain as part of the work if acceptable to the Architect.
- .6 The approved mock-up panel shall establish the standard for acceptance or rejection of actual work.

1.8 DEFECTS DEFINED

- .1 In addition to non-compliance with specified requirements or other contract requirements, the following will be considered defect:
 - .1 Shrinkage in individual units and erected panels.
 - .2 Spalling.
 - .3 Poor colour or texture blending of units.
 - .4 Surface deterioration dusting.
 - .5 Discolouration, crumbling and similar deterioration of mortar.
 - .6 Failure of built in items to remain anchored.
 - .7 Excessive cracking of mortar joints on brick faces.
 - .8 Over cuts at service entries, boxes, etc..

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

- .1 Store cementitious material in accordance with CAN3.A5. Store aggregates in accordance with CAN A.23. Stack masonry units to avoid chipping. Manufacturers seals and labels shall be intact.
- .2 Protect concrete block from rain and inclement weather to ensure that blocks are dry when delivered to site, while stored on site and when used.

1.10 FIRE SAFETY FEATURES

- .1 Masonry units used in partitions designed to provide fire separation shall be of material specified and in the case of hollow units shall have the percentage of solid material necessary to provide the rating called for and or required by authorities having jurisdiction.
- .2 Concrete block and similar hollow units shall be identified as to percentage of solid material and tested for fire separation value in each thickness. Delivery slips shall state tested status of the units and the skids shall be marked to facilitate identification of the units at Site.

1.11 **WARRANTY/GUARANTEE**

- .1 Provide guarantee for 2-year period. Warranty to cover both labour and materials. Warranty shall start from the date of substantial performance.

PART 2 - PRODUCTS

2.1 **MATERIALS (MASONRY UNITS)**

.1 **Veneer:**

- .1 Brick: Riverdale, colour: red, metric (Ontario size) modular to match existing series 2024 by Canada Brick.
- .2 Mortar Colour: to be selected.

.2 **Concrete Block:**

- .1 Standard concrete masonry units Type 1: to CAN/CSA-A165 Series (CAN/CSA-A165.1).
 - .1 Classification: H/15/A/M. (Unless noted otherwise on Structural Dwgs. & Spec.)
 - .2 Size: metric modular
 - .3 Curing: Autoclaving to CAN/CSA-A165 Series-M85 (CAN/CSA-A165.4) or bubble cure system, TCG Material Ltd or Boehmers.
 - .4 Use header and other special shape blocks for backups to blockwork forming piers, reveals, control and expansion joints and the like.
- .2 H/15/A/M, filled solid for top two courses of load bearing walls, for all locations where structural members bear on concrete block, and where shown on Drawings.
- .3 Strength of load bearing masonry units shall be: 7.5 MPa minimum for hollow units; 12.5 MPa minimum for 75% solid units based on gross area.
- .4 Provide special shapes and sizes as shown or specified such as halves, jambs, lintels, solids, corners, bullnoses and double bullnoses, semi-solids, 90 & 45 degree corner return units and the like as shown.
- .5 Where concrete block walls are required to act as fire separations or barriers, they shall conform to Ontario Building Code with respect to equivalent thickness and type of concrete.

Concrete Masonry Units – Light Weight:

- .1 CMU LWT, using L² 20S slag aggregate width as shown on drawings to provide noted fire ratings.

2.1 MATERIALS (MASONRY UNITS) (CONT'D)

- .6 Exposed block shall be uniform in colour, shade and texture, and made by one manufacturer.
- .7 Acoustic Concrete Masonry Units: size as indicated on the drawings, dual slotted with fibrous sound dampening filler, Acousta Wall by Day & Campbell Ltd., or SoundBlox by Brampton Brick.

2.2 MASONRY REINFORCEMENT FOR NON-CAVITY WALLS

- .1 Approved manufacturer:
 - .1 DW 100 by Dur-O-Wal Ltd., (Hohman & Bernard)
 - .2 Ladur by Dur-O-Wal Ltd., (Hohman & Bernard)
 - .3 Blok-Lok or Blok-Truss by Blok-Lok Ltd.
- .2 3.8 mm diameter (No. 9 Steel ga) deformed wire for single block wythes, 4.8 mm diameter (3/16") for two or more wythes; mill galvanized for interior wall locations; for exterior wall locations, hot dipped galvanized after fabrication, ASTM A153, Class B-2, minimum of 457 g/m² (1.5 oz/sf) zinc coating; sized 50 mm (2") narrower than wall or partition.
- .3 Provide shop fabricated corners and intersections where required hot dipped galvanized for exterior walls and mill galvanized for interior walls. In curved configuration provide shop fabricated reinforcement fully galvanized as specified herein.

2.3 ANCHORAGE AND REINFORCEMENT

- .1 Steel Wire: CAN/CSA G30.3.
- .2 Steel Sections and Plates: CAN/CSA G40.20/G40.21, Grade 350W.
- .3 Stainless Steel Wire: ASTM A580, Type 304 or 316.
- .4 Strap anchors 60mm thick, 38mm wide steel plate with 50 mm long Z shaped bends, H.D.G, lengths to suit applications, equal to BLT-112 by Blok-Lok.
- .5 Seismic clip: 14x25mm C shaped clip with 11mm inside width and 5 mm opening fabricated 1-37mm thick stainless steel, Type 304 equal to Lateral Tie Clip by Fero to be used with Fero V-tie in seismic zones. Refer to structural drawings.
- .6 Conform to Ontario Building Code.

2.4 MASONRY VENEER TIES AND ANCHORS

- .1 Stud Wall (Backup Construction): Fero Thermal Tie, Slotted Rap Tie masonry connector, manufactured by Fero, for use with brick or stone veneered steel stud wall construction. Stud tie to be side mounted and sized to fit structural steel studs, ½" sheathing 3 ½" insulation and 1" air space cavity and come complete with V-Tie, H.D.G. finish. Size & type of fastener to be in strict compliance with Fero installation instructions. Minimum of 2 self-drilling/self-tapping Screw Fasteners per connector.
- .2 Concrete Block Wall (Backup Construction): Fero Thermal Tie – Slotted Block (Type 4) masonry connector complete with block plate length to suit cavity of 3 ½" and 1" air space, and block width and V tie, HDG finish.

2.5 FLASHINGS

- .1 Flexible Membrane Flashing: 1.0 mm thick, self adhering SBS rubberized asphalt membrane with a cross laminated HPDE top surface, sheet width to suit application;
 - .1 Bakor Blueskin TWF by Henry Company Canada.
- .2 Bent Metal Drip Edge Flashing: 26 gauge thick **stainless steel** sheet Type 316, 3" wide with ½" hem; set in place with flashing sealant.
 - .1 HB Hohman & Bernard or Masonpro.

2.6 MORTAR AND GROUT

- .1 Cementitious Material: CAN/CSA A179.
- .2 Portland Cement: CAN/CSA A3001, Type GU, grey colour.
- .3 Mortar Aggregate: CAN/CSA A179, fine aggregate.
- .4 Grout Aggregate: CAN/CSA-A179, fine aggregate.
- .5 Hydrated Lime: ASTM C207-79; Type "N".
- .6 Aggregate: CAN/CSA A82.56, except that the maximum allowable percentage passing 600 um (No. 30) sieve shall be 80% and maximum passing 300 um (No. 50) sieve shall be 50%.
- .7 Mortar Colouring Compounds: Pure, synthetic, inorganic pigments manufactured by Northern Pigment Company in proportions recommended by manufacturer, but not exceeding 10% of weight of cementitious material.
- .8 Proprietary Mortar Mixes (in lieu of above) St. Lawrence Cement Company, Canada Cement, St. Marys Cement or Lake Ontario Cement Ltd.; conforming to mix requirements specified.
- .9 Ready Mixed Lime Mortar: Redi-Mix Mortar Ltd.

2.6 MORTAR AND GROUT

- .10 Water: Clean and potable. Exempt of ice, oils, acid, alkalis, organic material, sediments or other harmful matter.
- .11 Colour: Refer to colour schedule on Drawings.

2.7 JOINT FILLER

- .1 Compressible Joint Filler - Rodofom per type by Sternson Ltd.
- .2 Pre-moulded Joint Filler: For Fire Rated walls "Fire-Bloc" mineral fibre, as distributed by M.W. McGill & Associates Ltd., or other approved U.L.C. labelled materials.

2.8 MORTAR NET, VENTS AND WEEPERS

- .1 Cavity Drainage / Ventilation System: Provide recycled polyester/ polyurethane mesh with trapezoidal shape to suspend and break up mortar droppings at unequal height, over all height to be 10" and width to suit cavity (1" typical refer to drawings), by "Mortar Net USA LTD/ Mortar net Solution" or approved alternate.
- .2 Cell vent weep-hole Ventilator by "Dur-O-Wall" DA.1006 (Hohmann & Barnard). Sized 3" deep x 3-1/2" or as applicable to suit height of Architectural Stone used. (Colour to match Grout).

2.9 WATER PROOFING ADMIXTURES

- .1 Add integral water proofing to mortar at exposed areas (except Domtar Mortars) acceptable types: Sterad 300 by Sternsons Ltd., or Rheo-mix 235 by Master Builders unless otherwise noted. Dry-Block by WR Grace.

2.10 MORTAR MIXES

- .1 Mortar for Above Grade:
 - .1 Load bearing Walls: CAN/CSA A179, Type S using the Proportion specifications.
 - .2 Non-Load bearing Walls: CAN/CSA A179, Type N using Proportion specifications
- .2 Stain Resistant Pointing Mortar: CAN/CSA-A179, non-staining masonry cement for cementitious portion of specified mortar type.
- .3 For all load bearing concrete block wall masonry units in exterior cavity walls, interior bearing walls and partitions. Use Type 'S' cement mortar having a 28 day strength min 8.5 MPa and max 120 MPa.

2.10 MORTAR MIXING

- .1 Mixing: Prepare and mix mortar materials under strict supervision, in an onsite batching plant. Use and mix proprietary mortar in strict accordance with manufacturer's instructions to produce the following mortar types, CAN/CSA A179-M1976. Do not use re-tempered mortars.
- .2 For Bedding Steel Bearing Plates, Lintels, for Laying Bearing Courses Under Concentrated Loads and for Laying Masonry Below Grade: Use Type 'M' cement mortar, having a compressive strength of 17.5 MPa (2,500 psi) minimum.
- .3 Except as provided in 2.2.2 for Laying; Brick or Brick Facing only of double wythe walls whether backup is load bearing or otherwise: Use Type "N" masonry mortar, having a compressive strength of 5.0 MPa (750 psi) minimum.
Or proprietary or ready-mixed type "N" masonry mortar mixes specified, mixed in accordance with manufacturer's instructions.
- *.4 Use same manufacturer's product for the entire project to ensure uniformity of mix and coloration.

2.11 NON-SHRINK GROUT

- .1 "Masterflow 713" manufacturer by Master Builders Ltd. Or "M-Bed Standard" manufactured by Sika Canada Inc or 'CPD Non-Shrink Grout' by CPD Construction Products.

2.13 PACKING INSULATION

- .1 Loose glass fibre insulation, 16kg/m² (1lb/c.f.) density or mineral wool.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 General Workmanship
 - .1 Confirm required size of masonry openings for all doors, windows and equipment with supplier or manufacturer prior to installation of masonry units.
 - .2 Install Brick, Architectural Stone and architectural trim products in accordance with manufacturer's installation instructions.
 - .3 Architect is to be notified 36 hours in advance of laying first course of masonry to review installation of flashing, weep-vents, control joints and block positioning on wall. Failure to do so will result in removal for inspection.
 - .4 Employ properly qualified masons for laying up masonry units.
 - .5 Distribute exposed masonry units of varying colours, tones and textures evenly over wall surface to avoid patches and streaks and to produce a pleasing appearance.

3.1 INSTALLATION (CONT'D)

- .6 Gaining to meet spandrels, etc., leaving courses uneven or with visibly thicker mortar joints is not acceptable. Any such work must be removed and rebuilt to approval of Architect.
- .7 Construct masonry evenly in maximum lifts of 5'-0" (1500mm) per working day. Rake back ends of unfinished walls; do not tooth and bond new masonry.
- .8 Maintain dimensions, lines and levels.
- .9 Keep exposed faces free from stains, chips and cracks. Keep tolerance in plane 3 mm (1/8") in 2,400 mm (8'-0"). Do not use chipped, cracked or deformed units in exposed work.
- .10 Buttering corners of units, throwing mortar droppings in 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.
- .11 When mortar is "thumb-print" hard, tool joints slightly concave for exposed work, elsewhere, strike joints flush. Use sufficient force to press mortar tight against masonry units on both sides of joints. Remove excess material or burrs left after jointing. Use trowel or rub with burlap bag.
- .12 Lay all joints approximately 10 mm (3/8") thick unless otherwise specified or otherwise shown on Drawings. All joints shall be full of mortar except where specifically designated to be left open.
- .13 Build in all door frames, window frames, wood louvres, anchor bolts, sleeves, inserts, loose steel, etc.
- .14 Complete all door and windowsills, quoins, soldier courses, dovetail designs as per plans.
- .15 All outside 45-degree brick walls are to be completed with mitered corners.
- .16 "Load bearing" means supporting a load other than itself and any unit masonry wall which supports floor loads, roof loads, landing loads, staircase loads, or any other such loads whether directly or indirectly, or which is shown on Drawings as load bearing or which is shown on Structural Drawings, shall be considered to be a load bearing wall. Brick or stone veneer, whether cavity or otherwise, is not load bearing.
- .17 "Exposed" means unpainted, painted and special plastic coated block that are exposed to view in completed work.
- .18 Partition means a non load bearing interior wall.
- .19 Construct masonry evenly in maximum lifts of 5' – 0" (1500 mm) per working day. Rake back ends of un-finished walls; do not tooth and bond new masonry.

3.1 INSTALLATION (CONT'D)

- .20 Chases must be built – not cut.
- .21 Build-in hollow metal door frames previously set in place by Section 06 20 00 by building in lugs and fill voids with mortar. Refer to Section 08 10 00 for number of lugs per jamb. Keep frames free of mortar stains until planned.
- .22 Use bullnose and double bullnose block at all external corners where block is left exposed including all door and window jambs.

.2 Cold Weather Requirements

- .1 When laying masonry in ambient temperature below 4 degrees C, (40 degrees F), use heat and maintain temperature of masonry materials and protect completed work from freezing to Satisfaction of Architect. Heat and maintain temperature of masonry materials to at least 4 degrees C (40 degrees F) on both sides of masonry for a period of at least 72 hours.
- .2 Do not use scorched sand. Do not use salts, admixtures or anti-freezes. Use approved smokeless heaters.
- .3 In general conform to "Recommended and Guide Specifications for cold weather masonry construction" by O.M.C.A.

.3 Hot Weather Requirements

- .1 Protect freshly laid masonry from drying too rapidly by means of waterproof, non-staining coverings.
- .2 When the ambient air temperature exceeds 38°C, or 33°C with a wind velocity greater than 8 mph, execute the following:
 - .1 Store masonry units out of direct sunlight.
 - .2 Do not spread mortar beds more than 4' - 0" ahead of masonry.
 - .3 Set masonry units within one (1) minute of spreading mortar.

.4 Brickwork:

- .1 Lay face brick in running bond (no headers) in full bed of mortar except for header course at top of wall and other special brick coursings as detailed. Align vertical joints plumb in alternate courses. Evenly distribute variations in colour.
- .2 Use sufficient mortar on end of stretchers to ensure end joints are compressed full when brick is pressed into place. When laying closures provide full joints both sides of closure brick.

3.1 INSTALLATION (CONT'D)

.3 Install cell vents in accordance with manufacturer's directions, at bottom and top of exterior wythe of brick in exterior cavity walls and above all damp courses, lintels and flashings. Space not more than 600 mm (2'- 0") o.c. horizontally. Ensure that holes in vents are not plugged with mortar or debris.

.5 Blockwork:

.1 Lay block to align plumb over each other with thick ends of webs up. Leave no cells open in exposed work. Reinforce all blockwork as hereinafter specified.

.2 Minimize cutting block. Cut exposed block with power driven abrasive cutting disc or diamond cutting wheel where cutting is required and for flush mounted electrical outlets, grilles, pipes, conduit, leaving 3 mm (1/8") maximum clearance.

.3 Do not wet concrete masonry before or during laying in wall.

.4 Locate corners accurately with bullnose blocks.

.5 Use full bed of mortar for first course. For remaining courses bed face shells and cross and end webs and vertical end joints fully in mortar. Compress end joint mortar.

.6 Stagger end joints in every course. Align joints plumb over each other in every other course.

.7 Do not break bond of corridor walls or other walls of exposed units where partitions intersect and if bonding will show through on exposed face of walls. Bond these partitions to walls that intersect with prefabricated intersection masonry reinforcement in each course.

.8 Secure large precast units in place with stainless steel pins set in drilled holes within precast cap. Bent stainless steel anchor plates to be anchored to wall framing.

.6 Bullnose Concrete Masonry Units

.1 For interior applications provide bullnose concrete masonry unit at exposed corners, window jambs and sills, door jambs and where noted on drawings.

.2 Provide square base block in areas of ceramic tile installation for cove base and fitted corners. Contractor to grind exposed upper portion of block corner to match upper courses of bullnose blocks.

.3 Provide a square edged block at ceiling level to accommodate a square fitted corner in the ceiling grid.

3.1 **INSTALLATION (CONT'D)**

.7 Partitions:

- .1 Carry the following partitions up through ceiling to structure above, unless shown or specified otherwise: corridor partitions, demising partitions, partitions in areas without suspended ceilings and other partitions so shown on Drawings. Terminate such partitions 19 mm (3/4") below structure and fill space between top of masonry and structure with compressed packing insulation.
- .2 Co-ordinate bracing to provide lateral support for tops of partitions required to extend to within 19 mm (3/4") of underside of structure where they occur under steel joists and beams, slabs and other structural elements with section 05 51 00, Metal Fabrication.
- .3 Where walls and partitions are pierced by structural members, ducts, pipes, fill voids with mortar to within 19 mm (3/4") of such items flush with wall finish.
- .4 Fill spaces between partitions and structure, ducts and pipes with compressed packing insulation completely from one side of wall to other.

.8 Load Bearing Walls:

- .1 Wedge and grout load bearing walls to underside of structure.

.9 Cavity Wall:

- .1 Keep air space in cavity walls free from mortar droppings by means of a wood strip suspended in cavity on wire ties to catch droppings. Pull wood strip level as courses are laid; clean off mortar droppings before laying succeeding courses to next layer of ties or reinforcement.
- .2 Maintain max. capacity compartment to 100 s.f. (10m sq.) by bridging gap between insulation and back of block face with 4" (100mm) wide strips of insulation located between compartments. Apply similarly placed cavity filling strips up each building corner.
- .3 Provide each compartment with top and bottom venting through open joints containing weep vents as previously specified. Ensure vent openings are kept free of mortar.
- .4 Supply and install Blue Skin A.G. Air Barrier in conjunction with spray applied insulation
Blue Skin A.G. shall be installed at the following locations:
 - .1 At all exterior walls on the exterior face, at all corners and control joints. Blue Skin A.G. shall extend vertically from top of foundation walls to top of wall and shall extend minimum of 8" on each side of corners and vertical joints.

3.1 INSTALLATION (CONT'D)

- .2 At all exterior window and door frames at heads, sills, and jambs install Blue Skin A.G. on the exterior face of the wall and return the Blue Skin and adhere to the wood blocking at the frame lap the Blue Skin a minimum of 6" on exterior face of wall and provide Blue Skin A.B. fully adhered to wood blocking for the full depth of the window or door frame.
- .3 Install Blue Skin A.G. in accordance with manufacturers recommendations.

.10 Protection

- .1 Protect laid masonry from damage by weather. At end of each day or shutdown period, cover exposed tops of masonry with canvas or strong waterproof membrane securely clamped down and overhanging on each side of wall at least 600 mm (2'-0"). Use wire spring clamps which extend 200 mm (8") down each side of wall, spaced 2,400 mm (8'-0") maximum or other approved method.
- .2 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.
- .3 Subcontractor is responsible to protect glass, sliding patio doors and other building components (including concrete terraces) from mortar droppings, and will supply poly for same.
- .4 Protect and leave broom-clean all surfaces, where masonry work carried out over or above.
- .5 Wind bracing of all masonry walls during construction until the structure provides sufficient lateral support is a mandatory requirement.
- .6 Comply with the Occupational Health & Safety Act & Regulations For Construction Project.

.11 Reinforcement, Reinforcing Ties and Stud Shear Connectors

- .1 Install anchors and ties in accordance with CAN/CSA A370 and CAN/CSA A371.
- .2 Space wall ties in accordance with CAN/CSA A370. Increase wall ties where recommended by masonry unit manufacturer.
- .3 Reinforce all masonry walls with continuous masonry wall reinforcement in every second block or every 6th brick course. Reinforcing shall be continuous.
- .4 Adjustable masonry reinforcement not permitted to correct poorly laid masonry. Bending of masonry reinforcement or ties not permitted.

3.1 INSTALLATION (CONT'D)

- .5 At openings provide extra masonry/cavity wall reinforcement, so that first and second courses above and below openings are reinforced. Extend extra reinforcement 600 mm (2'-0") beyond opening in each direction.
- .6 Do not bridge expansion or control joints.
- .7 Lap reinforcement 6" (150 mm) minimum.
- .8 Where steel columns occur in masonry walls embed steel bar anchors fully with mortar, including bent ends.
- .9 In areas where exterior signage is indicated on the drawings, spacing of masonry ties are to be increased to 16" o.c.
- .10 Install Stud Shear connectors for brick veneer masonry in strict compliance with the manufacturer's instructions and the General notes on the Structural Drawings.
- .11 Refer to the General Notes on the Structural Drawings that are applicable to and govern the work of this section, notwithstanding whatever may be specified herein to the contrary.
- .12 Masonry Reinforcement for Earthquake: CAN/CSA 3-S304-M, refer to notes on Structural Engineers drawings.

.12 Built-ins

- .1 Confirm all built in items are available before proceeding.
- .2 Build in items occurring in masonry provided by other Sections including: steel door frames; anchor bolts; sleeves; inserts; loose steel lintels; shelf angles; access panels; masonry flashings not in direct connection with roofing and other such items. Build in items to present a neat, rigid, true and plumb installation. Leave wall openings required for ducts, grilles, pipes and other items.
- .3 Brace/plumb/square all built ins and maintain same until rigidly set.
- .4 Fill voids between masonry and metal frames with masonry mortar or insulation, as shown.

.13 Damp Course and Membrane Flashing

- .1 Install damp courses and flashings in accordance with the Manufacturers written Instructions and as shown on Drawings. If not fully shown on drawings, install in locations as follows and as specified hereafter.
 - .1 Over exterior lintels and shelf angles.

3.1 INSTALLATION (CONT'D)

- .2 Below first masonry course of inner wythe at floors on grade. Extend damp course through full thickness of inner wythe.
 - .3 Below second exterior block masonry course and the fourth exterior brick course above new grade line.
 - .4 Jointed masonry under windowsills.
 - .5 Wherever roofs or other exterior, horizontal surfaces intersect masonry walls, immediately above roof flashing or horizontal surface flashing and seal to roof or other flashing or vapour barrier.
-
- .2 Apply primer to all substrate areas where dampproof course/thru-wall flashings are to be applied. Apply primer using lamb's wool roller at rate 100 sq.ft to 300 sq.ft/gallon depending on porosity of substrates. Allow primer to 'tack-up' for approximately 30 minutes prior to application of dampproof course/thru-wall flashings. Primed surfaces not covered within 24 hours shall be completely re-primed.
 - .3 In non-cavity wall install flashing through full thickness of wall as shown. Lap joints at least 150 mm (6") and seal with sealant recommended by flashing manufacturer or heat weld P.V.C.
 - .4 Install all flashings and damp proofing courses to provide continuous waterproofing flashing in wall except where such courses occur over openings in walls extend them past opening a minimum of 200 mm (8") and turn up minimum 150 mm (6") at each end to create a waterproof dam to prevent water draining into cavity.
 - .5 Install membrane flashings onto Bent metal drip flashings and behind vertical wall air barrier membrane with primer. Keep membrane flashing back ½" from outer edge of masonry. Refer to Blow up Details in drawings.
 - .6 In double wythe walls and veneered walls carry flashings from front edge of bent metal drip, under outer wythes, then up backing not less than 300mm and ensure flashing is fully adhered with exposed edges sealed. Flashing is to be set behind air barrier.
 - .7 Inspect flashings for punctures, tears, misaligned seams and the like, apply additional layer of flashing membrane, extending minimum of 6" around damaged area in all directions.
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- .14 Drip Edge Flashing
- .1 Install Metal drip edge flashing with a minimum 1/2" (12 mm) extension beyond foundation wall. Set drip flashing in two (2) continuous beads of sealant. Ends are to be overlapped a minimum of 4" and sealed continuously with sealant recommended by manufacturer. Flexible membrane TWF flashing is to be sealed to top of metal drip and kept ½" back from brick face.

3.1 **INSTALLATION (CONT'D)**

.15 Lintels

- .1 Bridge openings not exceeding 1'-6" in width with 1/4" mild galvanized steel plate lintels bearing 100 mm on each side of opening. Width of plate shall be wall thickness less 1".
- .2 Set loose lintels for bridging openings in masonry.
- .3 Bearing surface for lintels shall be full width of wall or partition extending 8" (200 mm) each side of opening for openings up to 5'-0" (1500 mm) in width with 1/2" (13 mm) increments each side for each additional 1'-0" (300 mm) of span or part thereof.

.16 Lateral Supports

- .1 Lateral Supports - Where non load bearing unit masonry partitions meet structural elements at top of partitions, provide lateral supports as required by National Building Code. In areas where ceilings are scheduled, use (6") 150 mm lengths of steel angle located each side of partition at 1200 mm and staggered. Where no ceilings are scheduled, use continuous length of steel angle on each side of partition. Use angle of sufficient size to accommodate where required due to fire rated walls.

.17 Reglets

- .1 Provide reglets in masonry as required by the roofing and sheet metal trade, for installation of flashings. Reglets shall be full height of the joint and 1" deep.

.18 Control Joints for masonry

- .1 Provide continuous vertical control joints at the following locations and maximum at every 20'-0" on centre for clay masonry and 25' - 0" o.c. for concrete masonry.
 - .1 Interior and exterior of masonry panels.
 - .2 In line with the end of all lintels over doors, windows and other openings.
 - .3 Changes in wall directions.
 - .4 Changes in building height.
 - .5 Major changes in wall thickness.
 - .6 Abutting of new structure to existing structure.
 - .7 4'-0" from exterior corners. (one side)
 - .8 At movement joints in foundations, floors and roof.

3.1 **INSTALLATION (CONT'D)**

- .2 Control joints are to extend full height of the wall **and be mortar free.**
- .3 All locations to be reviewed on site with the Architect and the Project Manager prior to placement.
- .4 Install control joints as detailed on the drawings.

.19 Scaffolding:

- .1 Supply, erect and dismantle scaffolding that may be required.
- .2 Scaffolding must meet Ministry of Labour standards.

.20 Repointing or Tuckpointing:

- .1 Repoint defective joints as follows: cut back joints ½", taking care not to damage units. Remove dust and loose materials by brushing or by water jet. If water jet is used, allow excess water to drain before repointing. Repoint with same mix as original. Pack mortar tightly in these layers, and tool joints or strike flush as required.

.21 Fire Separations:

- .1 Construct fire separation wall tightly to adjacent construction without voids or openings.
- .2 Do not reduce the thickness of masonry fire separations to less than the thickness indicated for the required fire separation.
- .3 Refer to Mechanical and Electrical drawings for location of fire dampers and service penetrations requiring fire stopping.

3.2 **CLEANING**

- .1 Power spray washing of masonry is **not allowed.**
- .2 Obtain and follow masonry manufacturer's written instructions for cleaning. Test sample area, 10 square metres (100 sq ft), to judge effectiveness of cleaning procedures and obtain Architect's approval.
- .3 Keep wall clean and free of mortar stains during laying. Allow mortar droppings which adhere to wall to dry out but not to set. Then rub with small piece of masonry followed by brushing to remove all traces. On completion of masonry, after mortar is thoroughly set and cured, clean masonry thoroughly.
- .4 Remove all mortar fins, stains, discolouration and efflorescence to satisfaction of Architect.
- .5 Protect windows, trim and metal from cleaning agents.

3.2 CLEANING (CONT'D)

- .6 Remove mortar with wood paddles and scrapers before wetting. Saturate masonry with clean water and flush off loose mortar and dirt. Clean brickwork using water, scrubbing brushes and wood paddles only.
- .7 Clean masonry to be left exposed, using procedures as outlined herein and, where this is inadequate, try following recommendations outlined in Technical Notes on Brick and Tile No. 20, revised May 1964, published by the Canadian-Structural Clay Association. Should these methods prove inadequate consult masonry manufacturer before undertaking unusual cleaning procedures and obtain Architect's prior consent.
- .8 Repoint all defective joints.
- .9 Masonry work to be cleaned at the end of each working day and immediately after removal of scaffolding.

END OF SECTION

DIVISION 06 - WOOD, PLASTICS AND COMPOSITES

PART 1 - GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 INSTRUCTIONS

- .1 This Contractor shall report in writing to the General Contractor any defects of surfaces or work prepared by other trades which affect the quality or dimensions of this Contractor's work. Commencement of this Contractor's work shall imply complete acceptance of all work by other trades.

1.2 INTENT

- .1 This Contractor shall provide all articles, labour, materials, equipment, transportation, hoisting and incidentals noted, specified or required to complete the work of this Section.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- .1 Supply and installation of Millwork and Casework including Millwork Hardware Section 06 20 00
- .2 Building Insulation Section 07 21 00
- .3 Spray Polyurethane Foam Insulation Section 07 27 29
- .4 Built- Up Bituminous Roof- 4 Ply Section 07 51 00
- .5 Supply of Hollow Metal Frames Section 08 11 13
- .6 Supply of Finished Hardware Section 08 71 00
- .7 Painting Section 09 91 00

1.5 WORK INCLUDED

- .1 This Contractor shall supply and install all of the rough carpentry items indicated on the working drawings or specified herein, including but not limited to the following:
 - .1 Wood nailers and blocking, including supports for all washroom accessories, upper and lower millwork cabinets, vanities and wall mounted shelving.
 - .2 Wood curbs, caps and blocking for roofing and Mechanical & Electrical equipment.

1.5 WORK INCLUDED (CONT'D)

- .3 Plywood wall covering. Fire retardant in Non-Combustible Construction. (if Required)
- .4 Hardware for anchoring rough carpentry to masonry, concrete, steel, etc.
- .5 Supply and install continuous 3/4" pressure treated Plywood secured to wood blocking for attachment of windows, doors, exterior light fixtures and signage.
- .6 Safety railings and barricades around floor openings and edges are to be structurally sound, secured and maintained during construction.
- .7 Temporary stairs & railings

1.6 BY-LAWS & CODES

- .1 The design, fabrication and erection shall conform to the requirements of the Ontario Building Code and any other applicable local building by-law.

1.7 REFERENCES

- .1 This Specification makes reference to the following publications and where such reference is made, it shall be to the latest edition of such publications as listed below.
 - .1 CANPLY (Canadian Plywood Association) - Canadian Plywood Handbook.
 - .2 CAN/CGSB 51.34, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.
 - .3 CSA B111, Wire Nails, Spikes and Staples.
 - .4 CAN/CSA O80 Series M, Wood Preservation.
 - .5 CSA O141, Softwood Lumber.
 - .6 CSA O151, Canadian Softwood Plywood.
 - .7 National Lumber Grades Authority (NLGA) - Standard Grading Rules for Canadian Lumber.
 - .8 CAN/ULC-S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .9 CAN/CSA 3-086. Engineering Design in Wood (Working Stress Design).
 - .11 National Hardwood Lumber Association Standards.
 - .12 Architectural Woodwork Manufacturers Association of Canada Standards.

1.8 HANDLING AND STORAGE OF MATERIAL

- .1 This Contractor shall store all materials under waterproof cover both in transit and on the site in such a manner as to cause no damage to other materials, to any existing building or property or to the new structure.
- .2 This Contractor to co-ordinate delivery schedule of material with the suppliers.

1.9 REJECTIONS

- .1 Defective materials or workmanship whenever found, at any time prior to final acceptance of the work, shall be rejected. Inspection will not relieve this Subcontractor of responsibility but is a precaution against oversight or errors. Defective materials shall be removed and replaced by this Subcontractor at his own expense, and he shall be responsible for the cost of the work of other trades affected by this replacement.

1.10 CLEAN-UP

- .1 Upon completion of the work of this Section, all surplus material and debris caused by the work of this Trade shall be removed from the site to the satisfaction of the Consultant.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 All lumber for rough carpentry shall be well seasoned stock, free from shakes, splits, dry rot, mildew or other defects which would impair its strength or durability.
- .2 All lumber must be straight, sawn square and true, dressed four sides, properly sized and shaped to correct dimensions from nominal sizes indicated or specified. Kiln dried.
- .3 Lumber grade and moisture content: comply with the official grading rules of Canadian Lumberman's Association (CLA) for the particular lumber and grade, and structurally complying with the latest requirements of the Ontario Building Code. Comply with CSA Standard 0141 Softwood Lumber. Grade mark all lumber. For framing lumber: no. 1 or No. 2 Spruce.
- .4 All wood materials: well seasoned CLA. Moisture content limit: S-GRN: Unseasoned; S-Dry: Maximum 19% moisture content: KD; Maximum 15% moisture.
- .5 Blocking, cant strips, grounds, nailing strips: NLGA No. 2 Ontario White Pine, No. 2 Red Pine, all complying with the grading rules of the NLGA, or Construction, Douglas Fir dense complying with COFI standard grading and dressing rules.
- .6 Softwood Plywood Spruce: to meet specified requirements of CSA Standard 0151. For exterior sheathing use un-sanded exterior grade. For sub flooring use T. & G. un-sanded select sheathing.

2.1 MATERIALS (CONT'D)

- .7 Douglas Fir plywood: comply with CSA Standard 0121. COFI Exterior. Western softwood plywood - comply with CSA Standard 0151. COFI Waterproof glue WSF. Exposed two sides shall be Grade G2S and exposed on one side shall be Grade G.1.S. Consider fitment doors exposed on both sides.
- .8 Wood Preservative: solignum manufactured by Sturgeons, Ltd., Pentox manufactured by Osmose Wood Preserving Co. of Canada Ltd., Rez Sanding Sealer manufactured by Monsato Co. Ltd. or other approved manufacturer. For painted surfaces use clear type and for concealed surfaces use green tinted type.
Note: The following are not to be used in roof areas or in contact with roof membrane.
 - .1 Creosote.
 - .2 Pentachlorophenol.
 - .3 Copper Naphthenate.
 - .4 Copper & Quinolinalate.
- .9 Rough Hardware: nails (common and spiral), staples, spikes, screws, bolts, lag screws, anchors, special fastening devices and supports as required for the erection of all carpentry items. CSA B111. Cadmium plated or galvanized when used on exterior.
- .10 Adhesives: CSA 0112.

2.2 FINISHES

- .1 Galvanizing: To CAN/CSA-G164, for galvanized fasteners for exterior work.

2.3 FIRE RETARDANT TREATMENT

- .1 Fire retardant treatment of lumber and plywood: 'Dricon' fire retardant treatment by J. A. Biewer or approved alternate, conforming to CAN/CSA-O80.20 and CAN/CSA-O80.27 respectively, to provide a flame spread rating of 25 or less in accordance with CAN/ULC-S102.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Prior to fabrication, check all dimensions relating to this Section of Work. Report any discrepancies to the Architect.
- .2 Prior to site erection, examine all site conditions relating to this Section of Work to ensure that they are acceptable for installation. Report any discrepancies to the Architect.

3.2 ERECTION

- .1 This Contractor shall ensure that all structural timbers and connections will sustain any erection loadings that may occur with an adequate safety factor.
- .2 All timber members shall fit together properly, without trimming, cutting or any other unauthorized modifications. Report any discrepancies to the Architect.

3.3 TREATED WOOD

- .1 All wood nailers, blocking, cant strips, wood sills, etc. in contact with concrete or masonry, in roof areas and areas of high humidity or moisture shall be pressure treated to ensure full protection against rot and decay.
- .2 When treated lumber is cut or sawn for fabrication or drilled and countersunk for bolts etc., the new surfaces of the timber thus exposed shall be treated with two coats of the preservative.

3.4 WOOD CURBS

- .1 All necessary wood curbs and blocking for roof ventilators, Electrical and Mechanical equipment shall be supplied and installed level on the roof by this Contractor.

3.5 INSTALLATION - ROUGH CARPENTRY

- .1 Blocking and Grounds:
 - .1 Fasten wood nailers, blocking, bucks, cants, sills ground curbs, copings and strapping solidly to supporting materials in true planes so that they will remain straight and not be loosened by work of other Contractors or Subcontractors.
 - .2 Include blocking around each door & window and at window heads for blinds and all other such items.
 - .3 Refer to plans and details for locations and securement requirements.
- .2 Framing
 - .1 Do all wood framing in accordance with the Ontario Building Code 2012 and to CAN 3-086-M84 as applicable.
 - .2 Refer to all plans and details for locations and heights of framing, partitions, enclosures, blocking and grounds, sheathing, etc.
- .3 Wood Furring and Blocking
 - .1 Provide all miscellaneous wood furring, caps, blocking, strapping, nailing strips where required, and as indicated on drawings.

3.5 INSTALLATION - ROUGH CARPENTRY (CONT'D)

- .2 Coordinate with the applicable other trades and provide wood and/or plywood back-up within wood framing by this Section and metal stud framing specified in Sections 05 41 00 (Steel Metal Framing) and 09 21 16 (Gypsum Board Assemblies) as required to provide proper support for wall-mounted items. Coordinate locations of grab bars in washrooms with Division 15 to avoid interference with plumbing.
- .3 Apply strapping where required to provide backing for finishes to follow. Securely nail, staple or shoot straps in place uniformly spaced, all shimmed and straightened to flat planes. Strapping to be minimum 38 x 64 by 400 mm o.c. unless noted otherwise.
- .4 Align and plumb faces of furring and blocking to tolerance of 1:600.
- .5 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .6 Install wood cants, caps, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized fasteners.
- .7 Blocking of several thicknesses of wood may be necessary so that the top of the nailer will be level with the top of the roof insulation. Offset blocking layers 300mm (12 inches) and weave corners.
- .8 Assemble blocking using two staggered rows of nailing. Space nails in any row a maximum of 600mm (24 inches) on centre. Within 2440mm (8 feet) of outside corners, reduce maximum spacing to 300mm (12 inches) on centre.
- .9 Nailers shall be of treated spruce, sizes as indicated and as required, to be continuous unless otherwise noted.
- .10 Install sleepers as indicated.
- .11 Install wood backing, dressed, tapered and recessed slightly below top surface of roof insulation for roof scupper.
- .12 Provide additional items as required for strength and against movement and deflection, such as blockings, infill pieces, fasteners, furring, shims, grounds, bucks, dowels, bolts and washers, firestops and other hardware, whether indicated or not, and as required by building code.
- .13 For all services, piping, ductwork and other items projecting or becoming visible through finished surfaces of walls, columns, ceilings, as required to provide planes of finished surfaces on desired lines and/or elevations. Furring minimum 38 x 38 spaced at 400 mm O.C., unless otherwise required.

3.5 INSTALLATION - ROUGH CARPENTRY (CONT'D)

.4 Wall Sheathing:

- .1** Panels shall be installed vertically with their edges supported over studs and ends supported over plates or wood blocking.
- .2** Nailing shall be minimum 50 mm galvanized, ring or spiral thread and shall be well set into panels.
- .3** If nailing is done with pneumatic nailing gun, special attention must be given to assure nails are well set into panels.
- .4** Space nails at 300 mm O.C. in field and 150 mm O.C. along perimeters.

3.6 ELECTRICAL AND TELEPHONE BACKBOARDS

- .1** Supply and install 3/4" (19 mm) thick backboards of Douglas Fir Plywood, fire treated solid/25 grade; sanded both faces; in electrical and telephone rooms for extent noted on Drawings. Paint finish.
- .2** Fasten to wall by fasteners and at spacing suitable for type of walls to provide secure, sturdy installation capable of carrying normal equipment load without damaging wall or working loose.

3.7 INSTALLATION - STEEL FRAMES

- .1** Set frames plumb and square in their exact location. Firmly block and brace to prevent shifting. Shim up where required to ensure proper alignment and dimensions from finished floor to head of frame. Install temporary wood spreaders at mid-height.
- .2** Anchor frames securely (to studs) using minimum 3 anchors/jamb for jambs up to 6'-10" and a minimum of 4 anchors per jamb for jambs over 6'-10" high in masonry infill with grout. In interior partitions infill with acoustic/fire rated batt insulation to match partition construction. Spray foam infill for exterior wall installations.

END OF SECTION

DIVISION 06 - WOOD, PLASTICS AND COMPOSITES

PART 1 - GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 DESCRIPTION

- .1 Work included:

To complete all carpentry required as shown or specified and which is not specifically called for in "work included" portions of other specifications divisions.
- .2 Work installed but furnished by other sections:
 - .1 Finish hardware (Doors) Section 08 71 00
 - .2 Toilet, Bath and Laundry Accessories Section 10 28 00
- .3 Related work specified in other sections:
 - .1 Back Priming & Finish Painting Section 09 91 00

1.2 REFERENCES

- .1 Architectural Woodwork Manufacturers Association of Canada (AWMAC).
- .2 CAN/CSA B111, Wire Nails, Spikes and Staples.
- .3 CAN/CSA O115, Hardwood and Decorative Plywood.
- .4 CAN/CSA O151-M, Canadian Softwood Plywood.
- .5 CAN/CSA O153-M, Poplar Plywood.
- .6 CAN/CSA O141, Softwood Lumber.
- .7 CAN/CSA O153, Canadian Softwood Plywood.
- .8 National Lumber Grades Authority (NLGA), Standard Grading Rules for Canadian Lumber.

1.3 QUALITY ASSURANCE

- .1 Requirements of regulatory agencies:
 - .1 Mark each piece of wood that is pressure treated to meet fire retardant requirements of jurisdictional authorities, or underwriters, or both, with ULC Fire Hazard Classification label.
- .2 Reference standards:
 - .1 Conform to CAN/CSA Standard 0141 for dressed dimensions of wood members.
 - .2 Fabricate the listed Work to Custom Quality Standard of: AWMAC Specification, Quality Standards of the Architectural Woodwork Manufacturers Association of Canada.

1.4 QUALIFICATION

- .1 Contractor to have 5 years of experience in the Work of this Section.
- *.2 Subcontractor to submit a list of 5 previous jobs where he has performed similar work in scale and scope for review by the Consultant and Owner, and to be representative of his workmanship.
- *.3 Sub-contractor to provide documentation that he has required manpower for the scale of this job, to meet the construction schedule.

1.5 SUBMITTALS

- .1 Samples:
 - .1 Submit 1-12"x12" sample of each specified finish wood species, and in each cut. As per Section 01 33 00 "Submittals Procedures".
- .2 Shop Drawings:
 - .1 Submit shop drawings for manufactured items to Section 01 33 00 "Submittals Procedures".

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- .1 Environmental Requirements:
 - .1 Ensure that relative humidity in areas where Work is stored and installed does not exceed 55%.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING (CONT'D)

.2 Protection:

- .1** Ensure that Work of this Section is protected from damaged and deterioration during installation, and otherwise until Project completion.
- .2** Take particular care that wood made fire retardant by pressure treatment is exposed to no dampness.

1.7 WARRANTY

- .1** Warrant work of this Section against de-lamination of plastic laminate work and warpage of millwork for a period of 2 years from date Work is certified as substantially performed in accordance with General Conditions of the Contract and as amended by Supplementary General conditions. Promptly make good defects and deficiencies which become apparent within warranty period including making good any work damaged by this work, satisfactory to the architect and at no expense to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 General:

- .1** Include in Work of Section rough hardware required for its execution.
- .2** Moisture content of wood at time of installation shall be for interior locations at an average of 7%, with a permitted range of individual pieces of 5% to 9%, and for exterior locations at an average of 12%, with a permitted range in individual pieces of 10% to 15%.
- .3** Use only adhesives and fastenings that develop sufficient strength for intended use, are non-staining, and are unaffected by the environment to which exposed.

.2 Wood:

- .1** Grade mark softwood and hardwood lumber by the appropriate association under authority of the National Lumber Grades Authority. Where not exposed to view, use wood of grades suitable for fabrication, utility and structural needs.
- .2** Where exposed to view, use wood to meet requirements of AWMAC Quality Grade Standard.
- .3** Wood framing: No. 1 Eastern Spruce
Wood blocking: No. 2 Eastern Spruce

2.1 MATERIALS (CONT'D)

- .4 Hardwood lumber: to National Hardwood Lumber Association (NHLA) requirements, birch species, AWMAC custom-grade.
- .3 Plywood:
 - .1 Douglas Fir: to meet specified requirements to CAN/CSA Standard 0121, Sanded Grade, Good Two Sides where both sides are exposed to view, and Good one Side where only one side is exposed to view. Fire Rated as noted on Drawings
 - .2 Softwood: to meet specified requirements of CAN/CSA Standard 0151, Sanded Grade Solid Two Sides where both sides are exposed to view, and Good One Side where only one side is exposed to view.
 - .3 Hardwood: to meet specified requirements of CAN/CSA Standard 0115 veneer core, Type II, smooth sanded, rotary cut face veneers, Good Grade where exposed to view and Sound Grade where not.
 - .4 Poplar: to meet specified requirements of CAN/CSA Standard 0153.
- .4 Particleboard:
 - .1 To meet specified requirements of CAN/CSA-0188.1, Grade S.
- .5 Plastic Laminate:
 - .1 To meet specified requirements of CAN/CSA Standard CAN/CSA. A.172.
 - .2 For Counter Tops: General Purpose Grade, Standard Type, G.P. 040" thick.
 - .3 For post forming - Universal Grade Post-Formable U.32-.030" thick.
 - .4 For cabinet lining and shelves: General Purpose Grade, Light Duty type, 0.032" thick.
 - .5 Backing sheet: In same thickness as face sheet.
 - .6 Surface finish: Furniture finish, except for backing sheet.
 - .7 Colour: Refer to Finish Schedule on Drawings.
- .6 Melamine panels
 - .1 Melamine resin impregnated sheet thermally fused to rigid particle board substrate. General Purpose (GP) grade 120-gram weight.
 - .2 Colours and gloss shall be determined by Architect.

2.1 MATERIALS (CONT'D)

- .3 Backing Sheet: All panels shall be balanced with 0.5 mm (0.020") sheet manufactured by the same manufacturer as the facing sheet.
- .4 Core: CAN/CSA 0115-M1982 (G/SO) or CSA 0121 Grade "B" or CANCSA-0188.1, Grade R.

.7 Hardboard

- .1 To meet specified requirements of CGSB Specification 11-GP-3M, Type 2. In lieu of testing procedures attach labels attesting to conformance with reference specification.

.8 Miscellaneous Hardware

- .1 Standard of quality to be for heavy duty use to suit use and finish to match Hardware as listed and described on drawings. Unless specified otherwise, provide cabinet hardware to ANSI/BHMA A156.9, Grade 1, but not limited to the following.
- .2 Casework Hinge: Fully Concealed, adjustable, articulated, metal hinges, screw on type; accommodating 100 degree, 110 degree, 125 degree and 170 degree openings, with soft-closing mechanism.
- .3 Pull: Stainless steel, 10 mm OD handle, 185 mm overall length with 128 mm centre-to-centre fastening and 35 mm projection; eg. Contemporary Stainless Steel Handle Pull – 2102 by Richelieu.
- .4 Drawer Box and Slides: Full extension for 60 kg load at 500 mm; roller runners for bottom mounting, steel construction with baked enamel finish, ball bearing rollers, and soft-closing mechanism.
- .5 Continuous Hinges: To ANSI/BHMA A156.26; continuous stainless steel hinges, heavy duty type, length to suit full door height; eg. Roton 790-900 by Hager, with US32D finish.
- .6 Cupboard and Drawer Lock: To ANSI/BHMA A156.11, Operational Class, Grade 1; chrome finish, keyed to Owner's master keying system.
- .7 Padlock Hasp: Stainless steel, Type 304; with countersunk screw holes.
- .8 Slide Bolt for Inactive Leaf: 60 mm long barrel bolt, nickel plated.
- .9 Elbow Catch: Heavy duty type, nickel finish; eg. Model 5540180 by Richelieu.
- .10 Door Bumper: Nylon, eg. Model MP303-11 by Richelieu.

2.1 MATERIALS (CONT'D)

- .11 Pilaster Strip: 16 mm wide, 4 mm deep perforated metal strip, zinc plated; length as required; Model 2332GXX by Richelieu.
- .12 Pilaster Clip: Heavy duty bent metal clips, zinc plated; Model CP2562G by Richelieu.
- .13 Shelf Support for Drilled Gable: 5 mm OD metal pin, plastic-clad; eg. Model 34004011 by Richelieu.
- .14 Support Housing and Bolt: Nickel-plated metal, 9.5 mm mounting centre, suitable for 19 mm thick panels; complete with matching connecting bolt; eg. Rafx-SE Housing Model 263.15.705 by Hafele.
- .15 Cable Grommet: Plastic counter top fitting for computer / telephone / power cables; two-part cable set with spring closure top, 50 mm OD; Black colour; Model 60.2700.90 by Richelieu, or Type SG by Doug Mockett.
- .16 Circular Cable Entry Plug: Aluminum construction, 72 mm OD, 60 mm OD hole, 22 mm deep with 3 mm thick cap; polished chrome finish; eg. Model 600910140 by Richelieu.
- .17 Wire Management Moulding: 50 x 38 mm size, lengths as indicated; complete with mounting screws; Black colour; eg. Model 512490 by Richelieu.
- .18 Heavy Duty Bracket (HD-1): Prefinished steel construction, 500 kg capacity per pair, Hebgo brackets by Hafele, 480 mm long, 180 mm high, 80 mm wide; Model 287.45.468.
- .19 Medium Duty Bracket (MD-1): Prefinished steel construction, 150 kg capacity per pair, Hebgo brackets by Hafele, 580 mm long, 170 mm high, 82 mm wide; Model 287.44.470.
- .20 Magnetic Catch: Magnetic catch, automatic opening.
- .21 Automatic Door Bolt: Model 245.58.754 by Hafele.
- .22 Cart Casters: Heavy duty swivel caster, 100 mm OD elastic Dynatread wheel; 31 mm thread width; sealed brass wheel bearing; rated for 160 kg; eg. Model FC.421A14R100DZPH by McFadden.
- .23 Cart Corner Bumpers: Rigid plastic tapered corner bumper; surface mounted design, screw-fastened; colour as selected by Consultant; EcoRigid 90° Corner Cap by Richelieu, or JCBTPR Tapered Corner Bumper by Access Casters.

2.1 MATERIALS (CONT'D)

- .24 Countertop/Table Legs: 60 mm OD chrome-plated steel tubing, adjustable.
- .25 Base Cabinet Leveller: 100 mm size, adjustable to minus 5 mm and plus 10 mm; Model 637.45.326 by Hafele.
- .26 Coat Hook: Two-prong heavy duty design, 4.5 mm thick flat steel bar, 108 mm high, 19 mm wide; pre-drilled for screw attachment; zinc plated finish; Model 209Z by Royal Arch Inc.
- .27 Closet Rod and Flanges: 32 mm OD, 2 mm thick stainless steel tube, C32D satin finish; complete with matching closet rod flange; CBH 762 with CBH 742 and 752 closed end flanges.
- .28 Teacher Closet Door Hardware:
 - .1 Hinges: To ANSI/BHMA A156.1, Grade 1; 75 x 75 mm size, 5-knuckle ball bearing standard weight full mortise butt hinges, with brushed chrome finish; 1-1/2 pair required per door leaf; eg. Model FBB179 by Stanley.
 - .2 Slide Bolt for Inactive Leaf: Type as specified above, two required for top and bottom attachment to inactive door leaf.
 - .3 Lockable Handset: As specified in Section 08 71 00.
- .9 Fire Retardant Treatment
 - .1 Pressure treat lumber in accordance with CSA Specification 080 and plywood with 080.27, or to ULC Spec.; to ensure a flame spread rating of less than 25 when tested in accordance with ASTM Standard E84-77.
- .10 Wood Preservative
 - .1 Clear pentachlorophenol, to meet specified requirements of Standard 080.
- .11 Oak: Premium grade.
 - .1 All dry sound lumber selected for compatible colour and grain in accordance with AWMAC premium grade.
 - .2 All pieces smoothly machined with all visible surfaces smoothly sanded.
 - .3 No visible knots.
 - .4 This grade used for high quality transparent finish, refer to Section 09 91 00 (Painting).

2.1 MATERIALS (CONT'D)

- .5 Nominal size dimensions refer to details for actual size requirements.
- .12 Maple: Grade – Premium:
 - .1 All dry sound lumber selected for compatible colour and grain in accordance with AWMAC premium grade.
 - .2 All pieces smoothly machined with all visible surfaces smoothly sanded.
 - .3 No visible knots.
 - .4 This grade used for high quality transparent finish, refer to Section 09 91 00 (Painting).
 - .5 Nominal size dimensions refer to details for actual size requirements.
- .13 Hollow wall anchors
 - .1 Star Wall grip; Rawplug Rawlys; or Red Head WA series.
- .14 Provide all rough or builders hardware such as nails, spikes, ground, bolts, iron works, washers, anchors, etc., herein specified or as may be required for proper completion of the work.
- .15 Fastenings for exterior use to have a rust-inhibitive coating; screws for securing of galvanized anchors, etc., to be galvanized.
- .16 M.D.F Board
 - .1 MDF (Medium Density Fibreboard): to ANSI A208.2-02; Grade MD, density 740kg/mn, thickness as indicated. Manufacturers: Rangerboard, Medite.
- .17 Edge banding for melamine panels; solid polyvinylchloride (PVC), 3 mm thickness x full width of board, edging to be c/w 3 mm radius on all edges and corners. Apply edging with edge banner using hot melt adhesive. Maximum three (3) colours as chosen by Architect.
- .18 Fieldwood Preservatives: Pentox green as manufactured by Osmose Wood Preserving Co. of Canada, to CSA 080 and supplements.
- .19 Pressure Treated Lumber: to NLGA and CSA O141, softwood SPF species, Grade 2. Dimension sizes indicated:
 - .1 Pressure Treatment: to CAN/CSA O80 preservative with 0.25 percent retention.
- .20 Dimensional Lumber: To Section 06 10 00; sanded to remove grade marks, selected for knot-free appearance.

2.1 MATERIALS (CONT'D)

- .21 Cedar Lumber: Western Red Cedar species, to AWMAC QSI Premium grade and NLGA Grade Select-Tight-Knot (STK) or better.
- .22 Family Studies Countertop:
 - .1 Stainless Steel Countertop.

2.2 FABRICATION

.1 GENERAL WORKMANSHIP

- .1 Fabricate and install work in accordance with Architectural Woodwork Manufacturers Association of Canada Custom Grade Standards by skilled craftsmen of companies specializing in work specified and to requirements of other trades. Each item shall be as shown on Drawings and as detailed on shop drawings.
- .2 Assemble work in shop and deliver to Work ready for installation, as far as practicable. Leave ample allowance for fitting and scribing on job.
- .3 Take care to prevent opening up of glue lines in finished work.
- .4 Design construction methods for expansion and contraction of material.
- .5 Conceal joints and connections wherever possible. Locate prominent joints where directed by Architect. Intermediate joints between supports not permitted.
- .6 Joints made on the job shall be equal in quality & workmanship to joints made in shop.
- .7 All cabinets to be straight, level, square and plumb, and to be properly fitted to accommodate structural variances. Open gables should be flush to floor with no gaps between floor and gable panel. All cabinet and vanity doors to be leveled regardless of service work to be performed.
- .8 Install countertops and end splashes including scribing to the walls to a maximum of 1/8". If greater than 1/8", then bring to the attention of Contractor prior to the installation of the countertop.
- .9 Be responsible for methods of construction and for ensuring that materials are rigidly and securely attached and will not be loosened by work of other trades.
- .10 Take field dimensions and fabricate work to suit field dimensions.
- .11 Fasten wood nailers, blocking, framing and strapping solidly to adjacent materials in true planes.

2.2 FABRICATION (CONT'D)

- .12 Do not permit delivery of this work to Site until area is sufficiently dry so that woodwork will not be damaged by excessive changes in moisture content.
- .13 Check access clearance at Site before assembling large units or components in factory for shipment to work.
- .14 Provide all blocking coming in direct contact with millwork in accordance with applicable provision set forth herein.
- .15 Glues shall be waterproof and of a type suitable for work to be joined. All glue residue is to be removed from cabinetry, countertops and surrounding area, and all stickers removed by installer.
- .16 Moisture content of interior woodwork shall be not less than 4% nor more than 8%.
- .17 Comply with glue manufacturer's recommendations for lumber moisture content, glue shelf life, pot life, working life, mixing, spreading assembly time, time under pressure and ambient temperature.
- .18 Subcontractor to site measure after plumbing, electrical, HVAC and carpentry rough ins are complete allowing for drywall finish as necessary. At the time of measuring, identify any discrepancies between the approved layouts, work orders and the actual on-site dimensions, and review the differences and proposed final layouts with Contractor on site prior to releasing for production.
- .19 All holes required in cabinetry for plumbing to be drilled, not cut.

.2 PLASTIC LAMINATE FACED WORK

- .1 Provide cores of not less than 16 mm (5/8") nominal thickness. (Refer to Dwgs)
- .2 Apply backing sheet to laminated flatwork. Supply uniform coating of sealer on exposed edges. Provide backing sheet of sufficient thickness to compensate stresses caused by facing sheet.
- .3 Self edge, straight line edging with 1.6 mm (1/16") standard material and radius corners with post forming material, apply with same adhesive as facing sheet. Chamfer edges uniformly at approximately 20 degree, using machine router.
- .4 Locate joints at 8 to 10 ft., 2,400 mm to 3,000 mm o.c. At 'L' shaped corners mitre plastic laminate, to outside corners. Accurately fit member together to provide tight and flush butt joints, in true planes. Provide 6 mm (1/4") blind spline and approved type draw bolts. One draw bolt for widths up to 150 mm (6") and maximum 450 mm (10") centres for width exceeding 150 mm (6"). Colour match adjoining units.

2.2 **FABRICATION (CONT'D)**

- .5 Provide cutouts as required for inserts, fixtures and fittings. Use radiused corners and chamfer edges around cutouts to avoid chipping laminate.
- .6 Assemble work, true and square. Arrange adjacent parts of continuous laminate work to match in colour and pattern.

.3 **MILLWORK CABINETS & DRAWERS**

- .1 Material for interior millwork shall be hardwood plywood or particleboard with melamine veneer, as shown, and specified herein, for gables, shelves, backs, divisions tops and wherever sheet laminated material is shown.
- .2 Semi-Exposed Parts: Interior of all cabinet work except drawers, but including drawer fronts, shall match exposed parts except where indicated otherwise on Drawings or in schedules and except where specified otherwise. Drawer bottoms and dividers shall be melamine unless noted otherwise.
- .3 Case Drawers: Drawer fronts shall be plastic laminate faced veneer with plywood core. Edges shall have Veneer edge bands same as face veneer. All drawers shall be fitted with sliding hardware consisting of full extension medium weight drawer slides with nylon wheels. Drawers shall be fully removable.

.4 **SHELVING**

- .1 Except where noted otherwise, open shelving shall consist of 16 mm (5/8") melamine faced particleboard on all surfaces c/w 3mm PVC colour matched edging strip.
- .2 Gables for adjustable shelving units shall be 16 mm (5/8") thick melamine faced particleboard, routed to receive flush mounted metal pilaster strips (standards).
- .3 Unless shown or noted otherwise, provide 13 mm (1/2") melamine faced thick plywood backs to all units. Rout plywood backs into end gables when gables are exposed to view.
- .4 Metal wall standards and metal end shelf supports shall be supplied under this section for installation.

2.3 **MILLWORK SCHEDULE**

The following is representative of the millwork included in the contract but is not exclusive of any millwork shown on the Plans, Sections and Details contained in the Working Drawings.

- .1 Demonstration Counter.
- .2 Upper and lower cabinets in Family Studies Room.

2.3 MILLWORK SCHEDULE (CONT'D)

- .3 Open Millwork Shelving.
- .4 Teacher Storage Cabinet.
- .5 Refer to details on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Before commencing installation, ensure that grounds, strapping, and other constructions and surfaces to which Work is installed are satisfactory for fitting and adequate for securing of Work.

3.2 INSTALLATION

- .1 Take site measurements of construction to which Work of this Section must conform, and through which access must be made, before Work is delivered to site, to ensure that adaptation is not required which would result in construction delay.
- .2 General:
 - .1 Supply and install all other carpentry shown on Drawings or as required for completion of work. Co-operate with other trades in installing items supplied by other Sections, cut openings in woodwork when so required and make good disturbed surfaces.
 - .2 Back-prime exterior and interior woodwork immediately after delivery to site under Work of Section 09 91 00. Ensure that cut ends are primed. Scrape or sand smooth surfaces under Work of this Section. Notify those who are responsible for back-priming in sufficient time to enable them to schedule their Work.
 - .3 Install Work plumb, level and straight, and fasten it securely to backing to support itself and anticipated superimposed loads.
 - .4 Build Work into construction as indicated on Drawings or specified in other Sections of this Specification, or both.
- .3 Trim:
 - .1 Install in single lengths except where material limitation makes impossible. Stagger joints where they occur and locate over solid backing for fastening.
 - .2 Cut returns of stool and apron ends to match face profile.

3.2 INSTALLATION (CONT'D)

.4 Cutting and Fitting:

- .1 Cut mouldings with sharp true profiles.
- .2 Cope trim and mouldings at interior corners and at returns.
- .3 Mitre trim and mouldings at exterior corners. Glue and lock shop mitres that are over 4" from heel to point.
- .4 Scribe and joint Work accurately together, and to other work, to fit tightly and with flat smooth surfaces. Install trim or filler panels to close gaps.

.5 Fastening:

- .1 Fasten work with nails generally but use screws or special fasteners at critical joints where strain, usage and excessive shrinkage is anticipated, and where specified quality grade standards require.
- .2 Blink nail unless impossible. Set finishing nails below finished surfaces to receive putty.
- .3 Properly countersink (set) all fastener heads. No staples to be used. Fill, sand and clean all joints, nail heads, cracks and blemishes of completed trim work so as to make ready to accept paint.

.6 Installation of Washroom Accessories:

- .1 Install all washroom accessories supplied under work of Section 10 28 00 and supplied by Owner.

.7 Installation of Doors:

- .1 Install wood doors supplied under Work of Section 08 14 00 after finishing of walls.
- .2 Fit wood doors with 24 mm (3/32") clearance at jambs and heads and 3/8" over finished flooring.
- .3 Trim hinge side of wood doors to fit, and bevel latch edges as required.
- .4 Ensure that top and bottom edges of wood doors are primed under Work of Section 09 91 00 after they are cut to fit.
- .5 Install grilles in wood doors, supplied as specified in other Sections.
- .6 Undercut non fire rated wood doors where indicated on Door Schedule.

3.2 INSTALLATION (CONT'D)

- .8 Installation of Finishing Hardware:
 - .1 Accept delivery of all finishing hardware, and be responsible for safe storage, issuing and ultimate installation under this or other Sections.
 - .2 Make cuts in wood doors neatly.
 - .3 Accurately located and adjust hardware to meet manufacturer's instructions. Use special tools and jigs as recommended.
 - .4 Install hardware in wood doors at same locations as for hollow metalwork installed in Project.
 - .5 Locate top hinges with top 5" below door top, bottom hinges with bottom 10" from floor, and intermediate hinges equidistant between top and bottom hinges.
 - .6 Locate door stops to contact doors 3" from latch edge.
 - .7 Install hardware and trim square and plumb to doors.
 - .8 Replace missing hardware to ensure specified installation at time of building completion.
 - .9 Safeguard keys to keep them out of unauthorized hands, tag them with opening number, and deliver them to person designated by Architect at building completion.
- .9 Finishing:
 - .1 Sand wood surfaces after installation to leave surfaces in true planes and free of machine or tool marks, ready for application of finishes.
- .10 Wood Preservatives:
 - .1 Wood installed at exterior of building and which is specified for painting to receive a soaking coat of wood preservative on all surfaces. Give freshly cut ends two additional soaking coats.
 - .2 Apply to all wood members in contact with masonry.
- .11 Millwork Inspections:
 - .1 Subcontractor to inspect all cabinets before delivery. If damaged, Subcontractor to order damaged part before shipment of cabinets.

3.2 INSTALLATION (CONT'D)

- .2 All cabinetry shall remain the responsibility of the Subcontractor until installation is complete.
- .3 Immediately upon completion of work and on the same day, the Subcontractor's foreman will verify that all work has been performed satisfactorily.

3.3 ADJUSTMENT AND CLEANING

- .1 Adjust hinged doors to swing freely and easily, to remain stationary at any point of swing, to close evenly and tightly against stops without binding, and to latch positively when doors are closed with moderate force. Adjust sliding doors to operate smoothly without binding, and to close evenly and tightly against jambs.
- .2 Adjust hardware so that latches and locks operate smoothly and without binding, and closers act positively with the least possible resistance in use. Lubricate hardware if required by supplier's instructions.
- .3 Clean hardware after installation in accordance with supplier's instructions.
- .4 Sand and clean woodwork to leave free from finish defects in any exposed part.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

PART 1 – GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 SECTION INCLUDES

- .1 Labour, Products, equipment and services necessary for building insulation Work in accordance with the Contract Documents, and local Codes, Statutes, By-Laws and authorities having jurisdiction.

1.2 REFERENCES

- .1 ASTM C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- .2 ASTM C665, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- .3 ASTM C1320, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
- .4 CAN/ULC S701, Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
- .5 CAN/ULC S702, Thermal Insulation, Mineral Fiber for Buildings.
- .6 CAN/ULC S710.1, Standard for Thermal Insulation - Bead - Applied One Component Polyurethane Air Sealant Foam, Part 1.
- .7 CAN/ULC S710.2, Standard for Thermal Insulation - Bead-Applied One Component Polyurethane Air Sealant Foam, Part 2.

1.3 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
- .2 Submit Product data and manufacturer's installation recommendations for each Product specified.
- .3 When requested, provide information concerning installer experience which is similar in scope and scale to requirements of the Project, including location of Work and persons to be contracted as references.

1.4 **MOCK-UP**

- .1 Provide mock-up of materials of this section with wall cladding, masonry veneer and typical cavity wall construction.
- .2 Locate where directed by Consultant.
- .3 Approved mock-up may remain as part of the Work.

1.5 **QUALITY ASSURANCE**

- .1 Installer Qualifications; Qualified by manufacturer to install manufacturer's Products, and who has completed installations similar in design, scope and scale to those indicated for this Project.
- .2 Refer to Specification Section 01 45 00 'Quality Control' for Inspections & Testing.

1.6 **DELIVERY, STORAGE AND HANDLING**

- .1 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- .2 Protect from exposure to harmful environmental conditions at temperature and humidity conditions recommended by manufacturer.

PART 2 – PRODUCTS

2.1 **RIGID INSULATION**

- .1 Type 4 Rigid Extruded Polystyrene Insulation (XPS): to CAN/ULC S701, Type 4, ship lapped edge for single layer applications, CFC free and HCFC free:
 - .1 Compressive Strength: General use 210 kPa (30 psi) and high density 415 kPa (60 psi) where indicated.
 - .2 Thickness and **R Value**: as indicated on Drawings.
 - .3 Acceptable Products (general use):
 - .1 Dow Chemical Canada; Styrofoam SM.
 - .2 Owens Corning Foamular C-300.
 - .3 Or approved alternative.

2.1 RIGID INSULATION (CONT'D)

.4 Acceptable Products (high density use):

- .1 Dow Corning Styrofoam High load 60 insulation.
- .2 Or approved alternative.

2.2 SEMI-RIGID MINERAL BATT INSULATION

- .1 Mineral Wool Insulation Semi Rigid Type: Thickness and **R** value as indicated on Drawings. For rated walls provide required thickness and type of insulation as per ULC Design W- 606.
- .2 Acceptable Products:
 - .1 "Roxul CavityRock MD", by Roxul Limited.

2.3 THERMAL BATT INSULATION

- .1 Batt Thermal Insulation: to CAN/ULC S702, Type 1, friction fit. Thickness and **R** value as indicated on Drawings.
- .2 Acceptable Products:
 - .1 "EcoTouch® PINK™ FIBERGLAS" by Owens Corning Canada.
 - .2 Or approved alternate.

2.4 SOUND ATTENUATION BATT

- .1 Fibreglass Sound Batts: to CAN/ULC S702, Type 1, unfaced. Thickness: as indicated on Drawings.
- .2 Acceptable Products:
 - .1 CertainTeed Sustainable Insulation NoiseReducer.
 - .2 C.G.C. Thermafiber Sound Attenuation Fire blankets.
 - .3 Johns Manville Sound-SHIELD.
 - .4 Owens Corning QuietZone.
 - .5 Roxul AFB (Commercial) Or Roxul "Safe 'n Sound" (Residential).

2.5 SPRAY APPLIED INSULATION and THERMAL BARRIER

- .1 Closed Cell, Medium Density, spray applied polyurethane foam insulation and air barrier. CCSPF meeting the requirements of CAN/ULC-S705.1-15 for a minimum **R** value of **R 20**.
- .2 Blowing agent type to be HFO.
- .3 Long Term Thermal Resistance to comply with CAN/ULC S770-09:

100mm	3.84 (21.8)
75mm	2.83 (16.1)
50mm	1.82 (10.3)
- .4 Spray applied insulation under steel deck flute along the perimeter of the exterior roof and where applicable.
- .5 Acceptable Products:
 - .1 "Icynene Insulation System", polyisocyanurate insulation manufactured by "Icynene Inc."
 - .2 "Walltite ECO CM01 by "BASF-The Chemical Company"
 - .3 Or Approved alternate.
- .6 Thermal Barrier
 - .1 Product: "AD Cementitious Thermal Barrier"
 - .2 Follow Manufacturer's instruction for surface preparation and application method.

2.6 ATTACHMENT DEVICES AND RELATED ACCESSORIES

- .1 Adhesive: polyurethane construction adhesive, resistant to freezing.
- .2 Impaling Pins and Clips: Corrosion-resistant spindle anchor and self-locking washer type consisting of perforated metal plates with spindle welded to center and self-locking washers.
- .3 Expanding Foam Insulation and Sealant: CAN/ULC S710.1, single component, low expanding polyurethane foam.
 - .1 Compatible with specified rigid insulation.
 - .2 Manufacturer: Tremco or Presstite Division of Interchemical Corp. for acoustic partitions.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Examine the areas and conditions where building insulation is to be installed and identify any conditions detrimental to the proper and timely completion of the Work.
- .2 Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 PREPARATION

- .1 Clean substrates of substances harmful to insulation or vapour retarders, including removing projections capable of puncturing vapour retarders or interfering with insulation attachment.
- .2 Clean all surfaces free of dirt, grime, grease, oil or other substances which would be detrimental to proper bond of adhesives.

3.3 INSTALLATION – GENERAL

- .1 Install insulation after building substrate materials are dry.
- .2 Comply with insulation manufacturer's written instructions and recommendation applicable to Products and application indicated.
- .3 Install insulation in largest possible size to cover areas indicated on Drawings, closely butted together at sides, ends, and against walls, and structural members.
- .4 Extend insulation to the full thickness shown over entire area to be insulated. Neatly cut and fit insulation tightly around obstructions, projections such as pipes, conduits, hangers and other elements, and fill voids with insulation. Remove debris in conflict with insulation installation.
- .5 Fit insulation tight around and behind electrical boxes, plumbing and heating pipes and ducts.
- .6 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures.
- .7 Do not install any insulation that becomes damaged during the course of installation or is no longer in a physical condition to function for the use intended and replace with new material.
- .8 Exercise care to avoid damage and soiling of faces on insulation units which will remain exposed to view. Abut joints accurately with adjoining surfaces set flush.
- .9 Attach insulation in a manner to ensure stability and eliminate sagging.
- .10 Apply a single layer of insulation to the required thickness, unless a double layer is required, to make up the total thickness shown.
- .11 Concealed layers of material must not have a vapour retarder facing.

3.3 INSTALLATION – GENERAL (CONT'D)

- .12 Offset both vertical and horizontal joints in multiple layer applications.
- .13 Do not enclose insulation until it has been inspected and approved by Consultant.

3.4 INSTALLATION OF RIGID INSULATION AT FOUNDATION PERIMETER

- .1 Provide Type 4 Extruded Polystyrene (XPS foam), standard compressive strength.
- .2 Apply construction adhesive to full bed 3 mm thick.
- .3 Install boards on foundation wall and grade beams as indicated. Install horizontally or vertically to minimize joints.
- .4 Place boards in a method to maximize contact bedding.
- .5 Stagger joints.
- .6 Butt edges and ends tight to adjacent board and to protrusions.
- .7 Extend boards over control and expansion joints, unbonded to foundation 50 mm on one side of joint.
- .8 Cut and fit insulation tight to protrusions or interruptions to the insulation plane.
- .9 Foam fill voids with foam sealant.

3.5 INSTALLATION OF RIGID INSULATION UNDER CONCRETE SLABS

- .1 Provide Type 4 Extruded Polystyrene (XPS foam), high compressive strength.
- .2 Place insulation under slabs on grade after base for slab has been compacted.
- .3 Cut and fit insulation tight to protrusions or interruptions to the insulation plane.
- .4 Prevent insulation from being displaced or damaged while placing vapour barrier and placing slab.
- .5 Foam fill voids with foam sealant.

3.6 INSTALLATION OF THERMAL BATT INSULATION

- .1 Install insulation in accordance with ASTM C1320.
- .2 Use batt widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.

3.6 INSTALLATION OF THERMAL BATT INSULATION (CONT'D)

- .3 Place batts in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
- .4 For wood or metal-framed wall cavities where cavity heights exceed 2440 mm, provide mechanical support to batts.

3.7 INSTALLATION OF EXPANDING FOAM SEALANT

- .1 Apply expanding foam to fill irregular voids and cracks and to interface with building envelope, and around doors, windows, louvers and other openings in exterior wall.
- .2 Apply expanding foam in accordance with CAN/ULC S710.2 and the manufacturer's written instructions.
- .3 Apply foam to underside of roof drains and adjacent roof deck.
- .4 Foam fill shim spaces around perimeter of openings for frames of doors, windows and curtain walls.
- .5 Foam fill annular space around pipes, electrical boxes, conduits, etc, in insulated walls and roofs.
- .6 Finished surface of foam to be free of voids and imbedded foreign objects. Maintain cured skin.
- .7 Remove masking materials and over spray from adjacent areas immediately after foam surface has hardened.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

PART 1 – GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 SECTION INCLUDES

- .1 Labour, Products, equipment and services necessary for air barrier Work in accordance with the Contract Documents, and local Codes, Statutes, By-Laws and authorities having jurisdiction.

1.2 REFERENCES

- .1 ASTM D226, Standard Specification For Asphalt-Saturated Organic Felt Used In Roofing And Waterproofing.
- .2 ASTM E283, Test Method For Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
- .3 ASTM E96, Standard Test Method for Water Transmission of Materials.

1.3 PERFORMANCE REQUIREMENTS

- .1 Provide continuity of air seal materials and assemblies in conjunction with other materials and assemblies.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Section 01 31 00: Project management and coordination procedures.
- .2 Coordination:
 - .1 Coordinate with other Work having a direct bearing on Work of this section.
 - .2 Coordinate the Work of this section with all sections referencing this section.
 - .3 Pre-installation Meetings: Convene one (1) week before starting Work of this section.
 - .4 Sequencing: Sequence Work to permit installation of materials in conjunction with related materials and seals.

1.5 **SUBMITTALS**

- .1 Submit to Section 01 33 00.
- .2 Product Data: Provide data on material characteristics, performance criteria, limitations.

PART 2 – PRODUCTS

2.1 **SHEET MATERIALS**

- .1 Peel and Stick Membrane: Self-adhering transition membrane, SBS-modified membrane, minimum 1.0 mm (40 mil) thickness. Top face of membrane to be compatible with subsequent coverings. Provide primer and lap sealant where recommended by manufacturer.
 - .1 Air permeability to ASTM E283: < 0.02 L/sec·m² (< 0.004 cfm/ft²).
 - .2 Water vapour permeability to ASTM E96: < 2.0 ng/Pa·s·m² (< 0.035 perm).

2.2 **APPLICATIONS**

- .1 **Damp Course and Flashings** (Through Wall flashings)
 - .1 SBS rubberized asphalt compound with integrally laminated Polyethylene film. Thru-wall Flashing and dampproof course, “Blueskin TWF” by “Henry Company Canada.
 - .2 Galvanized Steel: Membrane flashing support, to ASTM A653/A653M, Z275 (G90) finish; 0.60 mm (24 gauge) core steel.
- .2 **Transition (Self-Adhesive Membrane)** (tie in at window and door opening)
 - .1 SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film.
 - .1 “Blueskin SA” as manufactured by “Henry Company Canada.
 - .2 “SOPRASEAL Stick FlashPro HT” by “Soprema” or approved alternate.
- .3 **Self-Adhered Water Resistive Air Barrier Membrane**
 - .1 Self-adhered vapor permeable, water-resistive air barrier membrane consisting of an engineered film and a patented, permeable adhesive technology with split-back poly-release Film for window jambs, header, door openings, inside and outside corners and other transitions shall be pre-cut “Blueskin VP 100” by “Henry Company Canada.
 - .2 Install continuously over wall sheathing prior to application of all wall spray applied insulation.

2.2 **APPLICATIONS (CONT'D)**

.4 **Cavity Wall Air Barrier System**

- .1 Wall Sheathing Paper, Sheathing Membrane, Breather type, to conform with CAN/CSA 2.51.32.
- .2 Dupont Tyvek," Commercial Wrap" for Commercial Application, or approved alternate.

.5 **Vapour Barrier:**

- .1 6 mil. Polyethylene Sheet "Super 6" to CAN/CGSB 51.34 Type 1.

.6 **Sealing Tape:**

- .1 "Tuck Tape" sheathing tape for Air Barriers, Blue in Colour.

2.3 **ACCESSORIES**

- .1 Sealant: Acoustical sealant, as specified in Section 07 90 00 "Joint Protection".
- .2 Staples: chisel point galvanized steel 25 mm crown, 1.5 mm thick, and length to suit substrate.

PART 3 – EXECUTION

3.1 **EXAMINATION**

- .1 Verify that surfaces and conditions are ready to accept the Work of this section.

3.2 **PREPARATION**

- .1 Remove loose or foreign matter which might impair adhesion of materials.
- .2 Clean and prime substrate surfaces to receive adhesive and sealants to manufacturer's instructions.

3.3 **INSTALLATION**

- .1 Install materials in accordance with manufacturer's written instructions.
- .2 Seal joints and penetrations through barrier with sealant and fasteners prior to installation of finish material.
- .3 Sheet to be airtight and free from holes, tears and punctures.
- .4 Repair any tears, breaks, holes and other damage by taping or patching.

3.3 **INSTALLATION (CONT'D)**

- .5 Tape all joints with 3M Na 8086 contractor's sheathing tape.

3.4 **TRANSITION (PEEL AND STICK) MEMBRANE INSTALLATION**

- .1 Install in accordance with manufacturer's written instructions.
- .2 Verify compatibility of membrane top face with coverings.
- .3 Prime surfaces to receive membranes where required by manufacturer.
- .4 Extend and seal membranes through openings and wall and roof interfaces to provide continuity of vapour and air barrier envelope.

3.5 **PROTECTION OF FINISHED WORK**

- .1 Do not permit adjacent Work to damage Work of this section.

END OF SECTION

DIVISION 07 - THERMAL & MOISTURE PROTECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1	Decking	Section 05 31 00
.2	Rough Carpentry	Section 06 10 00
.3	Flashings and Sheet Metal	Section 07 60 00
.4	Joint Protection	Section 07 90 00
.5	Ventilators, ductwork and Mechanical louvers: Roof Drains, Roof Hoppers and Rainwater Leaders, Curbs, Vents:	Divisions 20 - 23

1.3 REFERENCES

- .1 ASTM C931/931M-01: Standard Specification for Exterior Gypsum Soffit Board.
- .2 ASTM D4601-98: Standard Specification for Asphalt-Coated Glass Fibre Base Sheet Used In Roofing.
- .3 CSA A123.4-M1979: Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems.
- .4 CGSB 37-GP-9Ma: Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- .5 CGSB 37-GP-52M: Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric.
- .6 ASTM D1970: Vapour Barrier Sheet, Excluding Polyethylene, for Use In Building Construction.
- .7 CAN/ULC-S704-2001: Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
- .8 CAN/ULC-S706-02: Standard for Wood Fibre Thermal Insulation for Buildings.

1.3 REFERENCES (CONT'D)

- .9 OBC – Ontario Building Code
 - .1 Must be in compliance with the Ontario Building Code Act: Sections 3.1.15 (Roof Covering) and 5.2.2.2 (Determination of Wind Load) or Part 11 (Renovations) and all support sections.
 - .2 Submit evidence of compliance by Third Party Verified Listed Assembly (such as Under Writers Laboratory or Factory Mutual).

1.4 SUBMITTALS

- .1 All submissions to be in compliance with 01 33 00.
- .2 Provide product data sheets and material Safety Data Sheets (MSDS) for all products to be used at the site and/or incorporated in the Work.
- .3 Manufacturer Certificates: Signed by roofing manufacturer verifying that installer is approved, authorized or licensed by manufacturer to install specified Products.
- .4 Installer Certificates: Signed by installer verifying that they have the specified qualifications described below.
- .5 Copy of Manufacturer's 10 Year Warranty.

1.5 TEST REPORTS

- .1 Submit test reports as specified in Section 01 33 00
- .2 Manufacturer Field Inspection Reports: manufacturer's written acceptance of roofing installation based on regular inspections.

1.6 PROJECT CONTROL

- .1 Provide all supervision, labour, equipment and materials necessary to the orderly, competent, and expeditious completion of the work. Maintain site supervision capable of acting competently on site instructions issued by the Architect.
- .2 Do not assume that the presence on site of the Owner, Architect or the Manufacturer's Representative implies acceptance of work completed to date or work in progress. Retain on site for reference as required, a copy of all specifications, addenda, drawings, written instructions and changes in the Work.
- .3 Advise Architect of start-up date and alert Architect to any intended or unintended schedule changes.

1.7 QUALITY CONTROL

- .1 During the course of the Work, bring to the attention of the Architect any condition not expected or not previously identified.
- .2 Provide the Architect, Owner and his representative with access to the site for purposes of inspecting the Work.
- .3 Pay for any extra testing or inspection whereby the Work was found deficient.
- .4 Correct, at no cost to the Owner, all deficient work in a manner acceptable to the standard of these specifications.
- .5 Provide daily inspection reports including photographs to the owner at no additional cost.

1.8 DELIVERY, STORAGE, HANDLING

- .1 Deliver materials to job site in new, dry, unopened, and clearly marked containers indicating product and manufacturer names.
- .2 Store materials with attention to moisture and temperature sensitivity of each. Refer to manufacturers' literature and instructions for guidance.
- .3 Store material so as not to overload structural deck.
- .4 Secure stored materials against damage from wind, on going work, vandalism, and theft.
- .5 Handle and apply all materials in accordance with the manufacturer's recommendations. Identify and remove from site immediately, all damaged materials.

1.9 INSPECTION AND TESTING

- .1 An independent inspection and testing agency, nominated by the Architect, will be appointed to inspect and test Roofing and Sheet Metal Work.
- .2 Arrange site meeting with Roofing Inspector three weeks prior to commencement of work on site. Obtain Inspector's instructions with reference to procedures to be followed.
- .3 Cooperate with the Inspector and afford all facilities necessary to permit full inspection of the work and testing of materials prior to their use. Act immediately on instructions given by the Inspector.
- .4 Make cut-outs for testing purposes when required and make good roofing without additional cost to the Owner.
- .5 Payment of the Inspection and testing agency is included by Owner.

1.10 ROOF SYSTEM

The Roof System includes:

- .1 **Deck type:** New and existing steel deck and precast concrete complete with cementitious topping.
- .2 **Deck BD:** 5/8" (15mm) exterior grade moisture treated gypsum board panel with square edges.
- .3 **Vapor Retarder Application:** Self adhesive vapour retarder.
- .4 **Insulation:** 2 layers of 3.1 inch (75 mm) polyisocyanurate insulation, (Total 155 mm thickness as required by R value. R35 fully mopped.
- .5 **Cricket:** Cricket between drains and at roof cubs penetrations: Crickets between drains to be formed by tapered insulation.
- .6 **Cover/ Barrier Board:** 1/2" (12mm) high-density fiberboard insulation, fully mopped.
- .7 **Ply Sheet Waterproofing:** One (1) Ply #15 Perforated Organic Felt/Asphalt and **four (4)-Ply**, Type IV glass felt.
- .8 **Cover Ply Sheet.**
- .9 **Flashings:** 2-ply SBS modified bitumen.
- .10 **Roof Traffic Pads:** Asphaltic panels and a non-slip top surface of white mineral granules.
- .11 **Roof Cant:** Fiber Cant strip;
- .12 **Gravel Aggregate:** 6 – 10 mm (3/8") clean pea stone gravel.
- .13 **Pressure Treated timbers:** to construct parapet and curb details.

1.11 SITE CONDITIONS

- .1 Protect adjacent properties from damage as a result of contract operations.
- .2 Protect the Work and the Owner's property from damage as a result of contract operations.
- .3 Confine equipment, material storage, and operations of workers to limits indicated by laws, ordinances, permits, and prior arrangements with the Owner.
- .4 Do not interrupt or hamper occupant operations without prior written approval.
- .5 Remove progressively all debris created by the execution of the Work and dispose of same at appropriate disposal sites.

1.11 SITE CONDITIONS (CONT'D)

- .6 Alert the Owner to the expected presence of odours, fumes, or dust and co-ordinate the shielding of ventilation equipment or scheduling of process to achieve acceptable abatement.
- .7 Strategically locate kettles, materials and equipment, down wind and away from operational Occupancies. Maintain a distance of min 25' - 0" from building.
- .8 Protect walls where hoisting is necessary.
- .9 Upon completion of the work, leave premises in original order and condition.

1.12 ENVIRONMENTAL REQUIREMENTS

- .1 Do not install roofing during weather that might adversely affect the performance of the system.
- .2 Do not install roofing over surfaces that are wet, icy, dirty or otherwise unacceptable to the system being installed.
- .3 Secure the Work in a safe and watertight fashion before the onset of inclement weather and at the end of each day's work.

1.13 WARRANTY

- .1 Submit extended warranties in accordance with the General Conditions of the Contract.
- .2 Installer's Extended Warranty: standard 2 year warranty, commencing from the date of Substantial Performance of the Work.
- .3 Manufacturer's Extended Warranty: a written guarantee that the manufacturer will replace, at no cost to the Owner, any portion of the roofing system down to the existing roof deck for a period of 10 years, commencing from the date of Substantial Performance of the Work.

1.14 SAMPLES

- .1 Submit samples of fabricated sheet metal work showing method of forming joints, seams, expansion joints, stiffeners and anchors.
- .2 Submit sample of insulation.
- .3 Make submissions as per Section 01 33 00.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 THERMAL BARRIER OVER STEEL DECKS

- .1 Gypsum board shall be minimum 15.9 mm (5/8") thick, 1200 mm x 2400 mm (4' x 8') sheets: conforming to CSA A82.27-M standard; conforming to UL 723 standards (ASTM E84-05).
- .2 Specified product 5/8" GYPLAP® Brand Treated Core Gypsum Sheathing as manufactured by CGC Inc.; non combustible Type X core, water-resistant core, water-repellent paper. Alternate requires approval by the Consultant.

.2 ADHESIVE

- .1 Adhesive for installing gypsum board to steel deck shall be a one part solvent free, moisture curing, asphaltic urethane, 'FAS-n-FREE' Adhesive by Tremco Ltd. Adhesive to be manufactured under a UL quality assurance inspection program and conform to ASTM D 412-92, ASTM D 412-98A, ASTM D 816-82, ASTM D 1876-95 and ASTM D 816-82 (1993).

.3 SELF-ADHESIVE VAPOUR BARRIER

- .1 Self-adhesive Vapour Barrier onto primed area of roof deck or sheathing.
- .2 Product:
 - .1 Self-adhesive JM Vapour Barrier SA by Johns Manville
 - .2 SopraVapo'r by Soprema or
 - .3 Approved Alternate (requires approval by the Consultant)

.4 ADHESIVE TAPE

- .1 Polyethylene-coated cloth tape (Duct Tape), conforming to UL 723 specifications for flame spread and smoke development. (ASTM E 84-05).
- .2 Duck® Tape – Professional Grade or better; 3M™ Duct Tape - #3939 or better. Alternate as approved by the Consultant.

2.1 MATERIALS (CONT'D)

.5 RIGID THERMAL INSULATION

- .1 Polyisocyanurate closed cell foam rigid roof insulation board, pentane blown, HCFC free, Type 2, Class 3 minimum, manufactured with HC blowing agent bonded to glass fibre reinforced facers on top and bottom surfaces during the manufacturing process, meeting the requirements of CAN/ULC-S126, CAN/ULC-S107, conforming to CAN/ULC-S704 and CAN/ULC-S770 for Long Term Thermal Resistance (LTTR) R-values, approved and listed by Factory Mutual Global for Class 1-60 windstorm classification & meeting FM4450 approval requirements for Class 1 Fire as a component in roof deck construction.
- .2 Board size 1220 x 1220mm (48" x 48") and thickness to be 3.1" (75 mm). Provide required thickness as shown on drawings.
 - .1 E'NRG'Y 3 polyisocyanurate insulation by 'Johns Manville',
 - .2 Approved Alternate (requires approval by the Consultant)

.6 TAPERED INSULATION

- .1 Description: Polyisocyanurate insulation that meets CAN/ULC S-704-03, 1200mm x 1200mm (4'-0" x 4'-0") minimum size, square edge, top and bottom face finished with inorganic/organic. Tapered starting from ½" (12.5mm) at the drain with a 1% slope.
- .2 Refer to roof plan for locations of tapered insulation.

.7 INSULATION COVER BOARD

- .1 High density asphalt impregnated fiberboard roof insulation, compressed, rigid wood fiberboard, coated with asphalt, with square edges. Insulation to meet or exceed CAN/CSA A247-M, Type 1.
- .2 Board size to be 1219 x 1219mm (48" x 48). Insulation thickness to be 13mm (1/2").
- .3 Product:
 - .1 Duro-Fibre Fiberboard by Exeltherm, or
 - .2 " ½" RetroPlus Roof Board" by "Johns Manville".

.8 ROOFING MEMBRANE PLIES

- .1 **Glass-Fiber Base Ply Sheet:** Type IV consisting of a non-woven glass fiber mat impregnated with asphalt, to meet or exceed ASTM D-2178, CAN/CSA A123.17, Type IV.

2.1 **MATERIALS (CONT'D)**

.2 Product:

- .1 GlasPly IV as supplied by Johns Manville, or
- .2 Approved Alternate (requires approval by the Consultant)

.9 **ASPHALT BITUMEN FOR INSULATION ADHESION**

- .1 **Asphalt Bitumen for insulation adhesion:** Mopping grade roofing asphalt conforming to CSA A123.4-M1979, Type II.

.2 Product:

- .1 Type III Roofing Asphalt as supplied by 'Johns Manville', or
- .2 Approved Alternate (requires approval by the Consultant)

.10 **ASPHALT BITUMEN FOR BUILT-UP MEMBRANE APPLICATION**

- .1 **Asphalt Bitumen for Built-up Membrane Application:** Type III Mopping grade roofing asphalt conforming to CSA A123.4-M and ASTM D312, Type III.

- .2 Approved Product: Type III Roofing Asphalt as supplied by or Johns Manville, or

- .3 Approved Alternate (requires approval by the Consultant)

.11 **OTHER MATERIALS**

- .1 **Asphalt primer:** to CGSB 37-GP 9Ma. Approved Product: Asphalt Primer supplied by Johns Manville, or approved alternate (requires approval by the Consultant)

- .2 **Felt Bandage Plies and Base Ply:** No.15 asphalt saturated perforated organic roofing felt, conforming to CSA A123.3M and ASTM D226 Type I. Approved Product: No. 15 Asphalt Felt – Perforated as supplied by Johns Manville or approved alternate, as approved by the Consultant.

- .3 **Base Sheet Membrane Flashing:** 180 gm/m2 non-woven polyester reinforced sheet, saturated and coated with a blend of SBS rubber and high quality asphalt, conforming to CAN/CGSB 37-GP-56M latest draft, and ASTM D6164, Class P, Type II, Grade II. Sanded top surface and sanded underside.

.4 **Product:**

- .1 "DynaBase PR" as manufactured by "Johns Manville",
- .2 'Elastophene 180 SS' as manufactured "Soprema",
- .3 'Bakor NP 180 SS', as manufactured by "Henry Company-Bakor"

2.1 MATERIALS (CONT'D)

- .4 Approved Alternate (requires approval by the Consultant)
- .12 **Cap Sheet Membrane Flashing:** 180 gm/m² non-woven polyester mat, 4.0mm minimum thickness, saturated and coated with a blend of SBS rubber and high quality asphalt. To CGSB 37-GP-56M latest draft and ASTM D6164, Class G, Type II, Grade II. Top surface covered with ceramic granules and sanded underside.
 - .1 Product:
 - .1 'DynaLastic 250' as manufactured by "Johns Manville",
 - .2 "Sopralene 250 Granules" by "Soprema",
 - .3 'Bakor NP 250 GM' as manufactured by "Henry Company-Bakor",
 - .4 Approved Alternate (requires approval by the Consultant)
- .13 **Self-Adhering Waterproofing Membrane Flashing:** 1.1mm thick self-adhering waterproofing membrane composed of polymer modified asphalt reinforced with a glass fiber mat, with an embossed polyethylene surface and a removable release film on the underside. To meet or exceed the requirements of ASTM D1970.
 - .1 Product:
 - .1 "Ice and WaterGard" by Johns Manville,
 - .2 "MEL-PRIME" by W.R. Meadows,
 - .3 Blueskin SA by "Henry Company-Bakor",
 - .4 Approved Alternate (requires approval by the Consultant)
- .14 **Plastic Cement:** Asphaltic based non-shrink grout material conforming to CGSB 37-GP-5M.
 - .1 Product:
 - .1 As supplied by Johns Manville or
 - .2 'Bakor Polybitume' by 'Henry Company - Bakor'
 - .3 'Soprema Sopramastic' by 'Soprema'
 - .4 Approved Alternate (requires approval by the Consultant)
- .15 **Gravel Aggregate:** Clean, washed pea gravel 6mm to 13mm (¼" to ½") nominal size. Not more than 10% of the aggregate may be out of size. Free of fines and splinters. Gravel to meet or exceed ASTM D1863-83.

2.1 MATERIALS (CONT'D)

- .16 **Miscellaneous Hardware:** Nails, screws, bolts and other fastenings of the same metal or finish as the sheet metal being used. Fasteners for securing insulation to metal deck where Factory Mutual approved is required - Riv-Nails supplied by Marathon Equipment and Supply Limited., or other approved manufacturer except where fibrous glass insulation is used in which case fasteners shall be Lexsuco Clips manufactured by Lexsuco Canada Limited. The size of fastenings shall suit the applicable conditions.
- .17 **Roof Traffic Pad:** 3' - 0" x 3' - 0" x 1/2" roof traffic pad, multi-ply, asphaltic panels consisting of reinforced carrier sheet, fortified asphaltic core and non-slip top surface of white mineral granular that reflects heat and helps assure safe footing.; 'ROOF - TRED' by "W.R. MEADOWS'
- .18 **Roof Cant:** Fibreboard Cant to CAN/ULC S706.1 Type I, Grade 2, Asphalt impregnated fibreboard, 75 x 75 mm size cant set @ 45° angle.
- .19 **ROOFING ACCESSORIES**
 - .1 Pitch Pockets/Pans: Unless otherwise designated by Consultant, all pitch pocket type penetration flashings are strictly prohibited.
 - .2 Roofing accessories to be manufactured from spun aluminum or copper as required, and complete with removable caps where applicable. All units are to have foamed in place closed cell urethane foam insulation sprayed into unit at plant under controlled conditions. Flanges to be primed with rubberized asphalt compatible primer.
 - .3 Acceptable accessory and flashing products:
 - .1 Gasline Penetrations: MEF-AE1-12 to suit diameter by Thaler, supplied by Mechanical,
 - .2 Flexible Conduit Penetration: MEF-2A by Thaler Inc., supplied by Mechanical,
 - .3 Cable or Wire Penetration: WOP-212 by Lexcor, supplied by Mechanical,
 - .4 B-Vent Flashing: MEF-4A by Thaler Metal Ind. Inc., supplied by Mechanical,
 - .5 Plumbing Stack Flashing: SJ-20 with "B" Cap by Thaler Inc., supplied by Mechanical,
 - .4 Pourable Sealer: Elastomeric pourable sealer as supplied by Siplast approved equal from Soprema.
 - .5 Sealing Compound: Rubberized Sealing Compound to CAN/CGSB-37.29, rubber asphalt type Sopramastic by Soprema or approved equal from Siplast.
 - .6 Spray Urethane foam: One or two component polyurethane spray foam insulation. Use low pressure spray foam insulation at force sensitive areas.

2.1 MATERIALS (CONT'D)

- .7 Sheet Metal Flashings and Trim: As per Section 07620 and fabricated from Perspectra Series or Weather-X, 24 gauge pre-painted steel. Hook strips to be 2 gauges heavier than flashings.
- .8 Sealants: As recommended by membrane Manufacturer for application substrate. Colour of sealants to match component applied against.
- .9 Overflow Scupper: 24ga galvanized metal 150 high X 400 wide, depth to suit wall / parapet construction with new 25mm drip edge.

2.2 APPROVED MANUFACTURER

- .1 Built-up roofing materials shall be manufactured by:
 - .1 Building Products Limited
 - .2 Canadian Johns-Manville Company Limited
 - .3 Georgian Pacific Canada L.P.
 - .4 Tremco
 - .5 Or approved alternate

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verify that surface and site conditions are ready to receive work. Verify that deck is dry, supported and secured.

3.2 PREPARATION

- 1. Verify acceptability of deck, projections, curbs, parapets, walls, blocking, nailers and other constructions as these pertain to the roofing work and its expected performance.
- 2. Ensure all Mechanical and Electrical equipment supports and penetrations are in place.
- 3. Correct any deficiencies in these constructions or advise Inspector and General Contractor of conditions believed to be beyond the Scope of Work.
- 4. Clean deck surface of dirt, rust, oil and other deleterious materials that would impair application of roof.

3.3 INSTALLATION - GENERAL

- .1 Apply foam adhesive in the lower deck flutes at the perimeter and deck openings, so as to close off any airways, into the lower flutes from the building's interior. Apply the adhesive in a continual bead along deck flutes ensuring the gypsum board is fastened at a minimum of three (3) flutes, both on the outside and centre of each board. Approved products must be manufactured under a UL quality assurance program.
- .2 Self Adhering Membrane:
 - .1 Apply primer and install on to substrate, overlapping side and end laps in conformance with manufacturer's written recommendations. Begin work at bottom of slopes, unroll and align on substrate. Ensure all edges are supported.
 - .2 Remove release sheet and adhere membrane, working in sections to avoid wrinkles in membrane.
 - .3 Seal membrane at insulation perimeters and around penetrations to ensure sealed connection with base sheet at upstands.
 - .4 Leave no voids at block, penetrations, walls or parapets.
- .3 Install 48" x 48" panels of 3.1-inch (75 mm) thick polyisocyanurate insulation over completed vapour barrier, fully adhered with hot Type III asphalt. Fully butt each insulation board to surrounding boards. Minimize level variance between boards at joints.
- .4 Install a second layer of 48" x 48" panels of 3.1-inch (75 mm) thick polyisocyanurate insulation over the first, fully adhered with hot Type III asphalt. Ensure the second layer of insulation is horizontally and vertically off-set from the bottom layer a minimum of 6-inches (150 mm). Leave no voids at blocking, penetrations, walls or parapets.
- .5 Install ½" thick hi-density asphalt impregnated fiberboard insulation over completed prime insulation layer, set in a full mopping of hot Type III asphalt. Stagger insulation panels and offset fiberboard layer from polyisocyanurate layer.
- .6 Install two (2)-foot wide band of tapered fiberboard (1/2-inch to zero) along the perimeter. Alternately, ½-inch fiberboard may be used and chamfered by hand, ensuring a back-slope from the perimeter.
- .7 Install one (1)-ply No.15 organic felt and Type III asphalt membrane, covered by **four (4)-ply Type IV fiberglass** felts and Type III hot asphalt built-up roof membrane over completed insulation layers. Keep service traffic on the felts to a minimum, until surface temperature has cooled adequately (less than 180°F / 80°C).
- .8 Prime wood and other substrates to receive bituminous membrane flashings. Install 2-ply asphalt/felt bandage before installing the new 2-ply SBS modified bitumen flashings, mopped in place.

3.3 INSTALLATION - GENERAL

- .9 Install thru-wall scuppers at designated locations indicated on Roof Plan for overflow capacity. Flash the primed flanges with two plies of Type IV glass felt and hot asphalt. Scupper to be set at 50 mm (2") below perimeter roof edge elevation. Ensure uninterrupted flow to drain.
- .10 Install drains into a full bead of plastic cement, reinforcing the flange with 2-ply of Type IV glass felt and hot asphalt. Reinforce drain sumps a minimum of 6' x 6' using 180-mil SBS base sheet fully mopped with Type III hot asphalt.
- .11 Install galvanized b-vent flashings around conduit and pipe penetrations. Flash to roof membrane with 2-ply of Type IV glass felt and hot asphalt. Fill voids with expanding foam insulation. Install storm collars and seal with high quality single component polyurethane caulking.
- .12 Install spun aluminum stack jackets around plumbing vent penetrations, ensuring a minimum height of 12-inches, above the finished roof membrane. Flash to roof membrane with two plies of Type IV glass felt and hot asphalt. Fill voids with expanding foam insulation. Caulk cap to pipe.
- .13 Apply hot Type III asphalt flood-coat at a rate of 60 – 75-lbs/100 sq. ft. (2.8 – 3.4 Kg/ m²) and embed clean 3/8" (10 mm) nominal size pea gravel, clean and dry, over flood-coat, while still hot, at a rate of 500 – 550-lbs/ 100 sq. ft. . (22 – 25 Kg/ m²). Double pour corners for a radius of 6-feet (1.8-metres). Rake out gravel to provide a neat even surface
- .14 Install Quick Block supports (or approved alternate) for gas and/or conduit supports, a minimum of 10-feet (3-meters) between supports and/or at each change in transition. Treat gas lines with two coats of yellow rust paint, as per National Gas Code requirements.
- .15 Install galvanized pre painted, sheet metal flashings at all perimeters, sleepers and curbs in accordance with the metal flashing section of the C.R.C.A. manual.
- .16 Clean roof surface and grounds of all traces of roof work and replace any damaged landscaping to the Owner's satisfaction.

3.3 ROOF TRAFFIC PADS

- .1 Place traffic pads with a 25mm gap between sheets to allow for drainage. Install prior to graveling directly into the final flood coat while still hot. Embed by rolling Place around 2 service sides of all roof top equipment. Refer to roof plans for layout. Avoid gas lines on roof.

3.4 TEMPORARY WATERSTOP/TIE-INS

- .1 Remove embedded gravel, dirt and debris from top ply of felt along termination for a distance of 450 mm (18 inches).

3.4 TEMPORARY WATERSTOP/TIE-INS (CONT'D)

- .2 Extend roofing system at least 300 mm (12 inches) onto prepared area installing insulation fillers as required.
- .3 Seal edge with 150 mm (6 inch) wide reinforcing membrane embedded between alternate courses of temporary waterstop adhesive.
- .4 At beginning of next day's work, remove temporary connection by cutting felts evenly along edge of existing roof system and remove insulation fillers.
- .5 Temporary waterstop adhesive application rate:
 - 1. Cold 3.3 l/m2 (12 ft2/gallon)

3.5 PERMANENT WATERSTOP/TIE-INS

- .1 Remove embedded gravel, dirt and debris from top ply of felt along termination for a distance of 450 mm (18 inches).
- .2 Install 450 mm (18 inch) wide ply sheet(s) from exposed deck to the existing roofing with a continuous application of permanent waterstop adhesive.
- .3 Extend roofing system beyond permanent waterstop ply sheet and at least 300 mm (12 inches) onto prepared area of adjacent roofing.
- .4 Seal leading edge of new membrane with 300 mm (12 inch) wide reinforcing membrane embedded between alternate courses of flashing adhesive.
- .5 Permanent waterstop adhesive application rate:
 - .1 Cold 3.3 l/m2 (12 ft2/gallon)

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

PART 1 – GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 WORK INCLUDED

- .1 This section includes the supply & installation of all pre-finished metal flashings required to complete the contract.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- .1 Rough Carpentry Section 06 10 00
- .2 Steel Siding Section 07 46 19
- .3 Built Up Bituminous Roofing (4 Ply) Section 07 51 00
- .4 Joint Protection Section 07 90 00

1.3 REFERENCES

- .1 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels - Series: Components, Coatings and Finishes.
- .2 ANSI H35.1M, Alloy and Temper Designation Systems for Aluminum (Metric).
- .3 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .4 ASTM B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .5 ASTM C920, Specification for Elastomeric Joint Sealants.

1.4 QUALITY CONTROL

- .1 An independent testing and inspection company shall be appointed to ensure quality control. The cost of this work shall be paid by the Owner.
- .2 All work shall be carried out by experienced persons and shall comply with approved trade practices and C.P.C.A. requirements.

1.5 **SUBMISSIONS**

- .1 Product data: Submit duplicate copies of manufacturer's Product data for peel and stick vapour retarder indicating:
 - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
 - .2 Product transportation, storage, handling and installation requirements.
- .2 Shop drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 indicating:
 - .1 Details of gutter, scuppers, copings, and miscellaneous flashings.
 - .2 Proposed method of shaping, forming, and jointing.
 - .3 Fastening and application of flashing and sheet metal Work.
- .3 Samples:
 - .1 Submit samples of pre-coated finish and sheet metal joints for approval of colours.
 - .2 **Submit formed profile c/w seams, locking and joining details.**

PART 2 - PRODUCTS

2.1 **MATERIALS**

- .1 Prefinished Sheet Steel: To ASTM A755/A755M, Grade 230; Gauge 20, uncoated metal thickness, galvanized; with monochromatic paint coating.
- .2 Unfinished Sheet Steel: To ASTM A653/A653M ASTM A792/A792M, Grade 230; Gauge 22, uncoated metal thickness, galvanized.
- .3 Sheet Aluminum: To ASTM B209M, 3003-H14 alloy; Gauge 22, uncoated metal thickness, with monochromatic paint coating.
- .4 Nails: To ASTM F1667, Type I (NL); common wire, corrosion-resistant type, material compatible with adjacent surfaces; sufficient length to penetrate a minimum of 25 mm into substrate.
- .5 Cleats: Gauge 20, thick sheet steel; minimum 38 mm wide and interlocked with metal flashing.
- .6 Starter Strips: Gauge 20, thick sheet steel; continuous lengths.

2.1 MATERIALS (CONT'D)

- .7 Back-up Plates: Gauge 20, mm thick prefinished sheet steel; minimum 300 mm wide where adjacent lengths of cap flashing meet.
- .8 Screws, Bolts, and Expansion Shields: Non-ferrous metal compatible with adjacent surfaces. Exposed fastenings; same materials as metal surfaces through which they penetrate. Use cadmium plated screws with round heads suitable for soldering for galvanized work.
- .9 Solder: To ASTM B32, 50 percent block tin, 50 percent pig lead.
- .10 Flux: Commercial hydrochloric acid cut with zinc, or 10-20 percent solution of orthophosphoric acid in water, for use with galvanized work.
- .11 Membrane Underlayment: To ASTM D1970/D1970M; 1.0 mm thick, self-sealing, self-adhering, heat-resistant rubberized asphalt membrane, eg. Ice & Water Shield HT by Grace.
- .12 Primer: Water-based primer, eg. Perm-A-Barrier WB Primer by Grace.
- .13 Joint Sealant: Flashing sealant as specified in Section 07 90 00.
- .14 Flashing Paint: Quick drying asphaltic base paint; eg. Primer 910-02 by Henry Company Canada.

2.2 MANUFACTURED UNITS

- .1 General: All Manufactured units are to sized in height to accommodate required clearances above the finished roof, which may be an inverted roof system, 2ply mod bit system, ballasted EPDM or 4 ply BUR. Accommodate differing insulation depths due to varying R values, sloped insulation and crickets.
- .2 Pre-Insulated Stack Jack Flashings: 1.6 mm thick seamless, spun aluminum; insulated sleeve; diameters to suit applications; complete with premoulded urethane insulation on inner side of sleeve and 102 mm wide bituminous painted deck flange; with removable 1.29 mm thick aluminum hood and perforated collar; eg. Model SJ-31 Vandal Proof Stack Jack Flashing by Thaler Roofing Specialties Products Inc.
- .3 Flashing for Flexible Conduit: Goose neck shaped aluminum flashing pipe sleeve; diameters to suit application; complete with 102 mm wide bituminous painted deck flange; Model MEF-2A/2A1/2A2 Liquid Tight Flexible Conduit Flashing by Thaler Roofing Specialties Products Inc.
- .4 Flashing for 'B' Vent Pipes with Split Collars: 1.6 mm thick seamless spun aluminum sleeve flashing with sloping sides to allow for air movement, diameters to suit; compete with 50 mm wide perforated aluminum vent holes at top of sleeve for air circulation, 102 mm wide bituminous painted deck flange, and a 1.6 mm thick split aluminum collar eg. Model MEF-4A 'B' Vent Flashings by Thaler Roofing Specialties Products Inc.

2.2 MANUFACTURED UNITS (CONT'D)

- .5 Flashing for Roof Anchors: Stainless steel flashing sleeve with integral flange and EPDM triple-pressure seal; non-insulated type; diameters to suit; complete with bituminous painted deck flange, and vandal-proof stainless steel cap: eg. Model SJ-34-S New Standard Stack Jack Flashings by Thaler Roofing Specialties Products Inc.
- .6 Mastic Pans: Gauge 18 thick, prefabricated, spun aluminum mastic pans having seamless construction, minimum 200 mm high with 100 mm wide bituminous paint primed flange.
- .7 Through Wall Scuppers: Gauge 16 thick prefinished aluminum sheet, factory welded construction; prefabricated to custom sizes as indicated on Drawings; eg. Through Wall Scupper by W.P. Hickman Company.

PART 3 - EXECUTION

3.1 INSPECTION

- .1 Inspect the work of preceding trades and report any discrepancies. Commencement of work shall be taken as acceptance of conditions.

3.2 INSTALLATION / APPLICATION / ERECTION

- .1 Break and install the flashing metal. Discard any pre-finished material if surface is damaged or abraded by forming.
- .2 Break and provide metal profiles for flashings to suit secure installation in reglets
- .3 All sheet metal work shall be carried out in a uniform manner and shall be of the highest standard consistent with good trade practice.
- .4 All seams shall be locked unless otherwise noted, and corners shall be dovetailed and mitred, with the metal fitting closely and neatly.
- .5 No raw edges will be permitted, and all exposed edges shall be doubled back at least 13 mm (1/2").
- .6 Provide all ribs and stiffeners required.
- .7 Secure flashings with concealed fasteners where possible and use lead plugs, lead washers and expansion shields where fastening to concrete or masonry.
- .8 Locked seams shall be 25 mm (1") high or wide. Slip seams shall be 75 mm (3") wide, not soldered. Horizontal laps shall be 25 mm (1") wide.
- .9 Expansion joints, capped type permitting free movement without leaks shall be provided at 4500 mm (15') maximum on all continuous sheet metal flashings.

3.2 INSTALLATION / APPLICATION / ERECTION (CONT'D)

- .10 All continuous flashings at copings shall be dead level and true to line. No irregular or badly fitted metal work will be accepted.
- .11 Caulk all flashing joints and terminations and all other locations required to ensure the watertight integrity of the entire roofing and waterproofing systems.

END OF SECTION

DIVISION 07 - THERMAL & MOISTURE PROTECTION

PART 1 – GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 SUMMARY OF WORK

- .1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to install firestopping and smoke seal materials, as indicated on the drawings, as specified herein and as required for a complete project.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- .1 Rough Carpentry. Section 06 10 00
- .2 Gypsum Board Assemblies. Section 09 21 16
- .3 Fire stopping and smoke seals within mechanical assemblies (i.e inside ducts, dampers) and electrical assemblies (i.e. inside cable trays) Division 21 to 28 respectively.

1.3 REFERENCE STANDARDS

- .1 Underwriters' Laboratories Canada (ULC):
 - .1 CAN/ULC-S115-11, Standard Method of Fire Tests of Firestop Systems.

1.4 REGULATORY REQUIREMENTS

- .1 The work of this Section shall conform to the requirements of the applicable building code, to ULC design requirements for each assembly and to all other applicable codes and regulations, to the satisfaction of the authorities having jurisdiction.

1.5 SUBMITTALS

- .1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.
- .2 Test Reports: Submit test reports certifying that materials have been tested and approved as part of a firestop system by Underwriters Laboratories of Canada (ULC) or Underwriters Laboratories (UL) or Factory Mutual (FM).

1.5 **SUBMITTALS (CONT'D)**

.3 Product Data:

- .1 Include installation instructions for each material.
- .2 Include manufacturer's material safety data sheets for the safe handling of the specified materials and products, in accordance with Workplace Hazardous Materials Information Service (WHMIS) requirements.

16 **DELIVERY, STORAGE & HANDLING**

- .1 Deliver products in original unopened packaging with legible manufacturer's identification.
- .2 Store materials in strict accordance with the manufacturer's recommendations, off the ground, under cover and away from moisture.

1.7 **ENVIRONMENTAL REQUIREMENTS**

- .1 Maintain minimum ambient temperature above 15°C. for 24 hours before, during, and 72 hours after application.
- .2 Maintain relative humidity within manufacturer's recommended limits to allow proper drying.
- .3 Maintain adequate ventilation in areas of application during and for 24 hours after completion.

PART 2- PRODUCTS

2.1 **MANUFACTURERS**

.1 Acceptable Manufacturers:

- .1 3M Company Canada
- .2 AD Fire Protection
- .3 Hilti Canada
- .4 Tremco

2.2 **MATERIALS**

- .1 Use products by only one manufacturer throughout Work of this Section.

2.2 MATERIALS (CONT'D)

- .2 Fire stopping and smoke seal systems: in accordance with CAN/ULC-S115, asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN/ULC-S115 and not to exceed opening sizes for which they are intended.
- .3 Service penetration assemblies: certified by ULC in accordance with CAN/ULC-S115 and listed in ULC Guide No. 40 U19.
- .4 Service penetration firestop components: certified by ULC in accordance with CAN/ULC-S115 and listed in ULC Guide No. 40 U19.13 and ULC Guide No. 40 U19.15 under the Label Service of ULC.
- .5 Firestop Sealant: non-slump, one-part silicone type; capable of stopping travel of heat and ignition of combustible materials.
- .6 Firestop Insulation: Mineral/ceramic fibre type to ULC Guide No. 40 U18.7.
- .7 Firestop Mortar: Self-levelling, self-curing, cementitious matrix. Density as recommended by manufacturer to suit application and fire resistance rating.
- .8 Fire- resistance rating of installed fire stopping assembly shall not be less than the fire-resistance rating of the surrounding floor and wall assembly.
- .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 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.
- .13 Sealants for vertical joints: non-sagging.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Examine areas and conditions under which work is to be performed and notify the Consultant in writing of conditions detrimental to the proper and timely completion of the work.

3.1 EXAMINATION (CONT'D)

- .2 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.
- .3 Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.
- .4 Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Contractor shall be fully responsible for satisfactory work as specified herein.

3.2 PREPARATION

- .1 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .2 Ensure all surfaces are dry and clean before beginning application of firestop materials.
- .3 Clean bonding surfaces of dust, rust, oil, grease and other foreign materials that may impair application and adhesion.
- .4 Do not apply firestop materials to surfaces that have been painted or treated with other coatings, unless tests have been performed to ensure compatibility of materials. Remove paint and other coatings as required.
- .5 Prepare and prime surfaces as recommended by firestop material manufacturer.
- .6 Mask adjacent surfaces as required to protect from damage due to application of firestop materials.
- .7 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.

3.3 INSTALLATION

- .1 Install fire stopping and smoke seals at service penetrations through fire resistive construction and at all locations where the continuity of fire resistive construction is interrupted, as indicated on the drawings, as specified herein and as required for a complete project.
- .2 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.
- .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.

3.3 INSTALLATION

- .4 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .5 Tool or trowel exposed surfaces to a neat finish. Remove excess compound promptly as work progresses and upon completion.

3.4 REVIEW

- 1 Notify the Consultant when ready for review and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

3.5 SCHEDULE

- .1 Unless specified otherwise apply the following:
 - .1 Firestop mortar where surrounding surfaces are concrete or masonry.
 - .2 Sealant and insulation where surrounding surfaces are gypsum board.
- .2 Apply firestop materials to the following locations:
 - .1 Around pipes, conduits, ductwork and other mechanical or electrical components that penetrate through fire rated walls, ceilings and other assemblies.
 - .2 Along tops of fire rated walls and assemblies that extend to underside of floor and roof construction. Use firestop sealant and insulation, apply sealant to both sides of walls.
 - .3 Around supporting steel structures that penetrate fire rated walls and assemblies. Use firestop sealant and insulation, apply sealant to both sides of walls.
 - .4 Along tops of fire rated walls that extend to gypsum board assemblies applied around supporting steel structures. Use firestop sealant and insulation, apply sealant to both sides of walls.
 - .5 Around pipes conduits, ductwork and other mechanical or electrical components that penetrate through fire rated floor assemblies.

3.6 CLEANING

- .1 As work progresses, remove excess materials and clean adjacent surfaces immediately after application.
- .2 Remove temporary dams after initial set of fire stopping and smoke seal materials.
- .3 Upon completion of the work of this Section:

3.6 CLEANING (CONT'D)

- .1 Remove masking and temporary protection from adjacent surfaces.
- .2 Remove stains on adjacent surfaces and make good damage to adjacent surfaces caused by the work of this Section.
- .3 Remove from the premises all surplus material, dirt and debris caused by the work of this Section and leave the installation clean.
- .4 Remove temporary dams after initial set of fire stopping and smoke seals.

END OF SECTION

DIVISION 07 - THERMAL & MOISTURE PROTECTION

PART 1 - GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 INTENT

- .1 To provide all sealing not specified under other Sections but required to make building tightly sealed from exterior and interior to withstand the action of the elements and to complete the building vapour barrier.

1.2 REFERENCES

- .1 American Society for Testing and materials (ASTM)
 - .1 ASTM C661- Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of Durometer.
 - .2 ASTM C679- Standard Test Method for Tack-Free Time of Elastomeric Sealants.
 - .3 ASTM C719- Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
 - .4 ASTM C920, Specification for Elastomeric Joint Sealants.
 - .5 ASTM C1135 Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants.
 - .6 ASTM C1248 - Standard Test Method for Staining Porous Substrate by Joint Sealants.
 - .7 ASTM C1330 - Cylindrical Sealant backing for Use with Cold Liquid Applied Sealants.
 - .8 ASTM D412 - Standard Test Method for Vulcanized Rubber and thermoplastic Rubbers and thermoplastic Elastomers – tension.
 - .9 ASTM D 2202 - Standard Test Method for Slump of Sealants.
 - .10 ASTM E119 9UL 263) – Standard Test Method for Fire Tests of Building Construction and Materials.

1.3 SUBMITTALS

- .1 Provide in accordance with Section 01 33 00 "Submittal Procedures":
 - .1 Product data for silicon sealant, primer, joint backing, and other accessories. Include material and safety data sheets (MSDSs) and certifications showing compliance with specified standards.
 - .2 Shop drawings detailing sealant joints and indicating joint dimensions, materials, sealant profile, and size limitations.
 - .3 Manufacturer's colour chart for selection by Architect, or custom colour where noted.
 - .4 Manufacturer's instructions for installation and field quality control testing.
 - .5 Copy of warranties specified in paragraph 1.8 for review by Architect.

1.4 PROJECT CONDITIONS

- .1 Do not install silicone sealant during inclement or windy weather when such conditions are expected. Allow wet surfaces to dry.
- .2 Do not install sealant when temperature is less than 5 degrees Fahrenheit (3° C) below dew point. Silicones approved for -29C.

1.5 QUALIFICATIONS

- .1 Perform the Work by recognized established sealant contractor having a minimum of five (5) years experience and skilled mechanics thoroughly trained and competent in the use of sealant equipment and specified materials.

1.6 FIELD QUALITY CONTROL

- .1 Arrange with sealant manufacturer for a technical representative to visit the work prior to beginning sealant installation to discuss procedures to be adopted, analyze site conditions, inspect surfaces to be sealed and make recommendations should adverse conditions exist.
- .2 The following items should be discussed:
 - .1 Weather conditions under which work to be done.
 - .2 Anticipated frequency and extent of joint movement.
 - .3 Joint Design.

1.6 FIELD QUALITY CONTROL (CONT'D)

- .4 Suitability of durometer hardness and other properties of material in relation to Items 1 and 3 above.
- .5 Primers to be used.

1.7 WARRANTY

- .1 Provide under provision of Section 01 78 00 – Closeout Submittals.
 - .1 Installer's (5) five years workmanship warranty.
 - .2 Manufacturer's 20- year material warranty for properly installed silicon sealant.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- .1 Dow Corning Corporation. P.O. Box 994, Midland, MI 486886- 0994; (800) 248-2481; www.dowcorning.com/construction.
- .2 Approved Alternate: Tremco Commercial Sealants.
- .3 Requests to use equivalent products of other manufacturers shall be submitted in accordance with Section 00 21 00, article 2.6 Specified Manufacturer.

2.2 SEALANT

- .1 Type: One-component, ultra-low modulus, neutral-cure silicone rubber sealant; Dow Corning® 790 Silicone Building Sealant, as manufactured by Dow Corning Corporation.
- .2 Compliance: Sealant shall meet or exceed requirements of these standards:
 - .1 ASTM C920, Type S, Grade NS, Class 100/50, Use T, NT, G, M, A, and O.
 - .2 GSA CID A-A-272A.
 - .3 GSA CID A-A-1556.
- .3 Colour: Refer to Manufacturer's standard colours. Custom colour as noted by Architect on Drawings.
- .4 Shelf life: 12 months.
- .5 Application temperature range: Minus 20 to plus 120 degrees F. (Minus 29 to plus 50 degrees C.)

2.2 SEALANT (CONT'D)

- .6 Tack-free time: 1 hour at 50 percent relative humidity, tested in accordance with ASTM C679.
- .7 Working time: 10 to 20 minutes.
- .8 Curing time at 3/8-inch (10-mm) depth: 7 to 14 days at 77 degrees F. (25 degrees C) and 50 percent relative humidity.
- .9 Flow, sag, or slump in [3 inches] [76 mm] wide joint: None, when tested in accordance with ASTM D2202.
- .10 Volatile organic compound (VOC) content: 43 grams/liter maximum.
- .11 Cured sealant properties after 21 days at [77 degrees F] [25 degrees C] and 50 percent relative humidity:
 - .1 Joint movement capability: Plus, 100 percent extension and 50 percent compression, tested in accordance with ASTM C719.
 - .2 Hardness: 15-durometer hardness, Shore A, tested in accordance with ASTM C661.
 - .3 Properties tested in accordance with ASTM D412.
 - .4 Minimum peel strength: [15 ppi] [2.67 kg/cm], tested in accordance with ASTM C794.
 - .5 Properties tested in accordance with ASTM C1135.
 - .6 Weathering after 22,400 hours, tested in accordance with ASTM C1135 using QUV Weatherometer.
 - .7 Staining after 14 days at 50 percent compression, 158 degrees F (70 degrees C): None on concrete, granite, limestone, and brick, when tested in accordance with ASTM C1248.
- .12 Low Dirt Pick-up, Non-Staining, Medium-modulus, one-component, pre-pigmented, neutral-cure elastomeric silicone sealant; Compliance: Sealant shall meet or exceed requirements of ASTM C920, Type S, Grade NS, Class 50, Use NT, G, M, A, and O. *Dow Corning® 756 SMS Silicone Building Sealant*, as manufactured by Dow Corning Corporation.
- .13 **Exterior Concrete Sidewalk Sealants:** One part silicone – Dow Corning Parking Structure SL or Dow Corning Contractors Concrete Sealant or approved Alternate.
- .14 **Interior Building Sealants:** Acrylic emulsion compound fast setting, low odour and paintable equal to professional grade acrylic latex caulk by Tremco. Note: Use sealants from Item 7 where mildew resistance is required.

2.2 **SEALANT (CONT'D)**

- .15 Joint Backing: Round, closed cell foamed polyethylene; closed cell urethane foam; rubber; rubber tubing; non-migrating plasticised vinyl having Shore 'A' hardness of 20 and tensile strength of 20 - 30 psi, type of which is compatible with sealant type, and as recommended by manufacturer.
- .16 Joint Filler - white non-absorbent closed cell foam polyethylene rope "Ethafoam", Dow Chemical of Canada Limited or approved alternative.
- .17 **Exterior Building Sealants:** One-part silicone Construction sealants series 790, 795, and 888 SL and mildew resistant where specified, by Dow Corning to Canadian Standard CAN2-19-13 or ASTM C920.

2.3 **ACCESSORIES**

- .1 Substrate primer: As recommended for project conditions and provided by silicone sealant manufacturer.
- .2 Sealant backing: Provide backing complying with ASTM C1330 (Type B non-absorbent, bi-cellular material with surface skin.) (Type O open-cell polyurethane.), as recommended by sealant manufacturer.
 - 1. Size: Greater than joint opening by 25 percent minimum.
- .3 Bond breaker tape: Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement.
 - 1. Type: Polyethylene or other plastic tape recommended by sealant manufacturer.
- .4 Masking tape: Non-staining, non-absorbent type compatible with silicone sealant and adjacent surfaces.

PART 3 - EXECUTION

3.1 **GENERAL**

- .1 Prepare substrates and apply silicone sealant in accordance with manufacturer's instructions.
- .2 Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDSs).
- .3 Do not use silicone sealant for:
 - .1 Below-grade applications.
 - .2 Surfaces to be immersed in water for prolonged time.

3.1 **GENERAL (CONT'D)**

- .3 Brass and copper surfaces.
- .4 Materials bleeding oils, plasticizers, and solvents.
- .5 Structural glazing and adhesive.
- .6 Surfaces to be painted.
- .7 Surfaces in direct contact with food.
- .8 Medical and pharmaceutical applications.
- .4 Do not apply in totally confined spaces without ventilation for curing.

3.2 **PREPARATION**

- .1 Inspect new substrates to receive silicon sealant. Ensure surfaces are clean, dry, and free of frost, dust, dirt, grease, oil, curing compounds, form release agents, laitance, efflorescence, mildew, and previous films and coatings.
- .2 Clean substrates to receive silicone sealant.
 - .1 Porous surfaces: Abrasive-clean followed by blasting with oil-free compressed air.
 - .2 Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193.
 - .3 High-pressure water cleaning: Exercise care that water does not enter through failed joints.
- .3 Aluminum and other nonporous surfaces except glass require use of primer. Concrete, stone, masonry, and other nonporous surfaces typically do not require primer. Comply with Manufacturer's primer recommendations.
- .4 Adhesion test: Apply silicone sealant to small area and perform adhesion test in accordance with ASTM C1193, Method A, to determine if primer is required to achieve adequate adhesion. If necessary, apply primer at rate and in accordance with manufacturer's instructions. Allow primer to dry.
- .5 Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.
- .6 Clean joints and spaces which are to be sealed and ensure that they are dry and free of dust, loose mortar, oil, grease and other foreign materials, which may damage or destroy bond of sealant. Thoroughly clean sides of joints and spaces to establish good bond between sealant and adjacent materials.

3.3 PREPARATION (CONT'D)

- .7 Clean ferrous metals free of all rust, mill scale and foreign materials by wire brush, grinding or sandblasting.
- .8 Do not install materials when ambient air temperature is less than 5⁰ C, when recesses are wet or damp, or to manufacturer's recommendations.
- .9 Do not install materials on Building Exterior if windy conditions exist and present possibility of wind-borne dust adhering to sealant materials.
- .10 Wipe all metal surfaces to be sealed, except painted metal, with cellulose sponges or clean rags soaked with ethyl alcohol, xylol and wipe dry with clean cloth. Clean painted metal with solutions or compounds which will not injure paint, and which are compatible with the primer and sealant.
- .11 Where joints are 12 mm or deeper, insert backing material in continuous 30% compression with set-back from finished face of adjoining materials equal to required depth of caulking (width/depth ratio) as recommended by manufacturer of sealant, but not less than a distance which leaves minimum 6 mm thickness of sealant.
- .12 On horizontal traffic surfaces, support joint filler against vertical movement which might result from loads, including foot traffic.
- .13 Prime surfaces of joints with primer to which adhesion is required, unless otherwise instructed by manufacturer.
- .14 Seal joints in surfaces to be painted before surfaces are painted. Where surfaces to be sealed are primed in shop before sealing, check to make sure prime paint and sealant are compatible. If they are incompatible inform Architect and change sealant to compatible type approved by Architect.
- .15 Prime sides of joints with primer where required. In any case, prime all metal surfaces to be sealed, including pre-coated metals.

3.3 APPLICATION

- .1 Sealant backing: Install without gaps, twisting, stretching, or puncturing backing material. Use gage to ensure uniform depth to achieve correct profile, coverage, and performance.
- .2 Bond breaker: Install on backside of joint where backing is not feasible.
- .3 Sealant:
 - .1 Use sealant-dispensing equipment to push sealant bead into opening. Fill joint opening to full and proper configuration. Apply in continuous operation.

3.3 APPLICATION (CONT'D)

- .2 Before skinning or curing begins, tool sealant with metal spatula. Provide concave, smooth, uniform, sealant finish. Eliminate air pockets and ensure complete contact on both sides of joint opening. Tool joints in one continuous stroke.
- .4 Complete horizontal joints prior to vertical joints. Lap vertical sealant over horizontal joints.
- .5 Cleaning: Remove masking tape and excess sealant.
- .6 Apply joint filler to proper, uniform depth to give sealant bead of optimum size and shape for joint condition and expected movement condition.
- .7 Apply sealant using guns fitted with suitable nozzles and equipment approved by sealant manufacturer. Apply in strict accordance with manufacturer's directions and recommendations.
- .8 Apply sealants under pressure in such manner as to assure good adhesion to sides and to completely fill all voids in the joint.
- .9 Form surfaces of sealant smooth, concave, free from ridges, wrinkles, sags, air pockets and embedded foreign matter.
- .10 Apply fire stop sealants in strict conformance with manufactures directions to ensure compliance with U.L.C. rating of fire stop systems.
- .11 Upon completion, remove masking tape and sealant smears and droppings from adjacent and other surfaces.
- .12 Tool all joints smooth, minimum thickness of sealant over backing (1/4").
- .13 Ensure all wood shims and projections are cut back to ensure a full continuous bead of sealant.
- .14 All Exterior Precast Panel Joints are a three stage joint system, Exterior, Mid Panel & Interior. (except horizontal bearing joints). Mid joint is to vent/drain through to exterior. Horizontal bearing joint is a dual stage joint system within a 2" raked mortar joint. Refer to blow up details on drawings.
- .15 Around Curtain Wall System and components note: **Seal inside and outside of frame**, not at exterior location of pressure cap plate. A third line of sealant may be required behind the pressure plate to prevent water entry to the cavity wall if the curtain wall framing sits on a knee wall. Refer to Details on Drawings.

3.4 LOCATIONS (AS APPLICABLE)

- .1 Seal the junction of the following **Interior Materials:**
 - .1 Joint between full height masonry partitions and structure above.

3.4

LOCATIONS (AS APPLICABLE)

- .2 Hollow Metal Frames with adjacent materials - both sides.
- .3 Provide silicone sealant at splash juncture of vanity and wall and at juncture of mirror and wall and at juncture of other counters and walls.
- .4 All chair rails and wall tiles
- .5 At base of toilets and floor.
- .6 At perimeter of shower and tub enclosure and wall finish.
- .7 Concrete floor slab control joints.
- .8 Around all window frames.
- .9 All wall/floor penetrations fire stopped where required.
- .10 Joints between pre-cast concrete slabs and perimeter.
- .2 Seal the junction of the following **Exterior Materials**:
 - .1 Exterior pressed steel frames with adjacent materials.
 - .2 Seal all junctures between structural members and adjacent materials where space is less than 1" (25 mm).
 - .3 Sidewalk control joints.
 - .4 Masonry control joints.
 - .5 All doors, windows, patio door frames and sills.
 - .6 Under thresholds.
 - .7 All wall penetrations.
 - .8 Saw cut control joints in exterior concrete slabs.
 - .9 At junction of concrete slabs/walks to building foundation.
 - .10 Roof flashings, penetrations and joints.
 - .11 Where wood (including capped framing) and brick meet.
 - .12 Where wood (including capped framing) and concrete meet.

3.4 LOCATIONS (AS APPLICABLE)

- .13 Where aluminum and brick meet.
- .14 Recessed mortar joint in stone sills (one joint when window over 1.2 m wide).
- .15 To underside of balcony slab where concrete meets masonry wall.
- .16 Perimeter of all mechanical vents and louvers, electrical outlets, fixtures, hose bibs and exterior wall penetrations (including all PTAC sleeves).
- .17 All Exterior Precast Panel Joints. **Note:** Application is a three stage joint system, Exterior, Mid Panel & Interior and a two stage joint system for grouted panel bearing joints.
- .18 Around Curtain Wall System and components note: **Seal inside and outside of frame,** not at exterior location of pressure cap plate. A third line of sealant may be required behind the pressure plate to prevent water entry to the cavity wall if the curtain wall framing sits on a knee wall. Refer to Details on Drawings.
- .3 Provide sealant elsewhere as noted in drawings as caulking and/or sealant and not specifically noted to be provided by other Sections.

3.5 TESTING AND CLEANUP

- .1 Test all exterior joints with hose in presence of Architect if so requested. Clean adjacent and affected surfaces.

END OF SECTION

DIVISION 08 - OPENINGS

PART 1 – GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.
- .2 Conform to Canadian Manufacturing Specifications for Steel Doors and Frames published by Canadian Steel Door and Frame Manufacturers Association, except as specified therein.

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Installation of Hollow Metal Doors	Section 06 10 00
.2	Door Hardware	Section 08 71 00
.3	Power Door Operators	Section 08 71 13
.4	Gypsum Board Assemblies	Section 09 21 16
.5	Painting	Section 09 91 00
.6	Door Louvers	Section 23 37 00

1.2 SUBMITTALS

- .1 Submit Shop Drawings in accordance with Section 01 33 00 "Submittals Procedures".
- .2 Clearly indicate each type of door, frame, material, gauge, mortises, reinforcements and anchors.
- .3 Do not fabricate until Shop Drawings have been reviewed by the Consultant.

1.3 MEASUREMENTS

- .1 Where work is to be built into existing openings, measurements shall be taken on site at the actual location of the work. Fabricate the work to job measurements.

1.4 WARRANTY

- .1 Provide a warranty in accordance with the General Conditions, but for a period of five (5) years for all doors and ten (10) years for all frames.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

- .1 Baron Metal, Steel Doors and Frames ASSA ABLOY
- .2 Allsteel Fabrication
- .3 Fleming Steel Products ASA ABLOY
- .4 Daybar

2.2 MATERIALS

- .1 Steel Sheet - Commercial grade hot rolled steel to ASTM-A526-71 with "wiped coated" zinc finish to ASTM-A525-71, 0.25 oz. per sq.ft.
- .2 Reinforcing Steel - To CAN/CSA-G40.21 Type 33W hot dip galvanized with minimum zinc coating G90 to CAN/CSA G.164.
- .3 Insulation - Loose fibreglass, minimum density 1.5 lbs./cu.ft. (24 kg per cu. m.).
- .4 Door Bumpers – Resilient Rubber.
- .5 Thermal break – rigid neoprene or polyvinyl chloride (PVC) extrusion.
- .6 Primer - Zinc rich to CGSB-1-GP.
- .7 Core Material - Resin impregnated, rot resistant kraft honeycomb for interior doors, rigid polyurethane board stock foam insulation for exterior doors to CGSB-41-GP-14a. Fire rated doors to conform to U.L.C. requirements.
- .8 Fabricate doors, frames and all internal reinforcements of hot dip galvanized steel to ASTN -97, minimum coating designation ZF 75 (A25).

2.3 METAL THICKNESS

		Gauge	Inches	mm
.1	Building Doors & Frames			
.1	Frames and Framing	16	.060	1.5
.2	Doors			
	▪ Surface Sheets	18	.048	1.2
	▪ Top and Bottom end channels	18	.048	1.2

2.3 METAL THICKNESS (CONT'D)

.3 Accessories

▪ Lock and strike reinforcement	16	.060	1.5
▪ Hinge reinforcement	10	.135	3.4
▪ Flush bolt reinforcement	16	.060	1.5
▪ Reinforcement for surface applied hardware	12	.105	2.7
▪ Mortar guard boxes	22	.030	0.76
▪ Jamb floor anchors	16	.060	1.5
▪ Jamb spreaders	18	.048	1.2

.4 Anchors

▪ "T" - Strap Type	16	.060	1.5
▪ "L" - Strap Type	18	.048	1.2
▪ Stud Type	18	.048	1.2

5 Glazing Stops	20	.040	1.0

PART 3 - EXECUTION

3.1 FABRICATION OF WELDED FRAMES

- .1 Construct framing in accordance with details and reviewed shop drawings.
- .2 Fabricate fire rated frames to CAN/ULC – S105.
- .3 Provide fire labels to CSDMA Canadian Fire Labelling Guide for Commercial Steel Door & Frame Products.
- .4 Mortise, reinforce, drill and tap frames and reinforcement to receive hardware using templates provided.
- .5 Install 3 bumpers on strike jamb of frame for each single door and two bumpers at head of double door frames.
- .6 Protect strike, hinge and overhead concealed door closer reinforcement completely by guard boxes welded to frame.
- .7 Weld in 2 channel spreaders per frame, to ensure proper frame alignment.
- .8 Where frames terminate at finished floor, provide floor plates for anchorage to structural slab.
- .9 Cut mitre accurately and weld continuously on inside of frame profile.

3.1 FABRICATION OF WELDED FRAMES (CONT'D)

- .10 Grind welded corners to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.

NOTE: Neatly mitred and reinforced corners may be accepted subject to Architect's approval of sample prior to installation.
- .11 Fill surface depressions and butted joints with metallic paste and sand to a uniform smooth finish.
- .12 Provide 3 T strap adjustable jamb anchors per jamb for frames up to 2133 mm (7'-0") high to be installed in masonry walls. Provide additional anchor for each 600 mm (24") over 2133 mm (7'-0") high.
- .13 Provide steel anchors of suitable design for frames to be installed in stud partitions and for frames adjacent to pre-cast concrete. Securely wedge or weld anchor inside each jamb as follows:
 - .1 Frames up to 2133 mm (7'-0") high - 4 anchors per jamb.
- .14 Exterior Hollow Metal Framers for Door (Thermal Broken Frame) to be 1.5 mm (16 ga) heavy galvanized, secured together by an extruded poly vinyl chloride thermal break without the use of any fastening devices by S.W Fleming or approved equal. Thermal frame shall be complete with anchors and accessories as specified for frames and framing members. Exterior hollow metal frames to be packed with injected foam insulation. Fabricate frames with sufficient rigidity to effectively receive the forced entry. Provide minimum 2.7 mm (12 ga) continuous hinge reinforcement.
- .15 Insulate frames for exterior doors with spray foam insulation for full height and depth.
- .16 Prepare interior door frames for single stud door silencers, as follows:
 - a. Single Door Frames: Three on strike jamb.
 - b. Double Egress Door Frames: Two on head for each door leaf.
- .17 All exterior window and door frames are to be thermally broken.
- .18 Guard box to accept 25 mm (1") throw or deadbolt.
- .19 Fabricate frames and screens to accommodate scheduled glazing. Secure glazing stops to frames with counter sunk oval head sheet metal screws.
- .20 Prepare frames for scheduled door hardware and building security system devices. Blank, mortise, reinforce, drill and tap components.

3.1 FABRICATION OF WELDED FRAMES (CONT'D)

- .21 Thermally-Broken Frames:
 - .1 Provide wall and floor anchors suitable for installation, purpose made not to permit thermal conductivity.
 - .2 Do not fix sections together with screws, grommets or other thermally conductive fastening device.
 - .3 Provide full frame width drip caps.
 - .4 Conform to accepted Shop Drawings.

3.2 FABRICATION OF DOORS

- .1 Construct doors in accordance with details and approved shop drawings, fully welded construction with no visible seams or joints on faces or vertical edges.
- .2 Assemble doors with full sheets laminated under pressure to honeycomb core.
- .3 Reinforce and frame openings required for glazing. Provide glazing stops with countersunk flat head screws.
- .4 Interior Hollow Metal Doors: D20 Series. Each face formed from one sheet 0.9mm (20 ga) steel. Lock seam and seal longitudinal joints. Core to be honeycomb laminated under pressure to face sheets and to fill core space completely. Close top and bottom with 1.2 mm (18 ga) channels, spot welded.
- .5 Exterior Hollow Metal Doors: D18 Series. Each face formed from one sheet 1.2 mm (18 ga) steel. Lock seam and seal longitudinal joints, tack weld lockseams 15 mm o.c.. fill flush, grind smooth. Core to be polyisocynurate RSI 2.1 (R12) board, laminated under pressure to face sheets and to fill core space completely. Provide minimum 2.7 mm (12 ga) continuous hinge reinforcement. Close top and bottom with 1.2 mm (18 ga) channels, spot welded. Close top of out swing doors with sealed watertight cap.
- .6 Mortise, reinforce, tap and drill doors and reinforcement to receive hardware using templates provided by hardware supplier. Refer to Finishing Hardware Schedule for mounting heights.
- .7 Provide sound deadening and thermal insulation material to fill all voids in doors.
- .8 Assemble components by means of spot or arc welding.
- .9 Fit exterior doors and all interior stair doors with flush steel channel caps at top of door and seal against moisture penetration.
- .10 Provide condensate weep holes at bottom of exterior doors.

3.3 SHOP PAINTING

- .1 Wipe coated steel frame: touch up areas where wipe coating has been removed using zinc rich paint.
- .2 Wipe coated steel doors: touch up areas where wipe coating has been removed, using zinc rich paint, and apply one full coat of rust inhibitive primer to CGSB-1-GP-105M.
- .3 Uncoated Steel - Apply one rust inhibitive primer conforming to GCSB-1-GP-105M.

3.4 INSTALLATION

- .1 Supply hollow metal frames to masonry or drywall Trades in good time for building in so that building program is not delayed.
- .2 Co-operate with all Trades as required for the execution of the complete work.
- .3 Cut openings for mechanical supplied louvres, center in bottom of door and instal. Refer to door schedule.

3.5 FIRE DOORS AND FRAMES

- .1 Supply fire doors and frames assemblies to meet fire resistance time rating called for and carry the appropriate U.L.C. Label.
- .2 Fire doors and frames shall be installed as tested and as approved by a nationally recognized agency having a factory inspection service.
- .3 Locate label on frame on jamb midway between top hinge and head of door frame. Provide labels on door edge, hinge side.
- .4 Provide label on hanging edge of door near frame.

END OF SECTION

DIVISION 08 - OPENINGS

PART 1 – GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 RELATED WORK SPECIFIED ELSEWHERE

- .1 Power Door Operator Section 08 71 13
- .2 Glazing Section 08 80 00

1.2 SUBMITTALS

- .1 Submit Shop Drawings to requirements of Section 01 33 00 "Submittals Procedures".
- .2 Clearly indicate materials being supplied, connections, attachments, anchorage, reinforcing, elevations, dimensions and location of openings. List trade names of sealants to be used.
- .3 Submit for review, 300 mm (12") long pieces of frame material for each shape and finish specified before delivery of materials to Site.

1.3 MAINTENANCE DATA

- .1 Include in "Maintenance Manual", as required under Section 01 78 00 - Project Record Documents", maintenance instructions pertaining to doors, door closers and hardware adjustment.

1.4 PRODUCT HANDLING

- .1 Protect finishes with coating that will not mar, nor deface finish or removal. Leave protected coating intact until all risk of damage is past, or immediately prior to final cleaning.

1.5 WARRANTY

- .1 Submit extended warranties in accordance with General Conditions of the Contract.
- .2 Manufacturer's Extended Warranty: For a period of 10 years, covering the following:
 - .1 Finish: Replace any unit whose finish shows defects such as but not limited to delamination, blistering or excessive fading.
 - .2 Performance: Replace or repair any unit with air leakage, water leakage, defects or malfunctions under normal usage.

1.5 **WARRANTY**

- .3 Installer's Extended Warranty: For a period of two years, protecting against leakage, operational defects and malfunction under normal usage.

PART 2 - PRODUCTS

2.1 **DESCRIPTION**

- .1 Exterior Entrance doors and Frames: Thermally-broken tubular aluminum extrusions, clear anodized finish, site glazed with sealed insulating glass units, complete with sills, thresholds, flashings, specified door hardware, anchorage and attachment devices.
- .2 Interior Vestibule Doors and Frames: Tubular aluminum extrusions, clear anodized finish, site glazed with single pane tempered safety glass, complete with specified door hardware, anchorages and attachment devices.

2.2 **PERFORMANCE CRITERIA**

- .1 Exterior Entrance Doors and Frames: Meeting the following performance criteria:
- .1 Air Leakage (ASTM E283):
- .1 Frames: $\leq 0.2 \text{ L/s}\cdot\text{m}^2 @ 75 \text{ Pa}$.
- .2 Doors: $\leq 1.5 \text{ L/s}\cdot\text{m} @ 75 \text{ Pa}$.
- .2 Water Penetration:
- .1 Static Pressure (ASTM E331): No penetrations @ 103 kPa.
- .2 Dynamic Pressure (AAMA 501.1): No penetration @ 103 kPa.
- .3 Wind Load Resistance (ASTM E330/E330M): Limit mullion deflection to L/175 when measured at a cross pressure of 275 kPa.
- .4 Temperature Index (CSA A440.2): $1 \geq 53$.
- .5 Assembly Thermal Transmittance (ANSI/NFRC 100):
- .1 Frames: $U \leq 2.15 \text{ W/m}^2 \text{ degrees C}$.
- .2 Doors: $U \leq 3.94 \text{ W/m}^2 \text{ degrees C}$.
- .6 Assembly Solar Heat Gain Coefficient (ANSI/NFRC 200): $\text{SHGC} \leq 0.40$.

2.3 **DESIGN CRITERIA**

- .1 Design assemblies to AAMA SFM-1.

2.3 DESIGN CRITERIA (CONT'D)

- .2 Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall in accordance with applicable regulatory requirements.
- .3 Design assemblies to drain water entering joints, condensation occurring in glazing channels and migrating moisture occurring within system to exterior.

2.4 MATERIALS

- .1 Extruded Aluminum: To ASTM B221M, 6063-T54 alloy.
- .2 Sheet Aluminum: To ASTM B209/B209M, 5005-H32 alloy.
- .3 Sheet Steel: To ASTM A653/A653M, Commercial Steel (CS) Types A, B and C; cold-rolled sheet steel, galvanized.
- .4 Steel Sections: Shaped to suit mullion sections.
- .5 Fasteners: Stainless steel, 300 Series.
- .6 Thermal Break: Rigid polyamide.
- .7 Finishes – Colour: Refer to schedule for finish and colour.
- .8 Tempered Laminated Safety Glass – Refer to Specification Section 08 80 00.
- .9 Insulated Glass – Refer to Specification Section 08 80 00.
- .10 Inner Frame Insulation – Rigid, expanded polystyrene conforming to CGSB 41-GP-16a.
- .11 Accessories – Prefabricated shims, spacers, expansion bolts and screws, non-ferrous, clips, angles and fastening devices, galvanized steel. CAN./CSA G40.21, Grade 300W, or Type 316 stainless steel. Include clip angles required to support framed assembly to steel structure.

2.5 COMPONENTS

- .1 Exterior Entrance Frames: 2.5 mm thick extruded aluminum sections, 50 x 115 mm size profiles; thermally broken with interior tubular section insulated from exterior; applied glazing stops; drainage holes; internal weep drainage system; eg. Trifab VG 45 UT by Kawneer (thermally broken).
- .2 Interior Vestibule Frames: 2.5 mm thick extruded aluminum sections, 45 x 115 mm size profiles; flush glazing stops; drainage holes; internal weep drainage system; eg. Trifab VG 450 by Kawneer.

2.5 COMPONENTS (CONT'D)

- .3 Exterior Entrance Doors: 2.5 mm thick extruded aluminum sections, 57.2 mm deep profile; 127 mm wide top rail and vertical stiles, 260 mm wide bottom rail; thermally broken with interior tubular section insulated from exterior; rectangular glazing stops; eg. 560 insulclad by Kawneer.
- .4 Interior Vestibule Doors: 2.5 mm thick extruded aluminum sections, 44.5 mm deep profile; 127 mm wide top rail and vertical stiles, 260 mm wide bottom rail; bevelled glazing stops; eg. 500 Wide Stile by Kawneer.
- .5 Compensating Receptors: 51 x 140 mm size, extruded aluminum sections, head and jamb types.
- .6 Metal Flashing: 2.5 mm thick extruded aluminum, finish to match mullion sections where exposed.
- .7 Metal Sills: 2.5 mm thick extruded aluminum, finish to match mullion sections, complete with pre-formed clip anchor; sufficient depth to extend beyond wall face, full length pieces to minimize joints; and with integral drip edge profile and end dams.
- .8 Connection Flange: 3.0 mm thick extruded aluminum angle, size as indicated on Drawings.

2.6 HARDWARE

- .1 Door Handles: 25 mm OD aluminum tubing, ladder style, with anodized finish to match door stiles.
- .2 Hinges: 114.3 x 101.6 mm size, commercial quality steel, radius corner standard template butt style, 5 knuckle construction with two stainless steel ball bearings and non-rising removable pin; powder coated finish on exterior applications; 1-1/2 pairs per door leaf.
- .3 Push Bars: 25 mm OD aluminum tubing with anodized finish to match door stiles, double bend, 57 mm from face of door.
- .4 Door Arm Holder: Cast aluminum, surface-mounted; pivoting rubber-tipped holder-arm; anodized finish to match door stile.
- .5 Weatherstripping and Sill Sweep Strips: Manufacturer's standard type to suit application, finish to match door and frame.
- .6 Thresholds: Extruded aluminum, low profile design, width to suit application, mill finish.
- .7 All other finish hardware is specified in Section 08 71 00. This may include panic hardware, closers, powered door operators, locks and cylinders.

2.7 FABRICATION

- .1 Fabricate entrance and storefront assemblies to AAMA SFM-1.
- .2 Fabricate Products with minimum clearances and shim spacing around assembly perimeter.

2.7 FABRICATION (CONT'D)

- .3 Make joints flush, hairline and weatherproof.
- .4 Arrange fasteners and attachments to conceal from view.
- .5 Prepare components with internal reinforcement for door hardware and door operator hinge hardware.
- .6 Provide connection flange to full perimeter of frame, attached from interior side of frame with concealed fasteners cut flush with face of flange. Pre-drill fastener holes into flange to accommodate immediate on-site installation.
- .7 Prepare doors and frames for required door hardware and building security system devices. Blank, mortise, reinforce, drill and tap components as required.

2.8 FINISHES

- .1 Anodized Coating on Aluminum – Exterior Applications: To AAMA 611, AA-M10C21A44. Class I Anodic Colour Coating, No. 29 – Black.
- .2 Anodized Coating on Aluminum – Interior Applications: To AAMA 611, AA-M10C21A31, Class II Clear Anodic Oxide coating, No. 17 – Clear.
- .3 Powder Coated Finish on Steel Hardware – Exterior Applications: To AAMA 2605; electrostatically spray-applied polymer powder, factory-applied to 0.075 mm dry film thickness; graffiti – and abrasion-resistant with 4H Hardness rating to ASTM D3363; Black colour.
- .4 Steel Door Hardware – Interior Applications: To ANSI/BHMA 652 – Satin Chromium Plated.
- .5 Galvanized Coating on Steel Components: To ASTM A123/A123M, Coating Grade 55; hot dipped zinc alloy coating.
- .6 Galvanized Coating on Steel Hardware: To ASTM A153/A123M, Classes B3, C or D; hot dipped zinc alloy coating.
- .7 Galvanized Coating on Sheet Steel: To ASTM A653/A653M, Coating Designation Z275; hot dipped zinc alloy coating.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install Products to CSA A440.4.
- .2 Permanently fasten frames to building structure.
- .3 Align assembly plumb and level, free of warp to twist.

3.1 INSTALLATION (CONT'D)

- .4 After alignment, positively lock anchorage devices to prevent movement other than that designed to accommodate deflection and thermal expansion and contraction.
- .5 Erection tolerances for operable elements - consistent with smooth operations and weatherproof performance.
- .6 Perform necessary drilling of concrete, masonry and steel necessary to install the work of this Section. Site located fixings to the masonry and concrete shall be stainless steel lag screws and lead shields. Bear cost of repair satisfactory to the Architect of concrete chipped by drilling for fixing operations.
- .7 Apply a heavy brush-coat of asphaltic paint to aluminum or galvanized steel placed in or in contact with concrete, masonry mortar or dissimilar metals.
- .8 Fasten connection flange to wall assembly and connect transition sheet membrane to flange.
- .9 Seal connection flange to transition sheet membranes with continuous bead of joint sealant prior to application of air sealant foam.
- .10 Fill gaps between exterior frames and adjacent wall assemblies with air sealant foam, as specified in Section 07 27 36.
- .11 Make the completed installation free from objectionable noise, rattles, wind whistles, cracks or noise due to movement.
- .12 Cut back all shims prior to caulking to ensure full sealant bead.
- .13 Install hardware using templates provided.
- .14 Install glass as specified in Section 08 80 00.
- .15 Coordinate with other trades for the installation of Key-Fobs & Electric Strike, activation devices.

3.2 GLAZING

- .1 Perform glazing associated with work of this Section. Leave labels on glass until it has been set and inspected and approved. Leave glass whole and without cracks, scratches and other defects and with settings in perfect condition at completion, to the approval of the Architect. Remove rejected, broken or damaged glass due to defective materials or improper setting and replace with perfect materials. Replace units producing distorted vision.

3.3 ADJUSTMENTS

- .1 Upon completion of the project and just prior to the handing over of the building to the Owner or at a time as directed, inspect, test and adjust units for damage and correct same immediately.

3.4 FLAT ALUMINUM METAL TRIM AND JAMB EXTENSIONS

- .1 Ensure all metal is fully adhered to plywood backing without buckles oil canning or gaps.
- .2 Where metal is returned behind frames or into horizontal and vertical joints ensure minimum 25 mm (1") long return into sealed joint. Refer to detail on Drawings.
- .3 Do not cut out around shims.
- .4 Exposed fasteners will not be accepted.
- .5 Take all necessary precautions to protect surfaces during construction until acceptance after substantial performance.
- .6 All dimensions are to be confirmed on site and sheet materials to ensure full coverage and tight joints due to site conditions.
- .7 Refer to elevations and details for areas of application.

3.5 CLEANING

- .1 Wash down exposed surfaces with solution of mild domestic detergent in warm water. Apply with soft clean cloths.
- .2 Special care shall be taken to remove dirt from corners.
- .3 Wipe surfaces dry.

END OF SECTION

DIVISION 08 - OPENINGS

PART 1 - GENERAL

1.1 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.2 SECTION INCLUDES

- .1 Individual aluminum window units in exterior wall.

1.3 WORK INCLUDED

- .1 Supply and installation of all factory assembled and pre-finished extruded aluminum windows complete with glass, glazing, weather-stripping, all required anchorages, attachments, shims and perimeter weather seals, as specified.
- .2 Caulking of all aluminum work as per specification within.

1.4 RELATED WORK SPECIFIED ELSEWHERE

.1	Rough Carpentry - Rough Bulks & Blocking	Section 06 10 00
.2	Building Insulation	Section 07 21 00
.3	Air & Vapour Barrier	Section 07 27 00
.4	Joint Protection	Section 07 90 00
.5	Glazing types for windows	Section 08 80 00

1.5 REFERENCES

- .1 AA- Designation System for Aluminum Finishes, 1980.
- .2 CAN/CGSB-1.40-97, Anticorrosive Structural Steel Alkyd Primer.
- .3 CAN/CSA-A440-M90, Windows.
- .4 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.6 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittals Procedures.

1.6 SAMPLES (CONT'D)

- .2 Submit one 300mm by 300mm corner sample of each type of window. Include frame, sash, sill, glazing and weatherproofing method, insect screens, surface finish and hardware.
- .3 Submit duplicate 75mm by 150mm samples of each finish selected on actual metal.

1.7 SHOP DRAWINGS

- .1 Submit Shop Drawings in accordance with Section 01 33 00 - Submittals Procedures.
- .2 Upon notification, the Contractor shall have ten (10) days to supply to the Consultant six (6) sets of shop drawings of window superimposed over existing window opening clearly indicating materials and details for head, jamb and sill profiles of components and elevations of units, structural or reinforcing members, anchorage details, description of related components, exposed finishes, product types, quantities and proposed elevations. Indicate materials and details in scale full size for head, jamb and sill, profiles of components, interior and exterior trim junction between combination units elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes fasteners, and caulking. Indicate location of manufacturer's nameplates.
- .3 The Contractor shall indicate to the Owner in writing the name of the project supervisor and verification of his experience of no less than five (5) previous institutional retrofit/replacement projects.
- .4 Contractor to verify dimensions of existing openings prior to shop drawings and window fabrication.
- .5 Shop Drawings shall bear the seal and signature of a qualified Professional Engineer licensed to practice in the Province of Ontario.

1.8 TEST REPORTS

- .1 Submit test design reports affirming that the proposed installation conforms to CAN/CSA-A440.
- .2 Submit confirmation entire window assembly meets requirements of OBC, SB-10 as per glazing section.

1.9 QUALITY ASSURANCE

- .1 Qualifications of the work of this section shall be designed, fabricated and installed by a company (s) with a minimum of five (5) years proven first class experience in this type of work, having adequate skilled personnel to complete the work in an efficient and very best workmanlike manner.

1.9 QUALITY ASSURANCE (CONT'D)

- .2 Source Quality Control - Windows supplied under this specification shall have been tested by an independent testing agency indicating compliance with the present, up-to-date, performance requirements of CAN/CSA A440-M98 at the appropriate performance levels to meet climatic requirements and/or otherwise as specified herein. This qualification shall be a prerequisite for tendering.

1.10 MAINTENANCE DATA

- .1 Provide operation and maintenance data for windows for incorporation into the manual specified in Section 01 33 00 - Submittals Procedures.

1.11 WARRANTY

- .1 Provide a warranty in accordance with the General Conditions, but for a period of ten (10) years.
- .2 The warranty shall cover the fabrication and installation of units specified in this section. Defects shall include but not be limited to: leakage, loosening of the unit in whole or in part, deformation of framing, breakage of glass from stresses developed within the unit, and fading or discoloration of factory-applied finishes.
- .3 The warranty shall cover the replacement of any window unit whose finish shows defects such as delamination, blisters, or excessive fading.

PART 2 – PRODUCTS

2.1 DESCRIPTION

- .1 Aluminum Windows: Extruded aluminum frame, shop fabricated, site-glazed with sealed insulation clear glass units; complete with metal sills, metal flashings, connection flanges, anchorage and attachment devices.
- .2 Configuration: As indicated on Window Schedule.

2.2 PERFORMANCE CRITERIA

- .1 Aluminum Windows: To AAMA/WDMA/CSA 101/1.S. 2/A440 and CSA A440S1, and meeting the following performance criteria:
 - .1 Air Tightness:
 - .1 Fixed Units: Class Fixed
 - .2 Water Tightness: Class B4
 - .3 Wind Load Resistance: Class C5.

2.2 **PERFORMANCE CRITERIA (CONT'D)**

- .4 Forced Entry: Class F2.
- .5 Temperature Index (CAS A440.2): $1 \geq 58$.
- .6 Assembly Thermal Transmittance (ANSI/NFRC 100):
 - .1 Fixed Units: $U \leq 2.15 \text{ W/m}^2 \text{ degrees C}$.
- .7 Assembly Solar Heat Gain Coefficient (ANSI/NRFC 200): $\text{SHGC} \leq 0.40$.

2.3 **DESIGN CRITERIA**

- .1 Design assembly to drain water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system to the exterior.
- .2 Design intermediate members within units to be either solid or tubular design to suit wind loading, weight carrying requirements and wind deflection limitations.
- .3 Design coupling mullions to permit unit module construction and provide for thermal expansion. When required, reinforce wind-load carrying members with steel reinforcement suitably treated to prevent electrolytic action.

2.4 **COMPONENTS**

- .1 Frames and Mullions: 2.5 mm thick extruded aluminum; profile depth as indicated on Drawings; thermally broken with interior tubular section insulated from exterior; applied glazing stops; drainage holes; internal weep drainage system.
- .2 Metal Sills: 2.5 mm thick extruded aluminum sections, complete with pre-formed clip anchor; sufficient depth to extend beyond wall face, full length pieces to minimize joints; and with integral drip edge profile and end dams.
- .3 Metal Flashing: 2.0 mm thick extruded aluminum, finish to match mullion sections where exposed.
- .4 Connection Flange: 3.0 mm thick extruded aluminum angle, size as indicated on Drawings.

2.5 **MANUFACTURERS AND PRODUCTS**

- .1 The following manufacturers and product models numbers are acceptable for tendering of this project. However, other products tendered must meet and/or exceed the following product types and Window Specifications herein:
- .2 Aluminum Windows: Fixed windows with extended nose at jambs, head, and sill.
 - .1 Kawneer 6600 window 152 mm O/A or approved alternate.

2.5 **MANUFACTURERS AND PRODUCTS (CONT'D)**

- .3 Classification rating: to CAN/CSA-A440-M90.
 - .1 Air leakage: A3
 - .2 Water leakage: B7
 - .3 Wind load resistance: C5
 - .4 Condensation resistance: Temperature Index, D2

2.6 **MATERIALS**

- .1 Extruded Aluminum: AA 6063T54 alloy, 1.6mm minimum thickness for fixed units, 2.0mm minimum thickness for operable units. Confirm on site.
- .2 Formed Aluminum: Sheet alloy and temper suitable for purpose and finish.
- .3 Fasteners: Exterior 300 Series stainless steel; Interior: 4000 Series stainless steel cadmium plated.
- .4 Prefinished Extruded Aluminum Sills:
 - .1 Fabricate sills from extruded aluminum, finish shall match frame finish.
 - .2 Include drip deflectors at jambs, cover and splice plates at joints, reinforcing, and prefabricated internal and external corners. Sills shall have concealed fasteners.
- .5 Sealants
 - .1 All sealants will be asbestos free.
 - .2 Exterior/interior metal-to-metal, masonry, stone or porous materials - One part elastomeric sealant conforming to CAN/CGSB-19.13-M87, Dow Corning CWS.
 - .3 Exterior/ interior metal-to-metal and metal-to-glass joints - Silicone conforming to CAN/CGSB-19, 13-M82, Dow '999'. Colour to match window frame.
- .6 Fasteners
 - .1 To be countersink flat head screws. All fasteners to be non-magnetic and corrosion resistant stainless steel to ASTM E-149.
- .7 Glass Materials: Refer to Section 08 80 00 – Glazing for clear and coloured sealed units.

2.6 MATERIALS (CONT'D)

.8 Glazing Materials

- .1 All glazing materials will be asbestos free.
- .2 In colour to match sash. Compatibility of all materials is essential. Glazing compound to conform to CGSB 19-GP-2. Urethane sealer to conform to CGSB/CAN2-19.13-M82, Vulkem 116 by Mameco. Glazing/gasket tape - Perma Stick #1351@ 15lb. Density Tremco Polyshim.

.9 Finish

- .1 Finish aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes - 1973:
 - .1 Clear anodic finish: designation AA-M10C21A31.
 - .2 Appearance and properties of anodized finishes designated by Aluminum Association as Architectural Class 1, Architectural Class 2, and Protective and Decorative category, to CGSB 63-GP-2M paragraphs 5.13 and 5.13.1 Classes 1, 2, and 3, respectively.

.10 Bituminous Coating: Fibered asphalt emulsion.

.11 Thermal Break: Rigid polyamide.

- .1 Clear anodic finish: designation AA-M10C21A31.
- .2 Appearance and properties of anodized finishes designated by Aluminum Association as Architectural Class 1, Architectural Class 2, and Protective and Decorative category, to CGSB 63-GP-2M paragraphs 5.13 and 5.12.1 Classes 1, 2 and 3, respectively.

.12 Weathering/Glazing Gaskets: Extruded, black, closed cell or dense elastomer.

.13 Glazing Tapes: Macro-polyisobutylene with continuous built-in shim.

.14 Air Barrier Foam Sealant: Section 07 90 00 - Joint Protection (Sealants)

.15 Shims: Rigid PVC.

2.7 **FABRICATION**

.1 General

- .1 Fabricate windows using separate frames joined by means of a thermal break and as follows: Butt join all joints in main frame and sash neatly, in weathering manner and secure by means of screws anchored into integral screw ports. Secure sash corners with thread-cutting ape screw to ensure tight comers when reassembling after glass repairs have been made. Internally seal all sash corners.
- .2 De-burr and make smooth all sharp milled edges and comers of sash and screen frames. Provide tubular sections for all vertical sash rails, screen frames.
- .3 Provide sill members with minimum 5 degree slope away from the frame. Provide sill weep system, which will facilitate drainage of water accumulating in sill area while preventing passage of air, dirt and insects to interior.
- .4 Fabricate and anchor both inner and outer frames using specified screw fasteners without violating the thermo-barrier. Exposed fasteners or the use of pop rivets are not acceptable. Do not anchor frame through bottom sill. Fabricate entire window in a manner that will allow easy replacement of any defective, damaged or worn components, hardware or weather-stripping.

.2 Fixed Window Units

- .1 The fixed unit shall consist of two separate frames joined by means of a thermal break. All joints of the frame shall be butt type, joined neatly in a weathering manner. The units shall be designed for field glazing, using a combination semi 'solid/wet seal at the exterior weathering joint and a concealed screw applied stop with resilient gasket at the interior. The interior stop shall be extruded aluminum.

.4 Thermal-Barrier

- .1 Extruded virgin polyvinylchloride thermal barrier.
- .2 Provide complete metal-to-metal separation between the two main frame members. Do not use connecting screws, clips or other devices that would tend to bridge the two frame members or restrict in any manner, the expansion and contraction of the individual separate frame members.

.5 Glazing

- .1 Provide sash frames to permit glass replacement without the use of social tools.

2.7 **FABRICATION (CONT'D)**

.6 Weather-Stripping

- .1 Polypropylene woven pile seal manufactured by Schlegel Company of Canada.
- .2 Double weatherstrip window units at all sash perimeters. Conceal weatherstripping to prevent accumulation of foreign matter due to cleaning, operation or handling which would reduce the effective life of the seal.
- .3 Install all weatherstripping in specially extruded ports and secure to prevent shrinkage, movement or loss when removing sash for cleaning or glass replacement.

.7 Aluminum Sills

- .1 All aluminum sills to be one piece extruded aluminum unless otherwise indicated herein.
- .2 Extruded sills to be one piece where possible. Aluminum concealed caps to be used at any sill joint location.
- .3 Finish to match frame and sash material.

.8 Exterior Panning

- .1 Extruded aluminum alloy 6063-T6, minimum 2.9 mm thickness.
- .2 Provide one piece sections designed to slide and lock into window frame. Join panning section at corners, utilizing integral screw ports and screws and back seal.

.9 Interior Trims

- .1 Extruded aluminum alloy 6063-T6, minimum 1.5 mm thickness.
- .2 Provide extruded trims of sufficient size to neatly finish the window to the interior window opening. Seal joints between:
 - .1 Trim molding and window with one part silicone (colour to match window frame).
 - .2 Trim molding and interior window opening with one part poly-urethane.
 - .3 Sheet metal formed shades, exposed installation screws, nails or pop rivets not acceptable (unless otherwise instructed).

.10 Site measure to confirm exact window opening dimensions prior to fabrication of windows.

2.7 **FABRICATION (CONT'D)**

- .11 Fabricate to dimensions as detailed and in accordance with CAN/CSA-A440 supplemented as follows.
- .12 Fabricate units square and true with maximum tolerance of plus or minus 1.5mm for units with a diagonal measurement of 1800mm or less and plus or minus 3mm for units with a diagonal measurement over 1800mm.
- .13 Face dimensions detailed are maximum permissible sizes.
- .14 Brace frames to maintain squareness and rigidity during shipment and installation.
- .15 Finish steel clips and reinforcement with shop coat primer to CAN/CGSB-1.40.
- .16 Frames shall be thermally broken and shall be without condensation at the following design conditions:
 - .1 Winter outdoor temperature: -21°C.
 - .2 Indoor temperature: 22°C and 40% relative humidity.
- .17 Design windows to withstand, without detrimental effects to appearance and performance, wind loads and temperature range expected in geographical area of this project (OBC climactic information 30 year probability), unless specified otherwise.
- .18 Prevent water infiltration and penetration in any form.
- .19 Design windows to perform as an effective air and vapour barrier.
- .20 Design systems to accommodate without detrimental effects on appearance and performance:
 - .1 Thermal expansion and contraction of system components.
 - .2 Movement, deflection and creep of building structural frame.
 - .3 Wind loads: positive and negative.
- .21 Limit deflection of component parts under maximum design load to 1/175 of span or less if required by glass manufacturer.

2.8 **ISOLATION COATING**

- .1 Isolate aluminum from the following components, by means of isolation coating:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

2.8 **ISOLATION COATING (CONT'D)**

- .2 Concrete, mortar and masonry.
- .3 Wood.

PART 3 – EXECUTION

3.1 **EXAMINATION**

- .1 Verify dimensions, tolerances, and method of attachment with other work.
- .2 Verify that wall openings and adjoining air barrier and vapour retarder materials are ready to receive the work of this section.

3.2 **INSTALLATION**

- .1 Install window in accordance with manufacturer's instructions, by approved or pre-qualified installers.
- .2 Install windows plumb, level and true relative to building structure. Do not exceed 3mm in 3,800 mm variation from plumb and level.
- .3 Prepare for glazing of glass and panels by removing projections from glazing rebates and cleaning them of all materials, which would adversely affect adhesion of sealers. Ensure that metal protection has been removed from rebates. Remove stops and store to prevent damage.
- .4 Do not set any glass without glazing beads or gaskets.
- .5 Position glass in openings with equal clearance on all sides. When lites are oversize, set them on two setting blocks at quarter points and use spacer shims, except at tapes and gaskets, on all four sides located a minimum of 300 mm from ends, spaced 600 mm o/c.
- .6 Stainless steel (#8) screws to be used when anchoring windows in final position.
- .7 Do not install screws into sill area of operable sections.
- .8 Sealed units to be cap (heel) bead caulked on exterior side with Tremco Proglaze, one part silicone, colour to match window framing.
- .9 From interior, install a barrier consisting of a single component polymeric insulating sealant to form a complete continuous bridge, full depth of the cavity between the window frame and existing building. Approved material: Hilti CB124, Inst-foam NBS-7 or Ener Foam air barrier sealant by Abisko Manufacturing Inc. Foam to expand to a maximum of 25%.

3.2 INSTALLATION (CONT'D)

- .10 Installation shall be inspected by the Consultant at the following stages and must not proceed approval.
 - .1 Site confirmation of compliance with anodizing or other finish specified.
 - .2 Frame perimeter sealant installation.
 - .3 Architectural panel and sealed unit perimeter sealant installation. (Final glass washing to be completed just prior to this stage)
- .11 Trims, caps and caulking shall not be applied until such ceded areas are inspected and approved re: tender specification compliance.
- .12 Interior trims shall lie secured with mounting clips fastened at no less than 600mm on center. Exterior panning butt joints shall be mechanically connected with panning clips, and shall be back sealed and made weather tight at butt joints. Fastening at minimum of 600mm on center.
- .13 Window frame thermal break shall be supplied non-perforated and remain so.
- .14 Initial on-site installation of first window shall be supervised and approved by Consultant. Contractor to coordinate.
- .15 Arrange components to prevent abrupt variation in colour.

3.3 SILL INSTALLATION

- .1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece lengths at each location.
- .2 Cut sills to fit window opening.
- .3 Secure sills in place with anchoring devices located at ends and evenly spaced 600 mm oc in between.
- .4 Fasten expansion joint cover plates and drip deflectors with self tapping stainless steel screws.
- .5 Maintain 6 to 9 mm space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3 to 6 mm space at each end.

3.4 CAULKING

- .1 Provide the following depth-to-width ratios for caulking:
 - .1 Porous Materials:
 - .1 6mm deep, up to 10mm wide.

3.4 **CAULKING (CONT'D)**

- .2 10mm deep, up to 19mm wide.
 - .3 12mm deep, up to 25" wide.
- .2 Non-porous Materials:
 - .1 Joint depth and width must not be less than 25mm wide.
- .2 Examine joints before caulking to ensure that configuration, surface and width are suitable for sealant and service, and that execution of caulking and performance of sealants will not be adversely affected. Gaps between panning and existing structure in excess of 6mm shall be filled with foam backer rod of appropriate diameter, and/or single component polymeric foam sealant Adhesive, prior to caulking. The school board Project Manager or the consultant prior to fillings shall review gaps between panning and structure in excess of 10mm. Defective work resulting from application to unsatisfactory joint conditions will be rejected.
- .3 Prime inner face surfaces of joints as necessary for substrate in accordance with sealant manufacturer's specification, to provide full adhesion and to prevent staining of face surfaces at joint. Fill joints with: sealant in accordance with manufacturer's specification using pressure guns.

3.5 **PROTECTION AND CLEANING**

- .1 Protect finished work from damage in accordance with Section 01 60 00 - Product Requirements.
- .2 Remove protective material from prefinished aluminum surfaces.
- .3 Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- .4 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to the sealant manufacturer.

3.6 **CLEANING**

- .1 Clean glass at factory. Final cleaning of glass to remove job labels, site soiling shall be the responsibility of the Contractor. Leave surfaces reasonably clean, free from sealants, caulking or other foreign materials. Remove surplus materials and debris resulting from work of this trade Le. aluminum shavings, broken glass, etc., on a day-to-day basis.

END OF SECTION

DIVISION 08 - OPENINGS

PART 1 – GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 RELATED WORK SPECIFIED ELSEWHERE

- .1 Allowances Section 01 21 00
- .2 Finish Carpentry Section 06 20 00
- .3 Hollow Metal Doors & Frames Section 08 11 13
- .4 Wood Doors Section 08 14 00

1.2 WORK INCLUDED

- .1 This section includes the supply of finishing hardware including but not limited to the following:
 - .1 Interior door hardware, Electronic key Fobs, privacy, dummy, passage sets, lock sets, exit devices, stops, closers, kick plates, dead bolts, cane bolts, push, pull plates, hinges etc. (Labelled where required).
 - .2 All other General Building hardware including kick plates and thresholds, weather stripping, stops, electric strikes, Electronic Key Fobs, lockset, exit devices, electromagnetic locks, hinges and closers (labelled where required).

1.3 REFERENCES

- .1 Hardware for labelled fire doors.
- .2 N.F.P.A..80 Fire Doors and windows.
- .3 N.F.P.A..101 Life Safety Code
- .4 N.F.P.A..105 Installation of Smoke Control Door Assemblies
- .5 Ontario Building Code

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- .1 Delivery - supply hardware as and when required for each opening. Package hardware separately for each opening in a package which contains all the hardware for that opening and bears the number of the opening. Supply hardware to those who are to install it, complete with keys, templates and installation instructions together with all required screws, expansion shields, anchors and other related accessories for satisfactory attaching/installing hardware.
- .2 Hardware supplier to co-ordinate delivery of hardware to the site or to the appropriate parties.
- .3 Prior to delivery to the job site, a dry, secure room is to be provided for storage of finishing hardware.

1.5 SUBMITTALS

- .1 Submit product data, shop drawings and samples in compliance with Section 01 33 00.
- .2 Prepare a detailed finishing hardware schedule itemizing each opening. List all doors by number including size, hand, swing and any and all relevant details affecting the application of finishing hardware.
- .3 Submit catalogue cuts of all proposed hardware.
- .4 Submit samples for approval as required.
- .5 Submit template information to the General Contractor for preparation of product in related sections and installation of finishing hardware.
- .6 Prepare for review a detailed key schedule.
- .7 Submit wiring diagrams and a description of operation for electrified hardware systems specified.
- .8 Upon job completion, submit to the Owners two "Owners Operation and Maintenance Manuals containing the following information:
 - .1 Maintenance instructions for each items of hardware.
 - .2 Final Hardware Schedule.
 - .3 Final Keying Schedule.

1.6 GENERAL REQUIREMENTS

- .1 Comply with all applicable ANSI/BHMA standards and requirements of Authorities.

1.6 **GENERAL REQUIREMENTS (CONT'D)**

- .2 Grade of hardware to be; "Commercial Grade Standard Duty".
- .3 All door closers shall have back checking features and shall be of proper size to operate door efficiently.
- .4 Confirm all kick plate and threshold sizes before ordering them.
- .5 Use no wall mounted door stops on drywall.
- .6 Exposed screws for installing hardware shall have Phillips or Robertson heads.
- .7 Rim panic device strikes shall be mortise type application. Equip panic devices with sex bolts.
- .8 Confirm degree of swing for door holders, closers, etc.
- .9 All locksets and passage sets to be lever handles.
- .10 A hardware schedule is to be provided by a Certified Hardware Consultant for submission and review.
- .11 ***Refer to Hardware Schedule contained in the Schedules on Drawings.** This schedule is to be used as a guide to represent the minimum standard and quantity of hardware required. It is in no way to represent the exclusion of any required hardware as part of the contract.

1.7 **KEYING**

- .1 All locks to be keyed using blanks.
- .2 All locks shall be keyed as required to Master Key system as later described by the Owner, for all doors.
- .3 Quantity of keys per keying group to be determined later by Owner.

1.8 **FIELD QUALITY CONTROL**

- .1 Check all hardware when it has been installed and notify Architect of any cases where it has been improperly installed, is defective or is not specified.
- .2 The door closer supplier shall review installation and operation of all door closers on site and issue a written report to the Architect.

1.9 **WARRANTY**

- .1 All hardware is to be guaranteed for an extended period of five (5) years.

1.9 WARRANTY (CONT'D)

- .2 Provide a minimum ten (10) year warranty for door closers.
- .3 Warranty to commence from date of Substantial Completion.

1.10 MAINTENANCE

- .1 Provide three wrenches for door closer adjustment.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 All hardware shall be supplied complete with the necessary screw, bolts and other fasteners so as to anchor in position all finishing hardware to the Consultants approval. Exposed fasteners to be finished to match hardware. When a door pull is utilized on one side of the door and a push plate on the other, the plate is to be applied so as to conceal the door pull fasteners.

2.2 DOOR HARDWARE

- .1 Bull Hinges: To ANSI/BHMA A156.1, Grade 1.
- .2 Continuous Hinges: To ANSI/BHMA A156.26.
- .3 Self-Closing Hinges and Pivots: To ANSI/BHMA A156.17.
- .4 Locksets and Latchsets: To ANSI/BHMA A156.2, Grade 1.
- .5 Exit Devices: To ANSI/BHMA A156.3.
- .6 Closers: To ANSI/BHMA A156.4; surface-mounted type.
- .7 Cylinders and Input Devices: To ANSI/BHMA A156.5, Operational Class, Grade 1.
- .8 Overhead Door Stops: To ANSI/BHMA A156.8.
- .9 Interconnected Locks and Latches: To ANSI/BHMA A156.12, Grade 1.
- .10 Mortise Locks: To ANSI/BHMA A156.13. Operational Class, Grade 1.
- .11 Auxiliary Locks: To ANSI/BHMA A156.36, Grade 1.
- .12 Multipoint Locks: To ANSI/BHMA A 156.13, Operational Class 1.
- .13 Sliding and Folding Door Hardware: To ANSI/BHMA A156.14.

2.2 DOOR HARDWARE (CONT'D)

- .14 Powered Release Devices: To ANSI/BHMA A156.15.
- .15 Powered Door Locks: To ANSI/BHMA A 156.23; electromagnetic type.
- .16 Powered Locking Devices: To ANSI/BHMA A156.25.
- .17 Powered Strikes and Actuators: To ANSI/BHMA A156.31.
- .18 Delayed Egress Locks: To ANSI/BHMA A156.24.
- .19 Alarms for Exit Devices: To ANSI/BMHA A156.29.
- .20 Door Trim: Protection plates, push plates, door pulls, push bars, and pull bars; to ANSI/BHMA 156.6.
- .21 Thresholds: To ANSI/BHMA A156.21.
- .22 Auxiliary Hardware: To ANSI/BHMA A156.16.
- .23 Door Gaskets and Weather Stripping: To ANSI/BHMA A156.21.

2.3 FINISHES

- .1
 - 15/652 SATIN NICKEL
 - 28 ANODIZED ALUMINUM
 - 26D/626 SATIN CHROME
 - 32D/630 SATIN STAINLESS STEEL
 - 689 ALUMINUM PAINTED
 - AL ALUMINUM
 - PT PRIMED FOR PAINT

PART 3 - EXECUTION

3.1 EXAMINATION

- 1. Size and condition of opening shall be verified as to door frames being plumb and of correct tolerance to receive doors and hardware. [General Contractor]

3.2 INSTALLATION

- .1 Review proper mounting heights with the Architect and/or Owner.
- .2 Standard mounting heights (unless otherwise noted):
 - A. Locks/Latches 40-5/16" to centre line of strike from finished floor.

3.2 **INSTALLATION (CONT'D)**

B.	Deadlocks	48" to centre line of strike from finished floor.
C.	Exit Devices	40-5/16" to centre line of strike from finished floor.
D.	Door Pulls	42" to centre line of pull from finished floor.
E.	Push Plate	45" to centre line of Push Plate from finished floor.

The above noted mounting heights are a recommended standard and may vary under special applications and conditions.

3.3 **ADJUSTING AND CLEANING**

1. Upon final completion the hardware is to be left clean and free from defect. Hardware found defective is to be repaired or replaced.
2. All door closers are to be inspected for proper installation and adjustment. Provide a written report from the Manufacturer's Representative confirming proper door closer installation and submit the report to the Architect.

END OF SECTION

DIVISION 08 - OPENINGS

PART 1 - GENERAL

1.1 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.2 SUMMARY

- .1 This Section includes the following types of power door operators:
1. Exterior and interior, power door operators, low energy, with visible mounting.
 2. Automatic door operators shall be configured for doors as follows:
 1. Simultaneous pairs, out swing, in swing, or double egress.
 2. Simultaneous pairs, with single operator, out swing or in swing.
 3. Single doors, out swing or in swing.
 4. Refer to Plans and Schedules for locations.
- .2 Related Sections:
- | | |
|---|------------------|
| 1. Door Hardware | Section 08 71 00 |
| 2. Electrical Specification: electrical connections including conduit and wiring for power door operators & push button controls. | Division 26 |

1.3 REFERENCES

- .1 General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- .2 UL 325 – Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
- .3 ANSI/BHMA A156.19: Standard for Power Assist and Low Energy Power Operated Doors.
- .4 ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.3 REFERENCES (CONT'D)

- .5 ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- .6 BHMA A156.10 - Standard for Power Operated Pedestrian Doors.
- .7 NFPA 101 – Life Safety Code.
- .8 NFPA 70 – National Electric Code.
- .9 UBC: Uniform Building Code.
- .10 ISO 9001 - Standard for Manufacturing Quality Management Systems
- .11 Metal Finishes Manual for Architectural and Metal Products.
- .12 AAMA 607.1 - Clear Anodic Finishes for Architectural Aluminum.
- .13 AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.
- .14 CSA approved in compliance with the Provincial Building Code.

1.4 DEFINITIONS

- .1 Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

1.5 PERFORMANCE REQUIREMENTS

- .1 Provide power door operators capable of withstanding structural loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.
- .2 Operating Range: Minus 30 deg F (29 deg C) to 130 deg F (54 deg C).
- .3 Opening-Force Requirements for Egress Doors: In the event power failure to the operator, swinging automatic entrance doors shall open with a manual force, not to exceed 30 lbf (133 N) applied at 1" (25 mm) from the latch edge of the door.
- .4 Break Away Requirements: Power door operators provided with a breakaway device shall require no more than 50 lbf (222 N) applied at 1" (25 mm) from the latch edge of the door.
- .5 Door Energy: The kinetic energy of a door in motion shall not exceed 1.25 lbf-ft (1.69 Nm).
- .6 Closing Time:
 - .1 Doors shall be field adjusted to close from 90 degrees to 10 degrees in 3 seconds or longer.

1.5 PERFORMANCE REQUIREMENTS (CONT'D)

- .2 Doors shall be field adjusted to close from 10 degrees to fully close in not less than 1.5 seconds.

1.6 SUBMITTALS

- .1 Submit listed submittals in accordance with Conditions of the Contract and Section 01 33 00 submittal procedures.
- .2 Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work. Indicate wiring for electrical supply.
- .3 Color Samples for selection of factory-applied color finishes.
- .4 Closeout Submittals: Provide the following with project close-out documents.
 - .1 Owner's Manual.
 - .2 Warranties.

1.7 QUALITY ASSURANCE

- .1 Installer Qualifications: Manufacturer's authorized representative who is trained for installation and maintenance of units required for this Project.
- .2 Manufacturer Qualifications: A qualified manufacturer with a manufacturing facility certified under ISO 9001 and with company certificate issued by AAADM.
- .3 Certifications: Power door operators shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards:
 - .1 ANSI A156.10.
 - .2 NFPA 101.
 - .3 UL 325 Listed (Fire Door Operator)
 - .4 ICBO (UBC Standard 10-1).
 - .5 CSA approved in compliance with the provincial code.
- .4 Source Limitations: Obtain power door operators through one source from a single manufacturer.
- .5 Product Options: Drawings indicate sizes, profiles, and dimensional requirements of automatic entrance door assemblies and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

1.7 QUALITY ASSURANCE (CONT'D)

- .6 Power Operated Door Standard: ANSI/BHMA A156.19.
- .7 Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- .8 Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for swinging automatic entrance doors serving as a required means of egress.

1.8 PROJECT CONDITIONS

- .1 Field Measurements: General Contractor shall verify openings to receive power door operators by field measurements before fabrication and indicate measurements on Shop Drawings.
- .2 Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.
- .3 Other trades: General Contractor Advise of any inadequate conditions or equipment.

1.9 COORDINATION

- .1 Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing power door operators to comply with indicated requirements.
- .2 Electrical System Roughing-in: Coordinate layout and installation of power door operators with connections to power supplies.
- .3 System Integration: Integrate power door operators with other systems as required for a complete working installation.
 - .1 Provide electrical interface control capability for card reader or keypad operation of power door operators on doors with electric locking.
 - .2 Where required for proper operation, provide a time delay relay to signal power door operator to activate only after electric lock system is released.

1.10 WARRANTY

- .1 Power door operators shall be free of defects in material and workmanship for a period of 10 (10) years from the date of Substantial Performance.
- .2 During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.

1.10 WARRANTY (CONT'D)

- .3 During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

PART 2 - PRODUCTS

2.1 POWER DOOR OPERATORS

- .1 Manufacturer:
 - .1 Electra 150 by Besam, ASSA ABLOY
 - .2 Enex Door (West)
 - .3 Approved Alternate.

2.2 MATERIALS

- .1 Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - .1 Headers: 6063-T6.
 - .2 Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - .3 Sheet and Plate: ASTM B 209.
- .2 Sealants and Joint Fillers: Refer to Division 07 Section "Joint Sealants".

2.3 COMPONENTS

- .1 Header Case: Header case shall not exceed 6-1/8 inch x 4 inch (156 mm x 102 mm) in rectangular section and shall be fabricated from extruded aluminum with structurally integrated end caps, designed to conceal door operators and controls. The operator shall be sealed against dust, dirt, and corrosion within the header case. Access to the operator and electronic control box shall be provided by a full-length removable cover, edge rabbeted to the header to ensure a flush fit. Removable cover shall be secured to prevent unauthorized access.
- .2 Door Arms and Linkage Assembly: A combination of door arms and linkage shall provide positive control of door through entire swing; units shall permit use of butt hung, center pivot, and offset pivot-hung doors.
- .3 Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
- .4 Signage: Provide signage in accordance with ANSI/BHMA A156.19.

2.4 SWINGING DOOR OPERATORS

- .1 Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
- .2 Operators: Self-contained units powered by a minimum fractional horsepower, permanent-magnet AC or DC motors.
- .3 Electro-mechanical Operator: Transmit power from operator to door through reduction gear train, splined spindle, door arm, and linkage assembly. Drive train shall have positive constant engagement.
 - .1 Operation: Power opening and spring closing.
 - .2 Mounting: Visible
- .4 Features:
 - .1 Adjustable opening, open check, and closing speeds.
 - .2 Adjustable opening force.
 - .3 Adjustable hold-open time between 0 and 30 seconds.
 - .4 Reverse on obstruction.
- .5 Closing Operation: The operator shall close the door by spring energy employing the motor, as a dynamic brake to provide closing speed control. The closing spring shall be adjustable for positive closing action at a low material stress level for long spring life.
- .6 Manual Use: The operator shall function as a manual door closer in the direction of swing with or without electrical power. The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open.
- .7 Electrical service to door operators shall be provided under Division 16 Electrical. Minimum service to be 120 VAC, 10 amps for doors with operators in pairs, 5 amps for single doors.

2.5 ELECTRICAL CONTROLS

- .1 Electrical Control System: Electrical control system shall include a solid-state controller with quick connect plugs.
- .2 Controller Protection: The controller shall incorporate the following features to ensure trouble free operation:
 - .1 Fuse Protection.

2.5 **ELECTRICAL CONTROLS (CONT'D)**

- .2 Electronic Surge Protection.
- .3 Internal Power Supply Protection.
- .3 Program Dip Switches: The controller shall have program dip switches to allow selection or change at the following parameters: carpet or timer logic, single or dual door, and activation options.

2.6 **ACTIVATION DEVICES**

- .1 Push Plates: Provide 5 7/8 inch (150 mm) round SPDT push plates with UL listed switch. Face plates and mounting studs shall be stainless steel. Face plates shall be engraved with the international symbol for accessibility and "Push To Open".
- .2 Push Buttons to be as per FADM (Local Authority Facility Accessibility Design Manual):
 - .1 Push Buttons to be installed, so the centre located 1000-1100 mm (39- 3/8" – 43 1/4') from the floor;
 - .2 Incorporate controls that are clearly visible which are at least 150 mm (5-7/8") in diameter;
 - .3 Incorporate the International symbol of Access for Persons with Disabilities.
- .3 Interior and exterior push plates shall be wall mounted in single or double gang electrical boxes and hardwired to door operator controls.

2.7 **ALUMINUM FINISHES**

- .1 Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes. Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes.
- .2 Class II, Clear Anodic Finish: AA-M10C22A31 Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.40 mils minimum complying with AAMA 611, and the following:
 - .1 AAMA 607.1
 - .2 Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge.

PART 3 - EXECUTION

3.1 INSPECTION

- .1 Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of swinging automatic entrance doors. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- .1 Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.
- .2 Mounting: Install power door operators/headers plumb and true in alignment with established lines and grades. Anchor securely in place.
 - .1 Install surface-mounted hardware using concealed fasteners to greatest extent possible.
 - .2 Set headers, arms and linkages level and true to location with anchorage for permanent support.
- .3 Door Operators: Connect door operators to electrical power distribution system as specified in Division 16 Sections.
- .4 Sealants: Comply with requirements specified in Division 7 Section "Joint Sealants" to provide weather tight installation.

3.3 FIELD QUALITY CONTROL

- .1 Testing Services: Factory Trained Installer shall test and inspect each swinging automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

3.4 ADJUSTING

- .1 Adjust door operators, controls, and hardware for smooth and safe operation, for weather-tight closure, and complying with requirements in ANSI A156 by AAADM Certified Technician.

3.5 CLEANING AND PROTECTION

- .1 Clean surfaces promptly after installation. Remove excess sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.

END OF SECTION

DIVISION 08 - OPENINGS

PART 1 - GENERAL

1.1 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- .1 Glass and Glazing of:
 - .1 Hollow Metal Doors and Frames Section 08 11 13

1.3 REFERENCES

- .1 GANA, Glazing Manual and Glazing Sealing Systems Manual.
- .2 CAN/CGSB 12.1, Tempered or Laminated Safety Glass.
- .3 CAN/CGSB-12.3, Flat, Clear Float Glass.
- .4 CAN/CGSB-12.6, Transparent (One-Way) Mirrors.
- .5 CAN/CGSB 12.8, Insulating Glass Units.
- .6 CAN/CGSB-12.9, Glass, Spandrel.

1.4 SUBMISSIONS SAMPLES

- .1 Submit duplicate 300 x 300 mm (12"x 12") size samples of types of glazing and sealant material.
- .2 Submit samples as per Section 01 33 00 "Submittals Procedures".
- .3 Submit 600 mm x 1200 mm (24" x 48") printed film sample for approval.

1.5 WARRANTY

- .1 Warrant work under this Section against defects and deficiencies for a period of ten (10) years from date work is certified as Substantially Complete in accordance with the General Conditions of the Contract as amended by the Supplementary Conditions.
- .2 Promptly correct defects and deficiencies which become apparent within warranty period, including make good of work damaged by this work satisfactory to the Architect and at no expense to the Owner.

1.5 WARRANTY (CONT'D)

- .3 Defects shall include but shall not be limited to failure to seal of enclosed air space and deposits on inner faces of glass units, and delamination, discolouring or deposits on inner surfaces of laminated safety glass.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- .1 PPG Industries
.2 Guardian Glass
.3 A.G.F. Glass
.4 Approved Alternate.

2.2 GLASS MATERIALS

- .1 Where thickness of glazing is not specified, conform to requirements of Ontario Building Code.
- .2 Polished Plate or Float Glass: to CAN/ CGSB-12.3, 6 mm minimum thickness. Clear or tinted as indicated. Heat strengthened as required. As manufactured by Pittsburgh Plate Glass Co. (PPG)
- .3 Tempered (Laminated) Safety Glass: to CAN/ CGSB-12.1, 6 mm thick unless otherwise noted. 12 mm thick where vertical butt joints are used without mullion/frame. "Herculite" as manufactured by Pittsburgh Glass Co.
- .4 Low E Glass: CAN/CGSB 2, heat strengthened. ES72N by AFGD or approved alternate with manufacturer's 10 year warranty on the coating. Glass to meet minimum 2013 ANSI/ASHRAE 90.1 and Chapter 2 of the O.B.C.
- .5 Insulated Glass Unit (Sealed Unit): Total thickness 25 mm (1"): with warm edge spacer bar.
- .1 Outer Pane: Clear float 6 mm (1/4") thick, Low-E coated on surface #2.
- .2 Inner Pane: Clear float 6 mm (1/4") thick.
- .3 Interpane Space: 13 mm (1/2") air space, Argon filled gas. Min.90%.
- .4 Glass to meet minimum 2013 ANSI/Ashrae 90.1 and Chapter 2 of OBC requirements.

2.2 GLASS MATERIALS (CONT'D)

- .6 Insulated Glass Unit (Sealed Unit): Type "Tempered" Total thickness 25 mm (1"); with warm edge spacer bar.
 - .1 Outer Pane: Clear Tempered Glass 6 mm (1/4") thick, Low-E coated on surface #2.
 - .2 Inner Pane: Clear Tempered Glass 6 mm (1/4") thick.
 - .3 Interpane Space: 13 mm (1/2") air space, Argon filled gas. Mi. 90%.
 - .4 Glass to meet minimum 2013 ANSI/Ashrae 90.1 and Chapter 2 of OBC requirements.
- .7 Insulated Tempered Glass: Provide insulated tempered glass in vestibule, doors and adjacent to doors.
- .8 Spandrel glass: CAN/CGSB-12.9, 6 mm thick unless otherwise indicated, with water-based silicone emulsion coating applied to backside, 'Opaci-Coat 300' by ICD High Performance or approved alternative.
- .9 Coloured Glass: GlasPro – CG coloured glass, from standard palette of colours: Sunflower, Lapis and Light Grey Ideascapes, Solarban 70XL by PPG/Vitro.
- .10 Fire Rated Glazing to be 5 mm (min.) thick "FireLite® NT" safety impact grade glass, conforming to CAN/CGSB – 12.11, ASTM E2010, CAN 4 S-104 and CAN 4 S-106 and thickness required by Manufacturer for fire rating required in the assembly in which the glazing is installed.
- .10 Where edges of glass are exposed, they shall be ground and polished.
- .11 Tinted Glass: For exterior glazing, tint colouring to be Bronze or Solar Grey. Refer to elevations for locations.
- .12 For locations of glazing and colours refer to Elevation Drawings and Door Frame Schedule.

2.3 GLAZING AND SEALING COMPOUND MATERIALS

- .1 Only compounds listed on the CGSB Qualified Products List are acceptable for use on this project.
- .2 Glazing compound: oil type, to CGSB 19-GP-2 type 1, to selected colour.
- .3 Sealant compound: multi-component, chemical curing to CAN/ CGSB -19.24 type 2, class A, of selected colour.
- .4 Non-shrink Grout: M-Bed by Sternson Ltd., or V-3 Pre-Mixed Construction Grout by W.R. Meadows of Canada, Ltd. or Masterflow 713 by Master Builders Co. Ltd., or Tartan No-Iron Grout by Webster & Sons Ltd., or Set Non-Shrink Grout by Set Products (Canada) Ltd., or In-Pakt by C.C. Chemicals Ltd.

2.3 GLAZING AND SEALING COMPOUND MATERIALS (CONT'D)

- .5 Glazing tape: preformed butyl tape, 10-15 durometer hardness, paper released as manufactured by Tremco Manufacturing Co (Canada) Ltd., or 3 M ribbon sealer butyl tape manufactured by Minnesota Mining and Manufacturing Co. Ltd.
- .6 Setting blocks: neoprene, Shore "A" durometer hardness 80-90, 100 mm long, wide enough to extend from stop to opposite glass face, of thickness suitable to provide adequate glazing "bite".
- .7 Spacer shims: neoprene, Shore "A" durometer hardness 80-90, 75 mm long x 2.4 mm thick x 9 mm high, or as indicated.
- .8 Glazing splines: neoprene manufacturer's standard dry glazing splines to suite aluminum extrusions, to selected colour.
- .9 Lock-strip gaskets: black neoprene to ASTM C542-76, type and style as recommended by frame manufacturer.
- .10 Primer-sealers and cleaners: to glass manufacturer's standard.
- .11 Provide decals, as shown, 100 mm (4") in diameter, vinyl, and with Applicable Building Code symbol showing both sides.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Openings shall be free from moisture, frost, rust, dirt and foreign matter.
- .2 Clean surfaces to receive sealant with a clean cloth dampened with xylol or a 50-50 mixture of acetone and xylol. Wipe dry with a clean, dry cloth.

3.2 INSTALLATION

- .1 Conform to the recommendation of the Glazing Manual, Float Glass Marketing Association, revised Edition. Insulating Glass Manual Association of Canada.
- .2 Glaze hollow metal doors, interior windows and screens and wood doors scheduled to be glazed.
- .3 Protect glass edges from damage during handling and installation. Remove damaged glass Products from Place of Work and dispose of in accordance with the authorities having jurisdiction. Damaged glass is defined as glass with edge damage or other imperfections that, when installed, could weaken the glass and impair performance and appearance.
- .4 Place setting blocks, to manufacturer's instructions.
- .5 Install glass, rest on setting blocks, ensure full contact and adhesion at perimeter.

3.2 INSTALLATION (CONT'D)

- .6 Insert spacer shims to centre glass in space. Place shims at 600 mm (24") o.c. and keep 6 mm (1/4") below sightline.
- .7 Provide edge blocking necessary to prevent glass lites from moving sideways in glazing channel, in accordance with GANA Glazing Manual.
- .8 Tape Glazing: Position tapes on fixed stops so that, when compressed by glass their exposed edges are flush with or protrude slightly above sight line of stops. Install tapes continuously, but not necessarily in on continuous length. Do not stretch tapes to make them fit the opening.
 - .1 Cover the vertical framing joints by applying tapes first to heads and sills, and then to jambs.
 - .2 Cover horizontal framing joints by applying tapes first to jambs, and then to heads and sills.
 - .3 Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant.
 - .4 Center glass lites in openings on sitting blocks and press firmly against tape by inserting dense compression gaskets, formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work towards center of openings.
- .9 Gasket Glazing: Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
 - .1 Insert soft compression gasket between glass and frame of fixed stop such that it is securely in place, with joints mitre cut and bonded together at corners.
 - .2 Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets, formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work towards center of openings.
 - .3 Install gaskets so protrude evenly past face of glazing stops.
 - .4 Compress gaskets to produce weather tight seal without developing bending stress in glass.
 - .5 Seal gasket joints with compatible sealant.
- .10 Install removable stops, without displacing tape or sealant, and tightened all screws.
- .11 Provide edge clearance of 3 mm (1/8") minimum.

3.2 INSTALLATION (CONT'D)

- .12 Apply sealant to uniform and level line, both sides of glass, flush with sightline and tooled or wiped with solvent to smooth appearance, or trim tape flush with sightline.
- .13 Do not cut or abrade tempered, heat treated, or coated glass.

3.3 FINISHING AND CLEANING

- .1 Immediately remove sealant and compound droppings from finished surfaces.
- .2 Remove labels after work are completed.
- .3 As work progresses clean all glass, including mirrors and fittings. Remove all setting and glazing compounds from adjacent surfaces. Remove all finger and handprints and other soil. Use mild domestic detergent in warm water, apply with soft clean wiping cloths.
- .4 Apply decals, using permanent adhesives.

END OF SECTION

DIVISION 09 - FINISHES

PART 1 - GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 GENERAL REQUIREMENTS

- .1 Conform to CAN/CSA A-82.27, and CAN/CSA A-82.31 including appendixes.
- .2 Ensure strict compliance with Manufactures Literature.
- .3 ASTM C754 – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- .4 Ontario Building Code Section 9.24 Sheet Steel Stud Wall Framing.
- .5 Canadian Sheet Steel Building Institute Technical Bulletins and Manuals.

1.2 RELATED WORK SPECIFIED ELSEWHERE

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

1.3 QUALITY ASSURANCE

- .1 Requirements of Regulatory Agencies:
Install fire separations and fire protection exactly as specified in Underwriters' Laboratories test design specification that validates the specified rating.
- .2 Allowable Tolerances:
Install Work within 1/8" of dimensioned location unless approved otherwise, and flat to a tolerance of 1/8" maximum in 10'-0" and 1/16" maximum in any running 12".

1.4 DELIVERY AND STORAGE

- .1 Handle and store materials carefully to prevent damage.
- .2 Store gypsum board flat in piles with protected edges.
- .3 Obtain approval of proposed locations for stockpiling material.

1.4 **DELIVERY AND STORAGE (CONT'D)**

- .4 Do not install damaged or deteriorated material but remove from site immediately.
- .5 Provide any necessary temporary covers, skids and the like.
- .6 Materials as delivered shall bear manufacturer's name, brand name of material and where applicable, CSA classification.

1.5 **ENVIRONMENTAL REQUIREMENTS**

- .1 Do not apply gypsum board or joint filler to surfaces that are damp or contain frost.
- .2 In cold weather and during gypsum panel application and joint finishing, temperatures within work areas shall be within the range of 12 deg. C to 25 deg. C. for 7 days prior to application of joint compound and until cement and adhesives have cured.
- .3 Provide adequate ventilation to carry off excess moisture.

1.6 **RELATIONS WITH OTHER TRADES**

- .1 Co-ordinate with Mechanical and Electrical Trades to ensure that all services are installed prior to application of wall board.
- .2 Give directions to Section 06 10 00 for supplementary blocking.

1.7 **QUALIFICATIONS**

- .1 Sub-contractor to submit a list of 5 previous jobs where he has performed similar work in scale and scope, for review by the Consultant and Owner, and representative of his workmanship, prior to starting any work on site or submissions.
- .2 Sub-contractor to provide documentation that he has the required man power for the scale of his job, to meet the construction schedule.

PART 2 - PRODUCTS

2.1 **MATERIALS**

- .1 All materials to conform to CAN/CSA A82.27 unless specified otherwise.
- .2 Gypsum Board Types:
 - 1. Gypsum Board- Paper Faced (GB-PF): To ASTM C1396/C1396M, tapered edges, ivory paper faced, thickness as indicated on the drawings.

2.1 MATERIALS (CONT'D)

2. Gypsum Board- Fire-Rated (GB-FR): To ASTM C1396/C1396M, Type C, tapered edges, ivory paper faced, ULC labelled, thickness as indicated on the drawings.
3. Gypsum Board- Shaft-Liner (GB-SL): To ASTM C1658/C1658M, Type X, 25mm thick double bevelled edges, silicone treated gypsum core, with coated glass matt facers both sides.
4. Gypsum Board- Backing Board (GB-BB): To ASTM C1396/C1396M, 12.7mm thick paper faced, square edges.
5. Gypsum Board- Ceiling Board (GB-CLG): To ASTM C1396/C1396M, 12.7mm thick, paper faced, eased edges, maximum 6.5kg/m² weight.
6. Gypsum Board- Tile Backer (GB-TB): To ASTM C1178/C1178M, 12.7mm thick, Coated glass mat-faced gypsum panels, with silicone treated core, glass fibre mesh facers both sides and a co-polymer waterproof coating on the tile-face side, square edges.
7. Gypsum Board – Abuse Resistant Board (G.B.A.R.) to ASTM C1629, 16mm thick, Level 2 for abrasion, indentation and impact resistance paper faced, tapered edges.

.3 Partition Systems:

- .1 Steel Studs: 20 ga. min. steel, wiped coated, having knurled flanges 1-1/4" wide with edges doubled back at least 3/16", with girts as required, and with service access holes in webs at 18" o.c..
- .2 Partition Runner Tracks: As specified for studs, Min. 25 ga. electro zinc coated sheet steel with flanges minimum of 1 3/16" high, and to suit width of studs. Oversized to accommodate structural deflection and floor toppings. 2 1/2" "Slotted Deflection" track and 2 1/2" "Deep Track" to accommodate the installation of cementitious skim coat topping.
- .3 Bracing Channels: 18 ga. 1-1/2" x 3/4" cold rolled steel, wiped coated.
- .4 Steel Sheet Metal Blocking: 18 ga. 16" wide mtd. to face of studs for mounting of devices, accessories and millwork. Refer to details for mounting heights.
- .4 Corner Bead and Trims: 18 ga. galvanized steel with perforated flanges; one piece per location. Dur-A-Bead 1 1/4" x 1 1/4" metal bead for corners; "J" trim and "L" trim by "CGC" or approved alternate, fill type only. Paper or plastic beads are not acceptable.
- .5 Control Joint: C.G.C. No. 093.
- .6 Thermal Break: Permanent adhesive faced rubberized cork, 1/8" thick by width required.

2.1 MATERIALS (CONT'D)

.7 Fastenings and Ties:

.1 Screws: For metal furring. Self-drilling, self-tapping, case-hardened, Phillips head, drywall screws, with corrosion resistant finish. For wood furring: similar wood screws #6 x 1" for single thickness board fastening and #7 x 1-5/8" for double thickness board fastening.

.2 Tie Wire: 16 ga. galvanized soft annealed steel wire.

.3 Furring System: 16 ga. cold rolled steel, prime painted.

.1 1-1/2" x 1/2" where supported at centres of 3'-0" maximum.

.2 1-1/2" x 3/4" where supported at centres of 4'-0" maximum.

.4 Furring Channels: 25 ga. cold rolled steel, wiped coated, nominal size of 3/4" deep x 1-1/4" face, hat type with knurled face.

.8 Joint Treatment Material: (Joint compound, taping compound laminating compound). To ASTM C474 and C475. Use material recommended by board manufacturer for the proposed use.

.9 Resilient Sponge Tape: self sticking adhesive on one side, closed cell neoprene sponge tape Permastik 122X by Jacobs and Thompson Ltd. Or approved alternate.

.10 Adhesive: type acceptable to insulation manufacturers to provide vapour barrier of 1/8" thickness.

.11 Reinforcing Tape: Perf-A-Tape by C.G.C. or approved alternate.

.12 Ceiling Hanger System:

.1 Wire Hanger Anchoring Devices:

.1 Phillips Red Head by Phillips Drill Company of Canada Limited.

.2 T32, self-drilling for use in concrete deck.

.3 WS-3822 wedge anchor with tie wire insert for use in composite concrete and steel deck.

.4 "Grabber" H-2, 1/4" by 2" drill point screw eye lag with collar for use in steel deck, or as otherwise approved.

.5 All anchors with collars (Grabber H-2) to be fastened to side of deck flute.

2.1 **MATERIALS (CONT'D)**

.2 Hangers:

- .1 Zinc coated annealed steel wire; 12 ga. to support a maximum weight of 150 pounds per hanger.
- .2 9 ga. to support a maximum weight of 310 pounds per hanger and zinc coated annealed steel rod.
- .3 3/16" dia. to support a maximum weight of 500 pounds per hanger.
- .3 Sound Isolation Hangers: spring hangers of weight capacity required by Vibro Coustics Ltd. or approved alternate.

- .13 Tile Backer Board accessories: 2" wide 10 x 10 coated glass mesh tape, rust resistant fasteners. Mould resistant Drywall Type: Certain Teed Fiba Tape Mold-X10 Mould Resistant Drywall type with M2 Tech or approved alternate.

PART 3 - EXECUTION

3.1 **EXAMINATION**

- .1 Before application of drywall commences, ensure that services have been installed, tested, and approved; that conduits, pipes, cables, and outlets are plugged, capped, or covered; and that fastenings and supports installed by others are in place.

3.2 **INSTALLATION**

.1 General

- .1 Coordinate the Work of this Section with that of other Sections.
- .2 Install framing for support and incorporation of flush mounted and recessed components. Ensure adequacy of supports by consultation and verification of methods with those performing the Work of Divisions 22 to 28.
- .3 **Do not use through-the-roof deck flange hangers or puncture steel deck.**
- .4 Do not install metal framing, trim, casings, or accessories which have been bent, dented, or otherwise deformed.
- .5 Framing and furring shown on Drawings is indicative but do not regard it as exact or complete.
- .6 Provide for movement at intersections with structural members to avoid transference of loads to this Work.

3.2 **INSTALLATION (CONT'D)**

- .7 Make allowances for thermal movements in drywall systems of 1/2" min.
- .8 Do not support the Work of this Section from, nor make attachment to, ducts, pipes, conduit, or the support framing of the Work of other Sections.
- .9 Do not apply drywall in close proximity to hot pipes or heating ducts.
- .10 Install materials with the minimum of joints. Tightly butt joints, without force, and neatly align them.
- .11 Splice, framing members only where continuous lengths are not available from manufacturer.
- .12 Frame openings on every side with suitable sections. Provide clearances required at mechanical and electrical services, such as grilles, diffusers, access panels, and lighting fixtures only after verification of requirements in each case.
- .13 Coordinate Work with Section 06 10 00 to ensure that proper wood blocking for support of items secured to Work of this Section is installed and anchored adequately to prevent damage to Work of this Section.
- .14 Attach to framing adequate steel reinforcing members to support the load of, and to withstand the withdrawal and shear forces imposed by, items installed upon the Work of this Section.
- .15 Install each grab rail anchorage to withstand a force of 9500 pounds in all directions.
- .16 Include in Work; fire stopping bulkheads over doors, frames, screens, and changes in ceiling levels; stair soffits; furred beams; and pipe spaces; all as indicated on Drawings and required by the Ontario Building Code.
- .2 **Suspended Ceiling Framing and Furring:**
 - 1. Screw apply hanger anchoring devices with a collar to side of metal deck flute.
 - 2. Space hangers for runner channels to suit structure, to support ceiling load, at a max. distance of 4'-0" o.c., and at no greater distance than 6" from ends of runner channel.
 - 3. Install runner channels at 3'-0" o.c., generally, and at no greater distance than 6" from terminations of supported cross furring members. Bend rod hangers sharply under bottom flange or runners, and wire securely in place with saddle ties.
 - 3. Splice runner channels by lapping at least 12" with interlocking flanges and wired at each end with two loops. Do not bunch or line up splices.

3.2 INSTALLATION (CONT'D)

5. Install cross furring at 16" o.c., generally, and at no greater distance than 6" from walls, openings, breaks in continuity of ceiling, and changes of direction. Space furring in all cases to suit incorporated services, and so as to avoid contact with perimeter walls. Span hat-type furring no greater than 4'-0". Use metal studs for greater spans 1-5/8" deep spanning to 5'-0", 2-1/2" deep to 6'-0", and 3-5/8" deep to 8'-0".
6. Secure cross furring to supports with double wire ties or approved equivalent attachment. Splice by nesting and tying together with 8" overlap.
7. Erect entire hanger and suspension system to adequately support the ceiling assembly, including incorporated services, with a maximum deflection of 1/360 in the span of each component member, and free from horizontal movement.

.3 Metal Stud Partition Framing:

- .1 Secure ceiling and floor runner tracks at floor and tops of partitions for their full length, at 24" o.c. with concrete nails, square cut nails, toggle bolts, or sheet metal screws as suitable for base material. Install runner tracks also at heads and sills of openings. Secure runner tracks at openings by cutting flanges, turning up webs, and screwing to studs.
- .2 Install top runner deflection tracks with slotted oversized flanges at top of non-load bearing partitions to compensate for deflection of structure.
- .3 Install base runner tracks with oversized flanges to compensate for installation of poured in place cementitious floor toppings (min. 1" deep).
- .4 Butt, not mitre, runners at wall intersections and corners. At ceilings, lap and screw channels together.
- .5 Space studs at 16" O.C., generally; and at no greater distance than 2" from abutting walls, partitions and corners.
- .6 Secure studs to runners by screws, crimping, or welding, as required by stud type, and in accordance with manufacturer's design specification.
- .7 Install studs of depth indicated on Drawings: but in no case span studs 1-5/8" deep more than 9'-0" between supports; 2-1/2" deep, 12'-0"; and 3-5/8" deep, 16'-0".
- .8 Extend double studs on each side of all openings from floor to ceiling or structure above, whichever is indicated.
- .9 Erect three studs at corner and intermediate intersections of partitions.

3.2 INSTALLATION (CONT'D)

- .10 Install bracing channels in partitions, spaced equally in partition height, at no more than 3'-0" O.C. where not otherwise specified; over doors in partitions of greater height than 10'-0", spaced as preceding; and above and below window-type openings, spaced not more than 6" from the top and bottom of the opening. Install two lines of bracing in partitions up to 8'-0" high and three lines in partitions up to 12'-0" high. Install bracing channels in stud cut-outs, wire tied or welded to each stud, and extending horizontally across entire length of each braced partition and across two full stud spaces at each side of door and window openings.
- .11 Splice studs by nesting, with 8" minimum lap, and fastened with one screw in each flange.
- .12 Coordinate Work with others installing horizontal runs of service lines so that Work of all is done simultaneously.
- .13 Screw, or weld, frame anchor clips, of frames supplied under the Work of Section 08 11 13 "Hollow Metal Doors and Frames", to jamb studs, and head and sill runners. Ensure adequate fastening to prevent movement of the frame within the partition. Remove spreaders at floor after frames are anchored.
- .14 Unless shown otherwise on Drawings, partitions, together with wall board facings, shall extend above ceiling to underside of structure above or be laterally braced.
- .15 Ensure strict compliance with the limiting height tables for stud size, gauge and allowable deflection, and when used for alternate board products with different weights and performance.
- .16 Metal studs in walls required to have a fire resistance rating shall be installed so that there is a 1/2" clearance between the top of the stud and the top of the runner to allow for expansion in the event of fire.

.4 Accessories

- .1 At external corners install corner beads secured to framing at 6" o.c. on alternate flanges.
- .2 At board edges secure casing beads at 12' o.c. at edges exposed to view, where board butts against other materials with no trim to conceal junction, at control joints, at perimeter of ceiling surfaces, at tops of partitions where otherwise indicated on Drawings.
- .3 Install control joints in walls, partitions and ceilings at no greater spacing than 25'-0" in each direction, at perimeters of ceilings where they abut walls and other vertical surfaces, or as otherwise indicated. Line up control joints in other construction or with centre lines of mullions, columns, piers, or similar building elements.

3.2 INSTALLATION (CONT'D)

- .4 Install casings and thermal breaks at junctions of drywall with exterior door, window or screen frames. Apply self-sticking resilient sponge tape where gypsum board abuts, same, to casing bead.

.5 Application of Board

- .1 Extend board into door, window, and other opening reveals, and on metal stud partitions to structure above, unless noted otherwise on Drawings.
- .2 Board is to be cut to fit tight into deck flutes and around structural members to maintain acoustic & fire separations, thermal barriers and to provide a completed finish.
- .3 Apply board with long dimension perpendicular to supports except at stud partitions where they shall be parallel to studs for Fire Rated Assemblies.
- .4 Back all joints with a framing member. Locate joints on opposite sides of partitions on different studs, and at least 12" from opening jambs.
- .5 Install board in maximum lengths and widths to minimize joints, and in lengths of 6'-0" minimum. Stagger end joints where they are unavoidable.
- .6 Form neat joints at mill ends and at job cut edges of board panels. Cut paper on face with knife. Smooth by sanding and rubbing edges together.
- .7 Fasten wallboard to metal support members by sheet metal drywall screws 3/8" minimum and 1/2" maximum from centre of joints. Space screws:
 - .1 At ceilings of fire rated board at 8" o.c. at edges and in field.
 - .2 At walls of fire rated board at 8" o.c. at edges and 12" o.c. in field.
 - .3 Locate screws opposite one another in adjacent panels.
 - .4 At walls and ceilings where non-fire rated board is used at 12" o.c. at edges and in field.
 - .5 To both double jamb studs for all openings @ 8" o.c.
- .8 Start application on walls at corners of rooms, and on ceilings from centre line of spaces. Do not force adjacent boards into place; allow moderate contact. Install extension clips where required. Drive screws to form a slight depression, but not so paper cover is broken.
- .9 Nail board to wood furring as specified in CSA Standard A82.31.

3.2 **INSTALLATION (CONT'D)**

- .10 Ensure gypsum board sits tight to floor surface to provide full support for wall bases.
- .6 Control Joints for Gypsum Board partitions
 - .1 Control joints should be employed in long expanses of partitions at 25-foot intervals, from floor to ceiling. Control joints are recommended at doorjamb, extending from door head to ceiling. Where doorjamb extends from floor to ceiling and are spaced less than 25 feet apart, no control joints are required.
 - .2 Control joints are required in ceilings to limit areas to 2,500 square feet. Additionally, control joints should be installed in ceilings to limit dimensions in either direction to 50 feet. Control joints should be installed where ceiling framing or furring changes direction.
- .7 Finishing of Joints and Depressions:
 - .1 Fill joints, casing beads, corner beads, holes at board fasteners and depressions on board surfaces exposed to view to ensure smooth seamless surfaces and square neat corners. Use jointing compounds and reinforcing tapes in conformance with manufacturer's specification. Ensure that board is tight against framing members, fasteners are properly depressed, and adhesives have sufficiently cured.
 - .2 For joints not exposed to view but are part of an acoustic wall with insulation fill, an STC Rating or a Fire Rating, these are to be fully taped and mudded full height.
 - .3 Fill joints by three-coat method:
 - .1 Embed reinforcing tape in a cover coat of joint filler.
 - .2 Apply skim coat of topping cement when level coat has dried.
 - .3 Feather edges of compounds into surfaces of wallboards.
After skim coat has dried for at least 24 hours sand to leave smooth. Do not sandpaper face of wallboard.
 - .4 At bevelled joints: Apply cover coat 7" wide, level coat 10" wide, and skim coat 12" wide.
 - .5 At end joints and butt joints formed at cut edges of wallboard. Apply cover coat 14" wide, level coat 20" wide, and skim coat 24" wide. Camber treatment over end joints to 1/32" thick at most.

3.2 INSTALLATION (CONT'D)

- .6 At Internal Corners: First fill gaps between boards with joint filler. Embed creased reinforcing tape in a thin coat of joint filler applied 2" wide at each side of corner. Apply cover coat as specified for bevelled joints) to just one side of joint, and when dry, apply skim coat to other side.
- .7 At External Corners: Fill to nose of corner bead with joint filler and topping cement as specified for bevelled joints.
- .8 At casing beads: As specified for bevelled joints.
- .9 At Board Fasteners: Fill holes and depressions with a two coat application of joint filler.

.8 Caulking

- .1 Caulk between casing beads and other construction where junctions are exposed to view.
- .2 Caulk junctions between drywall fire separations and projections, and other construction to ensure that integrity of fire rating is maintained. Ensure that caulked joints provide a continuous seal and that they are caulked before other Work encloses them.
- .3 Clean joints, prime and install sealants in accordance with the requirements of Section "07 90 00 Joint Protection".

.9 Bracing:

- .1 Non-Full Height walls require lateral bracing every 6'-8'.
- .2 Corner braces and/or angle braces up to roof / floor structure on both sides of walls are required.
- .3 Securing top track only to the underside of an acoustic tile T-bar ceiling is not permitted. Lateral bracing is still required for walls as noted above , however, connection of top track to the framing for a suspended drywall ceiling is permitted.

.10 Openings:

- .1 All openings in fire separations require double studs on both sides.
- .2 Refer to the fire damper installation documents for framing requirements around dampers.

3.2 INSTALLATION (CONT'D)

- .3 In non-fire separations, openings >6' up to 12', provide double studs on both sides.
- .4 Openings up to 4 feet - Track only lintel is acceptable, except in a fire separation use a double track lintel.

3.3 CONSTRUCTION OF SOUND ATTENUATED PARTITIONS

- .1 Execute as follows for all gypsum board wall construction:
 - .1 Install sound attenuation batts.
 - .2 A 1/8" continuous bead of acoustical sealant around perimeter of wall at web of top and bottom tracks and end studs. Lay gypsum board into position forcing caulking bead to fill space between gypsum board and structure.
 - .3 Seal full perimeter for cut-outs around electrical boxes, pipes and ducts and perimeter convactor pipes with acoustical sealant.

3.4 CONSTRUCTION OF FIRE RATED PARTITIONS AND CEILINGS

- .1 Construct all gypsum board partitions and ceilings identified to require a fire resistance rating in strict conformance with U.L.C. Designs or approved alternate.
- .2 Fit assemblies tightly to enclosing constructions to maintain integrity of the separations.

3.5 TILE BACKER BOARD APPLICATIONS

- .1 Studs and retaining t's are to be spaced at 16" o.c. max. deflection = 1/360 of span.
- .2 Install 1/2" tile backer board in all areas and washrooms to receive ceramic tiling. Install board with the grey face out away from framing. Boards can be set parallel or perpendicular to the wall framing.
- .3 To extend 6'-0" from F.F.L. continuous around perimeter in Washrooms, full height in Showers.
- .4 Fasten at 150mm (6") o.c. and a min. of 12.7mm (1/2") from edges. Drive fasteners flush to coated surface of board.
- .5 Joint Treatment: Butt ends and edges snugly and fit tight around all cut-outs and adjacent surfaces. Reinforce all joints with a 50mm (2") wide 10 x 10 coated glass mesh tape embedded in the adhesive to be used by the tile installer.

3.5 TILE BACKER BOARD APPLICATIONS (CONT'D)

- .6 Follow the manufacturers literature and instructions to ensure compliance with the limited warranty. If any part of these instructions are in conflict with the contract documents request clarification from the architect.

3.6 ADJUSTMENT & CLEANING

- .1 Remove droppings and excess of joint compound from Work of others, and from Work of this Section, before it sets.
- .2 Make good to cut-outs for services and other Work, fill in defective joints, holes and other depressions with joint compound.
- .3 Make good defective work, and ensure that surfaces are smooth, evenly textured and within specified tolerances to receive finish treatment.
- .4 Clean off beads, casings and other metal trim, and leave all surfaces ready for specified finishes.

END OF SECTION

DIVISION 09 - FINISHES

PART 1 - GENERAL

1.1 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- .1 Gypsum Board Assemblies Section 09 21 16

1.3 REFERENCE STANDARDS

- .1 Do tile work in accordance with Installation Manual 200 Ceramic Tile, produced by the Terrazzo, Tile and Marble Association of Canada (T.T.M.A.C.).

1.4 SUBMITTALS

- .1 Submit 2 random samples of each colour of ceramic tile used on this project; clearly identify with manufacturer's name, colour number and project number. Do not proceed with work until samples have been approved by Consultant.
- .2 Mount tile on 1/2" plywood 12" x 12" complete with grout colour to represent project installation.

1.5 PROTECTION

- .1 Protect Work of this Section against damage by other trades for minimum 72 hours after application by prohibiting passage of traffic over tile.
- .2 To prevent soiling or damage to finish flooring where pedestrian traffic occurs after the flooring has been installed, install and maintain 0.152mm polyethylene membrane or reinforced kraft paper temporary protection, secured in place and with joints sealed by reinforced pressure sensitive tape.
- .3 Install plywood panels of minimum 6mm thickness over completed finish flooring materials on which further construction work is performed or delivery of products is made, or both. Seal joints between panels with reinforced pressure sensitive tape.

1.6 QUALIFICATION

- .1 Contractor to require membership in good standing with the TTMAC and must have 10 years experience in the Work of this Section.
- * .2 Subcontractor to submit a list of 5 previous jobs where he has performed similar work in scale and scope for review by the Consultant and Owner, representative of his workmanship.

1.6 QUALIFICATION (CONT'D)

- * .3 Subcontractor to provide documentation that he has required manpower for the scale of this job, to meet the construction schedule.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Ceramic Floor Tile and Base: Must Series, Unglazed Porcelain Tile, 24" x 24", colour taupe matte, code OV.MU.TPE.2424 Matte, by Olympia Tile or approved alternate.
- .2 Ceramic Wall Tile: Colour and Dimension Series, Glazed wall tile, 4" x 16", Arctic White Bright, code: Qt.CD.ARW.0416.BR by Olympia Tile or approved alternate.
- .3 Waterproofing Mortar : "Mapelastic 315".
- .4 Cement: to CAN/CSA-A5-M77, colour to Consultant's selection.
- .5 Sand: to CAN/CSA A82.56-M1976.
- .6 Lime: to CAN/CSA A82.43-1950 (R1971).
- .7 Latex: formulated for use in cement mortar.
- .8 Water: potable and free of minerals which may discolour mortar.
- .9 Dry Set Mortar: to ANSI A118.1-1976 - Kerabond by Mapei.
- .10 Grouts:
 - .1 Keracolor S Grout by Mapei: For all floor tiles;
 - .2 Keracolor U Grout by Mapei: For all wall tiles
 - .3 All grouts to be sealed through.
- .11 Epoxy Mortar: "Flextile 100 Epoxy mortar or approved alternate.
- .12 Epoxy Grout: Kerapoxy or Kerapoxy CQ Grout by Mapei, or LATICRETE® SPECTRALOCK® PRO Premium Grout
- .13 Level Cure - LCB as manufactured by Master Builders Ltd.
- .14 Sealants - conform to Section 07 90 00.
NOTE: Colour selection for acid resistant grout shall match tile colour.

2.1 MATERIALS (CONT'D)

- .15 Sealers - as recommended by the Mortar Manufacturer. Wax for protection after sealer as recommended by the Mortar Manufacturer to meet pre-requirements of T.T.MAC #3000 series.
- .16 Special Tile Shapes - bullnosed, dado cap and coved bases.
- .17 Scratch & Levelling Coat: (by volume): One part Portland cement, 4 parts sand and latex additive where required by TTMAC Details. Premixed mortar may be used per manufacturers instructions. Adjust water volume depending on moisture content of sand to obtain the required consistency and workability.

2.2 MANUFACTURED COMPONENTS AND ACCESSORIES

- .1 Edge and Transition Strips: Roll-formed stainless steel edge strips, 3 mm wide at top edge; with integral perforated anchoring leg for setting the strip into the setting material; height as required; brushed finish; eg. SCHIENE-EB by Schluter Systems (Canada) Inc.
- .2 Tapered Transition Strips – To Other Floor Finishes: Roll-formed stainless steel transition strips; profile and height as indicated; with integral perforated anchoring leg for setting the strip into the setting material; sloped transition and decorative edge strip for transition from tile to lower finish; brushed finish; eg. RENO-EBU by Schluter Systems (Canada) Inc.
- .3 Tapered Transition Strips: To Concrete Floors: Extruded aluminum transition strips; with integral perforated anchoring leg for setting the strip into the setting material; sloped transition and decorative edge strip for transition from tile to lower finish; height as requested satin anodized finish; eg. RENO-RAMP AE by Schluter Systems (Canada) Inc.
- .4 Stair Nosings: Photoluminescent tile nosing complete with Ecoglo step definition strip and slip resistance strip in anodized aluminum profile. M4 Series Nosing, Model M417.10 Black, for use with ceramic tile by Kinesik.
- .5 Decorative Edge Trim: Extruded aluminum decorative edge trim with integral perforated anchoring leg for setting the strip into the setting material; complete with pre-formed corners; satin anodized finish; e.g. RONDEC-DB 14 AE by Schluter Systems (Canada) Inc.
- .6 Tile Expansion and Control Joints for Thin-Set Applications: Roll formed stainless steel profiles joined by a soft CPE movement joint material, with integral perforated anchoring legs for setting the joint into the setting bed; height as required to suit application; insert colour as selected by Consultant; eg. DILEX-EKSN by Schluter Systems (Canada) Inc.
- .7 Waterproofing Membrane System: To ANSI A118.10; soft polyethylene membrane with fleece webbing laminated on both sides; use special cut-width rolls and special shapes for corners and pipe sleeves; KERDI by Schluter Systems (Canada) Inc.

2.2 **MANUFACTURED COMPONENTS AND ACCESSORIES (CONT'D)**

- .8 Uncoupling Membrane: To ANSI A118.10; 3mm thick high density polyethylene membrane with grid structure of 12 x 12 mm square cavities, each cut back in dovetail configuration, and polypropylene anchoring fleece laminated to underside; eg. DITRA by Schluter Systems (Canada) Inc.

2.3 **ACCESSORIES**

- .1 Crack Isolation Membrane: Loadbearing membrane, ASNI A118.12, High Performance Rating.
- .2 Reinforcing Mesh: 50 x 50 mm size; 1.6 mm thick steel wire mesh; welded fabric, galvanized.
- .3 Metal Lath: To ASTM C847; 1.4 kg/m² galvanized steel lath.
- .4 Tape: 50 mm fibre mesh tape, as recommended by backer board manufacturer.

PART 3 - EXECUTION

3.1 **EXAMINATION**

- .1 Examine surfaces prepared to receive installation of tiling. If discrepancies exist, report to Architect. Installation of any part of the Work will be construed as acceptance of such surfaces as being satisfactory.
- .2 Ensure compatibility of abrasives and fillers supplied under this Section and which will bear contact with substrate materials.

3.2 **INSTALLATION**

- .1 **Prior to installation of floor finishes, the General Contractor is to verify and confirm that there is Positive Drainage to all floor and trench drains without ponding. Failure to comply with this requirement will result in the removal and replacement of the floor slab at his cost.**
- .2 Do not install any floor finishes until the requirement in 3.2.1 has been met.
- .3 Regard recommendations, installation methods specified and illustrated in Terrazzo, Tile and marble Association Manual No. 22 - 1979, and applicable manufacturer's instructions as minimum acceptable standard, except as varied by this Specification.
- .4 Use tile setting method specified hereinafter.
- .5 Obtain Architect's approval of surfaces over which tile is to be installed before commencing tiling.
- .6 Place tile snugly around piping, fixtures and other items built in or passing through tile work. Form external angles with round edge tile extending over edge of square edge adjacent tile. Internal angles shall be formed square, carrying 1 flat tile past edge of other.

3.2 INSTALLATION (CONT'D)

- .7 Drill holes for fixing accessories of other trades.
- .8 Finish surfaces flat and level or sloped and graded as required.
- .9 Provide strings, caps, coves, corners, angles and other moulded pieces to suit requirements of job. Ensure that striping and joints are in alignment.
- .10 Lay out borders and defined lines, wherever they occur, prior to setting of adjacent tiles. Keep inner edges of borders against fields or wall panels straight.
- .11 Cut tiles to conform to irregularities in wall lines and vertical planes along outer edges. Smooth cut edges with carborundum block or by other means to provide clean straight edges.
- .12 Make joints of tiles 3 mm (1/8") in width. Point joints with specified mortar or grout. Remove strings and wedges used for jointing and bracing prior to mortar or grouting.
- .13 Re-point joints after cleaning to eliminate imperfections. Avoid scratching tile surfaces.
- .14 Finished tile to be clean and free of tiles which are pitted, chipped, cracked or scratched.
- .15 Apply by steel trowel level cure where required to build up existing concrete floors to elevations as noted on the Drawings or as directed by the Consultant or Owner.
- .16 Install expansion joints at maximum 20'-0" o.c. in both directions.
- .17 All floor and wall tiles to be installed with acid resistant grout and waterproof mortar.
- .18 All grouts are to match colours in Schedules on Specification. All grouts to be sealed through.
- .19 Tile setting accessory installation
 - 1. Install solid metal edge strips at unprotected exposed edges of flooring and wall tiles.
 - 2. Install in continuous lengths, to level straight lines by pressing the perforated anchoring leg of the accessory solidly into the tile setting adhesive.
 - 3. Butt ends of units tightly together with hairline joints.
 - 4. Trowel an additional layer of tile setting material over the anchored leg of the accessory prior to placement of tiles.
 - 5. Set tile flush with top of setting accessory.
 - 6. Leave a 3mm joint between tile and tile setting accessory for the filling of grout.
 - 7. Install preformed corners, endcaps, and trim at changes in direction and at terminations.

3.2 **INSTALLATION (CONT'D)**

8. Mitred joints are not acceptable and will be rejected.

.20 **Layout tile pattern on walls and floors such that pieces at either end are no smaller than 1/3 of a full tile.**

3.3 **MOVEMENT JOINTS**

.1 Install expansion and control joints in strict compliance with the TTMAC detail 301 MJ.

.2 Keep expansion and control joints free of setting materials.

.3 In addition to the guidelines outlined in the TTMAC Specification Guide 09 30 00, provide movement joints over cold joints, saw cuts, at columns and at wall plane changes.

3.4 **CLEANING**

.1 Clean tile work progressively as work proceeds. Do not allow mortar to stain absorbent tile.

.2 Do not use acids for cleaning unless specifically recommended by the manufacturer.

.3 Clean tile in accordance to tile manufacturer's recommendations by procedures and products certified with the T.T.M.A.C. "Maintenance Guide".

.4 Machine scrub unglazed tile.

.5 Remove and replace defective, damaged, loose and unbonded tile, and point defective joints.

3.5 **SEALING**

.1 Seal tiles subject to discolouration from grouts prior to grouting.

.2 Seal tiles where recommended by manufacturer using procedures and products certified with the T.T.M.A.C.

.3 Apply 2 coats of #3000 series sealer to unglazed floor tile after being cleaned and dried.

3.6 **PROTECTION**

.1 Protect finished areas from traffic until setting materials have sufficiently cured.

.2 Protect grouted areas from traffic for 24 hours after grouting.

.3 Provide protective covering until Owner occupancy.

3.6 PROTECTION (CONT'D)

- .4 Protect wall tiles and bases from impact, vibration, heavy hammering on adjacent and opposite walls for at least 14 days after installation.

3.7 MAINTENANCE MATERIALS

- .1 Supply to owner min 4 boxes of each tile colour, pattern and type of material, labelled by colour and area of use.
- .2 Submit as per Specification Section 01 33 00.

3.8 TTMAC REFERENCE DETAILS

- .1 Tile Installed Over Masonry or Concrete Walls – Thin-Set Method: TTMAC Detail 303W.
- .2 Tile Installed Over Gypsum Board – Thin-Set Method: TTMAC Detail 304W.
- .3 Tile Installed on Coated Glass Mat Backer Board: TTMAC Detail 305W (B – Interior Wet/Dry Areas).
- .4 Tile Bonded to Concrete Slab – Thin-Set Method: TTMAC Detail 311F (A – Interior/Exterior), or (C – Crack Concrete Interior/Exterior – Full Coverage).
- .5 Tile Applied Over Wood Subfloor in Dry Areas – Thin-Set Method: TTMAC Detail 313F (A-Thin-Set on Plywood).
- .6 Tile Installed on Interior/Exterior Stairs (Concrete Stairs): TTMAC Detail 318 (E).
- .7 Tile on Shower Receptors: TTMAC Detail 319 SR (B – Thin-Set on Backer Unit/Board).
- .8 Tile on Shower Receptors – Curbless / Barrier Free Shower: TTMAC Detail 319 SR/BF/C (A-Curbless/Barrier Free Shower Construction on Recessed Concrete Slab).
- .9 Large Format Tile on Interior Floors: TTMAC Detail 329 LFT.
- .10 Large Format Tile on Interior Walls: TTMAC Detail 330 LFTW.

END OF SECTION

DIVISION 09 - FINISHES

PART 1 – GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 RELATED WORK SPECIFIED ELSEWHERE

- .1 Gypsum Board Assemblies: Section 09 21 16
- .2 Painting: Section 09 91 00
- .3 Mechanical Divisions 20- 23
- .4 Electrical Divisions 26- 28

1.2 REFERENCE STANDARDS

- .1 Do all installation in accordance with ASTM C636, except where specified elsewhere.

1.3 DESIGN CRITERIA

- .1 Maximum deflection to be 1/360th. of span to ASTM C635-78, deflection test.

1.4 SUBMITTALS

- .1 Submit samples including all pertinent information showing basic construction and assembly, treatment at walls, recessed fixtures. Splicing, interlocking, finishes, acoustical unit installation.
- .2 At completion of the project provide an additional 2% of ceiling panels for future use. Package and label panels and turn over to Owner. Where the resultant 2% results in less than 1 full case of tiles provide a minimum 2 cases. Cut tiles will not be accepted as part of this submission.

1.5 WARRANTY

- .1 Acoustical Panels: 30 years against sagging and warping.
- .2 Grid System; 30 years against rusting and manufacturers defects.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Acoustic Ceiling Tiles:

- .1 Acoustic Ceiling Tile (ACT-1): To ASTM E1264, Type A, Form A1.2, Pattern E; well-formed mineral fibre non-sagging lay-in tile, complete with anti-mould and mildew treatment, and sag resisting treatment; as follows:

- .1 Size: 610 x 1 220 mm size.
- .2 Thickness: 16 mm.
- .3 Pattern: Medium texture, fissured.
- .4 Edge: Square.
- .5 Weight: 1.09lbs.ft²
- .6 Finish: Factory-applied latex paint, White colour.
- .7 Fire Resistance (CAN/ULC-S102): Class A.
- .8 Noise Reduction Coefficient: NRC ≥ 0.55.
- .9 Light Reflectance: LR ≥ 0.80.
- .10 Manufacturer and Product Name: Cortega Item No. 823 Fire Guard by Armstrong World Industries or approved alternate.

.2 Approved Equivalent.

- .2 In rooms with existing tile and grid remaining, match existing.

- .3 All components shall be listed or labelled for fire resistance classification as required.

.4 Ceiling Hanger System:

.1 Wire Hanger Anchoring Devices:

- .1 Phillips Red Head by Phillips Drill Company of Canada Limited.
- .2 T32, self-drilling for use in concrete deck.
- .3 WS-3822 wedge anchor with tie wire insert for use in composite concrete and steel deck.
- .4 “Grabber” H-2,1/4”x2” Drill Point Screw Eye Lag for use in steel deck as otherwise approved.
- .5 All anchors to be fastened to lower/bottom flute of metal deck.

2.1 MATERIALS (CONT'D)

.2 Hangers:

- .1 Zinc coated annealed steel wire; 12 ga. to support a maximum weight of 150 pounds per hanger.
- .2 9 ga. to support a maximum weight of 310 pounds per hanger and zinc coated annealed steel rod.
- .3 3/16" dia. to support a maximum weight of 500 pounds per hanger

.5 Ceiling Grid:

- .1 Components: All main beams and cross tees shall be Class HD commercial quality, heavy duty, hot dipped galvanized (galvanized steel, aluminum or stainless steel) as per ASTM A 653. Main beams and cross tees are double-web steel construction with type exposed interlocking flange design. Exposed surfaces chemically cleansed, capping pre-finishes galvanized steel (aluminum or stainless steel) in baked polyester paint. Main beams and cross tees shall have rotary stitching (exception: extruded aluminum or stainless steel).
 - .1 Structural Classification: ASTM C 635 HD.
 - .2 Colour: Low sheen baked enamel White, unless noted otherwise.
 - .3 Acceptable Product: design based on DX/DXL as manufactured by CGC Inc. or Prelude XL by Armstrong World Industries.
- .2 Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct hung unless otherwise indicated.
- .3 Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least three times design load, but not less than 12 gauge.
- .4 Support channels and hangers, galvanized steel, to rigidly secure ceiling system with max deflection of L/360.
- .5 Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.
- .6 All components to be rated for seismic "D,E,F" category. Refer to Structural Drawings and O.B.C. Matrix.

2.1 MATERIALS (CONT'D)

- .7 Exposed Perimeter Trim: Extruded aluminum, knife edge design, straight profile, 60 mm high, 200 mm wide; complete with pre-mitred inside and outside corner units, hanging clips, connector clips, splice clips, alignment clips, hold-down clips, and adjustable trim clips; White baked enamel finish; eg. Axiom Knife Edge AXKE2STR by Armstrong World Industries.
- .6 Accessories: splices, clips, stabilizer bars, hold down clips, wire ties, retainers and flush type wall moulding to complement suspension system components as per manufacturer's instructions.
- .7 Ship materials to site in manufacturer's original cartons. Maintain dry condition, piled in accordance with manufacturer's recommendations.

PART 3 – EXECUTION

3.1 EXAMINATION

- .1 Verify layout of hangers will not interfere with other work.
- .2 Verify ducts, pipes, fittings and other penetrations have been properly installed.
- .3 Examine all site conditions and other work upon which this work depends. Advise Architect in writing of unsatisfactory preparation work. Commencement of work implies acceptance of conditions as satisfactory.

3.2 SUSPENDED CEILING GRID

- .1 Install suspended ceiling grid system to ASTM C636/C636M and Cisca installation standards.
- .2 Provide support channel and hanger assemblies necessary for suspended planks.
- .3 Suspended planks from support assembly using caps, cross tree plugs, and threaded studs, mounted at height above finished floor as indicated on Drawings.
- .4 Hang suspended ceiling grid directly from structural elements, independent of walls, columns, metal deck, ducts, pipe fittings and conduit. Provide additional support channels and hangers.
- .5 Install suspension system to manufacturer's instruction and to structure with screws and metal clip/anchors. **Do not puncture steel deck.**
- .6 Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers to span the extra distance.

3.2 **SUSPENDED CEILING GRID (CONT'D)**

- .7 Install additional hangers and reinforcing to accommodate loads being carried.

3.3 **INSTALLATION**

- .1 Examine site conditions and other work upon which this work depends. Advise Architect in writing of unsatisfactory preparation work. Commencement of work implies acceptance of conditions as satisfactory.
- .2 Install suspension system to manufacturer's instruction and to structure with screws and metal clip/anchors. **Do not puncture steel deck.**
- .3 Conform to ceiling pattern as shown on Drawings.
- .4 Space hanger wires 1210 mm (48") o.c. maximum along main tees and within 150 mm (6") of end of main tee.
- .5 Do not erect ceiling suspension system until work above ceiling has been inspected by the Consultant.
- .6 Lay out centre line of ceiling both ways, to provide balanced borders at room perimeter as indicated on the Reflected Ceiling Plan.
- .7 Install wall moulding to provide correct ceiling height. Level finished ceiling to within 1:1000.
- .8 Completed suspension system shall support-imposed loads, such as, lighting fixtures, diffusers and grilles and speakers.
- .9 Support light fixtures and diffusers with additional ceiling suspension hangers within 150 mm (6") and at maximum 610 mm (12 ½") around perimeter of fixture as directed by the Architect/Consultant.
- .10 Co-ordinate suspension system with location of related components.
- .11 Interlock cross tee to main tee to provide rigid assembly.
- .12 Install exposed perimeter trim at exposed system edges.
- .13 Do not install finished ceiling panels until suspension system has been inspected by Architect.
- .14 Install ceiling suspension system as required by manufacturer to meet all guidelines and requirements of seismic category "D,E,F".

3.4 CEILING TILES

- .1 Fit ceiling tiles within grid, free from damaged edges.
- .2 Neatly cut ceiling tiles to accommodate necessary penetrations.
- .3 Cut and rabbet ceiling tiles at border areas and vertical surfaces.
- .4 Lay directional patterned units on way with pattern parallel to longest room axis. Fit border neatly against abutting surfaces.
- .5 Install hold-down clips to retain ceiling tiles tight to grid system within 6 000 mm of exterior door and entire vestibules.

3.5 ADJUSTMENT AND CLEANING

- .1 All chipped or cracked tiles, scratched or abraded tiles, loosely fit tiles, or over cut tiles are to be replaced at direction of Architect.

3.6 MAINTENANCE MATERIALS

- .1 Supply to owner a minimum of 4 boxes of each acoustic ceiling tile type, labelled.
- .2 Submit as per Specification Section 01 33 00.

END OF SECTION

DIVISION 09 - FINISHES

PART 1 – GENERAL

1.1 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1	Cast-In-Place Concrete	Section 03 30 00
.2	Tiling	Section 09 30 00
.3	Resilient Tile Flooring	Section 09 65 19
.4	Carpeting	Section 09 68 13
.5	Sanitary Drains	Section 22 13 13

1.3 REFERENCES

- .1 ASTM A240/A240-22b: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .2 ASTM F710-22: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
- .3 ASTM F1303-04 (2021): Standard Specification for Sheet Vinyl Floor Covering with Backing.
- .4 ASTM F1869-23: Standard Test Method for Measuring Moisture Vapour Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- .5 ASTM F2170-19a: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
- .6 ASTM F2678-16 (2021): Standard Practice for Preparing Panel Underlayments, Thick Poured Gypsum Concrete Underlayments, Thick Poured Lightweight Cellular Concrete Underlayments, and Concrete Subfloors with Underlayment Patching Compounds to Receive Resilient Flooring.
- .7 ASTM F3191-23: Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.
- .8 ASTM F3441-24a: Standard Guide for Measurement of pH Involving Resilient Flooring Installations.

1.4 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Selection Samples: Duplication 300 x 300 mm size sampled of each specified Product, illustrating manufacturer's complete line of available colours and patterns.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit samples as per Section 01 33 00.
- .2 Maintenance Data: Manufacturer's standard maintenance and cleaning guidelines sufficient quantity for inclusion in operation and maintenance manual.

1.6 EXTRA STOCK MATERIALS

- .1 Supply extra stock materials as specified in Section 01 78 00.
- .2 Extra Stock Materials: Three percent or 6 m², whichever is greater, of each Product, colour and pattern; clearly marked to identify:
 - .1 Manufacturer's name,
 - .2 Product's name,
 - .3 Product colour and pattern.
- .3 Supply roll goods in full width rolls.
- .4 Store roll goods in upright position, with roll wrapped in a protective cover to prevent damage.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver and store Products undamaged in original wrapping or cartons.
- .3 Store Products for minimum 3 days prior to installation in warm dry room.

1.8 AMBIENT CONDITIONS

- .1 Maintain ambient air temperature of 20 degrees C three days prior to, during and 48 hours after installation.
- .2 Maintain ambient air relative humidity level between 35 percent and 55 percent RH.
- .3 Do not lay flooring in condition of high humidity or where exposed to cold drafts.
- .4 In hot weather, protect flooring from direct sunlight.

1.8 AMBIENT CONDITIONS (CONT'D)

- .5 Provide adequate ventilation.

PART 2 - PRODUCT

2.1 MATERIALS

- .1 Resilient Sheet Flooring: To ASTM F1903 + F1700, tonal non directional heavy duty homogenous flooring:
 - .1 Thickness: 2.0 mm.
 - .2 Roll Width: 2 000 mm x 20 m.
 - .3 Static Coefficient of Slip Resistance (ASTM D2047): 0.92 (Dry), 0.88 (Wet).
 - .4 Colour and Pattern: to be selected by Architect.
 - .5 Manufacturer and Product Name: Series Polysafe, Verona Pur, by Polyflor, or approved Alternate.

2.2 ADHESIVES

- .1 Adhesive for Resilient Sheet Flooring: Two-part resin-based polyurethane adhesive; eg. Johnsonite 975 by Tarkett Johnsonite. Or approved alternate.

2.3 ACCESSORIES

- .1 Underlayment Patching Compound: Self-drying, hydraulic cement-based underlayment, having a trowel-applied consistency; mould-and mildew-resistant; capable of achieving a true feather edge; zero VOC content; eg. Feather Finish by Ardex Americas.
- .2 Seam Welding Rods for Resilient Sheet Flooring and Cushioned Sheet Flooring: 4 mm OD vinyl, solid colour; colour matched to resilient sheet flooring.
- .3 Cove Filler Strip: 38 x 38 mm size, 44 mm radius, extruded fire rated vinyl; eg. Tarkett Johnsonite CFS-00.
- .4 Metal Base Caps: Purpose made stainless steel profiles, to ASTM A240/A240M, Type 304; with AISI No. 4 – Brushed finish.
- .5 Resilient Transition Strips: As specified in Section 09 65 13.
- .6 Drain Ring: Stainless steel, mechanically fastened type, diameter to suit floor drain.
- .7 Primers: Waterproof type.
- .8 Sealers and Wax: As recommended by flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Refer to Section 01 70 00.
- .2 Verify surfaces are dry, true, even and smooth, and free of gaps, holes, depressions, paint, grease and oil.
- .3 Verify concrete slabs have cured for minimum 28 days.
- .4 Verify concrete slabs have pH level between 7 and 10, to ASTM F3441.
- .5 Conduct moisture vapour emission rate tests on concrete slabs-on-fill to ASTM F1869. Do not proceed with installation until tests indicate MVER $\leq$ 1.4 kg per 100 sm for 24 hours.
- .6 Conduct relative humidity tests on concrete slabs to ASTM F2170. Do not proceed with installation until tests indicate RH $\leq$ 75 percent.
- .7 Determine absorptive nature of substrate by conducting porosity tests to ASTM F3191.

3.2 PREPARATION

- .1 Prepare substrate recommended by manufacturer for absorptive conditions determined by porosity test. Conform to ASTM F710.
- .2 Prepare underlayment patching compounds and slab surfaces to ASTM F2678.
- .3 Clean substrate to remove deleterious matter that would impair subsequent installation.
- .4 Prime substrate to endure proper adhesion of Products.

3.3 INSTALLATION

- .1 Spread only enough adhesive to permit installation of materials before initial set.
- .2 Set flooring in place, press with heavy roller to attain full adhesion.
- .3 Lay flooring with joints and seams parallel to building lines to produce minimum number of seams.
- .4 Provide minimum of one-third full roll width.
- .5 Double cut sheets and continuously seal seams to ASTM F1516 with matching seam welding rods.
- .6 Lay flooring continuously from wall to wall in each area, including beneath casework.
- .7 Terminate flooring at center line of door openings where adjacent floor finish is dissimilar.

3.3 INSTALLATION (CONT'D)

- .8 Scribe flooring to walls, columns, floor outlets, and other appurtenances to produce tight joints.
- .9 Connect sheet flooring to floor drain assembly with mechanically-fastened stainless steel drain ring. Secure in accordance with drain manufacturer's recommendations.
- .10 Flash Coved Base:
 - .1 Install cove filler strip at wall-to-floor junction.
 - .2 Flash cove sheet flooring over cove filler strip and up wall surface minimum 150 mm.
 - .3 Cap upper edge with metal base cap.

3.4 CLEANING

- .1 Refer to Section 01 74 00.
- .3 Clean, seal and wax installed Products.

3.5 PROTECTION

- .1 Refer to Section 01 76 00.
- .2 Protect completed installation with suitable and durable materials or by keeping traffic off floor.
- .3 Maintain protection until Owner occupancy.

END OF SECTION

DIVISION 09 - FINISHES

PART 1 – GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 RELATED WORK SPECIFIED ELSEWHERE

- .1 Rough Carpentry Section 06 10 00
- .2 H.M. Doors and Frames Section 08 14 00
- .3 Gypsum Board Assemblies Section 09 21 16
- .4 Shop Priming Specified in Various Sections of the Specification
- .5 Factory Applied Paint Coatings Unless otherwise Specified
- .6 Fire Suppression Division 21
- .7 Plumbing Division 22
- .8 HVAC Division 23
- .9 Integrated Automation Division 25
- .10 Electrical Division 26
- .11 Communications Division 27
- .12 Electronic Safety and Security Division 28

1.2 SCOPE OF WORK

- .1 With exceptions specified above or specifically called for in other Sections of the Specification, all paintwork is included in the scope of this Section of the Specification. Colours will be specified at a later date by the Owner, allow for accent walls of primary colour to some areas, **maximum 12 colours.** Refer to Finish Plans & Details on Drawings &/or in Specification.
- .2 In locations where Drawings do not call for paint or similar finish on walls and/or ceilings, the intent of this Specification is that all wood and metal surfaces normally painted or similarly finished shall be so treated.

1.2 SCOPE OF WORK (CONT'D)

- .3 Paint exposed drywall and the like in locations where finish is not otherwise specified or noted. Do not paint such surfaces in mechanical shafts, unless specifically noted.
- .4 In locations where Drawings do not call for paint or similar finish on walls and/or ceilings, the intent of this Specification is that items such as new work or patched work, including miscellaneous metal work, shall be painted.
- .5 Patched work on walls or ceilings shall require a complete surface to be painted, back to a proper cut off point, i.e. corner or change in direction from floor to ceiling for walls and wall to wall for ceilings.
- .6 Paint all perimeter and interior walls floor to ceiling prior to the installation of equipment, millwork or other devices.
- .7 Paint new pipes, conduit, ducts and related thermal insulation and all prime painted mechanical and electrical equipment and supports located in mechanical and electrical storage and maintenance rooms in all locations where Drawings call for paint or similar finish on walls and/or ceilings.
- .8 Do not paint pipe, conduit, ducts, insulation and the like where concealed above ceilings or in service shafts.
- .9 Items exposed on the roof shall be shop painted. Refinish all new and existing H.V.A.C. units to selected colours where noted on Elevation, Plans and Schedules.
- .10 Make good paint finish on shop coated work where damaged.
- .11 Paint edges and all faces of doors where primed for paint supplied.
- .12 Paint all exposed suspension rods and hanging devices located in an exposed ceiling being painted.
- .13 Interior of ducts and diffusers visible from exterior on room side.
- .14 Repaint existing surfaces after approved preparation, includes all previously painted surfaces, i.e. walls, doors, frames, handrails, closets, etc.
- .15 Paint all exposed roof deck, steel joists, beams, conduits, sprinklers and plumbing lines and all other items in ceiling area where left exposed.

NOTE: Care is to be taken NOT to paint sensitive services/devices.
- .16 Finish all wood where exposed to view.
- .17 Paint all exposed steel columns and R.W.L./piping where not concealed.
- .18 Prepare, prime & paint concrete floors.

1.3 REFERENCE STANDARDS

- .1 Do painting and finishing to CGSB-85-GP series standards including Appendix A and to material manufacturer's instructions and/or to Canadian Painting Contractor's Association except where specifically specified otherwise.

1.4 ENVIRONMENT

- .1 Do not commence interior painting in temperatures below 15 deg. C or when adequately controlled ventilation is not available. Do not paint exterior surfaces during cold, windy, rainy, dusty, foggy or frosty weather when temperature is likely to drop below 5 deg. C.
- .2 Test for moisture content in each location immediately before commencing application of paint. Do not apply paint on surfaces where moisture content exceeds 14%. Promptly notify Architect if such conditions are encountered.
- .3 Provide approved equipment for testing moisture content of surfaces to receive paint finishes and have available on Site at all times during Work of this Section.

1.5 SUBMITTALS

- .1 Submit triplicate samples 12" x 8" (300 mm x 200 mm) panels of each type of paint finish specified. Panels shall be of same material as that on which sample coatings are to be applied in the field where possible. Identify each sample as to job, name of paint manufacturer, finish, colour, name and number, sheen and gloss units and name of Contractor.
- .2 Submit in accordance to Section 01 33 00.

1.6 MAINTENANCE MATERIALS

- .1 Provide one sealed can, 4 litre capacity, of each product in each colour used in the Work for Owner's use in maintenance Work.
- .2 Container to be new fully labelled with manufacturer's name, type of paint, and colour.
- .3 No paint is to be left on site once work is completed. Provide copies of mix data in maintenance manuals for use at a later date.

1.7 STORAGE

- .1 Store paint and painter's materials in locations approved by the Architect.
- .2 Provide CO2 fire extinguisher minimum 20 lbs. (9 kg.) capacity in paint storage area.

1.8 SIGNS

- .1 Provide legible signs throughout the Work reading "WET PAINT" in prominent positions during painting and while paint is drying.

1.8 SIGNS (CONT'D)

- .2 Use 75 mm (3 inch) high letters on white card or board.

1.9 TEMPORARY COVERS AND PROTECTION

- .1 Protect floors and other surfaces with temporary covers such as dust sheets, polyethylene film or tarpaulins. All to Architect's approval.
- .2 Mask identification plates occurring on equipment, switch boxes, and fire rating labels, etc. which require painting.
- .3 Protect, remove and replace hardware, accessories, lighting fixtures, and similar items as required except primed for paint door closures which shall be painted. Light switches and electrical communication outlet plates to be removed and reinstalled on completion of paint application.
- 4. Keep oily rags, waste and other similar combustible materials in closed metal containers; take every precaution to avoid spontaneous combustion, remove waste and combustible materials daily.
- .5 Clean surfaces soiled by spillage of paint, paint spattering and the like. If such cleaning operations damage the surface, repair and replace damaged work at no cost to the Owner.

1.10 RETOUCHING

- .1 Do all retouching, etc. to ensure that the building may be handed over to the Owner in perfect condition, free of spatter, fingerprints, rust, watermarks, scratches, blemishes of other disfiguration.
- .2 After fully decorating and retouching a room or other area, notify Architect. After inspection and final approval by Architect post sign 'DECORATING COMPLETE - NO ADMITTANCE WITHOUT PERMISSION'.

1.11 TEST AREA

- .1 A room or area in the building will be designated by the Architect as a test area to establish standard of workmanship, texture, gloss and coverage.
- .2 Prior to any painting being started, request a meeting between Architect, Contractor, Subcontractor and Material Manufacturer's Representative to review conditions, surfaces, anticipated problems and to clarify quality of workmanship acceptable to Architect.
- .3 Apply finishes to each type of surface within room with correct material, coats, colour, texture and degree of gloss in sample area and have same approved prior to providing Work of this Section.
- .4 Retain test area until after completion of Work. Test area to be minimum standard for the Work.

1.11 TEST AREA (CONT'D)

- .5 Failure to comply with the above will be cause for Architect to request all Work previously painted to be repainted.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Paint and finishing materials - highest grade, Acrylic Latex, stain resistance, easy to clean, first line quality provided by manufacturer who agrees to provide supervision service during painting operations. The following manufacturers are acceptable:

- .1 Benjamin Moore Company (Preferred Vendor)
- .2 Glidden Company, Division of S.C.C. (Canada) Ltd.
- .3 Para Paints Ltd.
- .4 Pratt & Lambert Inc.
- .5 Pittsburgh Paint
- .6 Sherwin Williams
- .7 Dulux

Or other approved manufacturer providing inspection service and proving same prior to bidding.

- .2 Latex Water Based Epoxy
- Sherwin Williams B70W00211-Waterbased catalyzed Epoxy extra white / Tint base A / B60V00025 – Waterbased Catalyzed Epoxy Semi Gloss Hardner Part B
 - Glidden – 4420 –True Glaze Waterborn Epoxy / 4426 True Glaze semi gloss converter
3. Latex Super Adherent Primer,
- General Paint 51-050 Premium Latex Plastic Primer
 - Benjamin Moore # 23-00 Freshstart Acrylic Primer Sealer
 - Zinser 1-2-3 Acrylic Primer Sealer
 - Sherwin-Williams –B51WQ8850-Adhesion Prm White
 - Glidden Latex super undercoat 94280

2.1 MATERIALS (CONT'D)

- 4.. Interior Latex Block Filler, C.G.S.B. Standard #-GP-188M
- General Paint 70-224 Premium Latex Block Filler
 - Benjamin Moore # 595-01 Latex Block filler
 - Glidden # 36250 Concrete Block Filler
 - Sherwin Williams B42W00046 Heavy Duty Block Filler
5. Stain Suppressant Sealer/Primer Hi-Hide, C.G.S.B. # 1-GP-119M (Prior approval Required)
- General Paint 60-200 X-Terminator 2 Latex Sealer
 - Zinsser BIN Primer, hi-hide (spot prime only)
 - Zinsser Bullseye Odourless
 - Sherwin-Williams -B49WQ8820 Multipur LTX Pr Wh
 - Glidden / Jammer 200
- .6 Paint Gloss Rating Description: Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following gloss level categories, as defined in the MPI Architectural Specification Manual:
- .1 Gloss Level G1: Matte or Flat Finish.
 - .2 Gloss Level G2: Velvet Finish.
 - .3 Gloss Level G3: Eggshell Finish.
 - .4 Gloss Level G4: Satin Finish.
 - .5 Gloss Level G5: Sem-Gloss Finish.
 - .6 Gloss Level G6: Gloss Finish.
 - .7 Gloss Level G7: High Gloss Finish.
7. Colours shall be selected by Architect or as per Owner's directions. All primers and undercoats may be tinted to no more than 25% of the intensity of the finish colour. Where deep/intense colours are specified, only colours from the nearest factory premixed colour selection shall be altered to match those specified. The application of Clear Base Deep Tints in either Primer or Finish is not acceptable.
8. All primer and paint must be delivered to the job site in manufacturer's original containers.
9. All materials used in this painting contract are to be applied according to product label directions and in accordance with information stated on the Products Data Specification sheet.
10. Unless otherwise indicated two coats of the specified finish paint are required.

2.1 MATERIALS (CONT'D)

- 11. Any work not conforming to the specification, or not meeting with the approval of the Architect or Owner's representative, shall be removed or corrected and or/repainted.
- 12. Manufacturer's sales representatives shall perform inspections on the owner's behalf. In order to ensure compliance with product specifications.
- .13 Paints, enamels, fillers, primers, varnishes and stains- ready mixed products of one of the manufacturers listed herein. Substitutes will not be allowed.
- .14 Thinners, cleaners - type and brand recommended by the paint manufacturer.
- .15 Only products manufactured by paint manufacturer stated at time of submission of samples will be allowed on Site unless other materials specifically specified herein. No painting to be performed until paint manufacturer identified and acceptance received from the Architect.
- .16 Deliver materials to Site in original unbroken containers bearing brand and maker's name. The presence of any unauthorized material or containers for such, on Site shall be of sufficient cause for rejection of ALL paint materials on Site at that time.

PART 3 - EXECUTION

3.1 GENERAL PREPARATION OF SURFACES

NOTE: ALL NOTED SURFACES MAY NOT BE APPLICABLE TO THIS PROJECT.

- .1 Prepare surfaces in accordance with the following standards unless otherwise specified:
 - .1 Prepare wood surfaces to MPI Architectural Paint Specification Manual and Approved Product List as standards of reference for vinyl sealer over knots and resinous areas, wood paste filler for nail holes. Tint filler to match for stained woodwork.
 - .2 Touch up damaged spots of shop paint primer on steel MPI # 79 Primer, Alkyd Anti-Corrosion and MPI Architectural Paint Specification Manual Surface Preparation.
 - .3 Prepare galvanized steel and zinc coated surfaces to CGSB 85-GP-16. This includes wiped coated steel surfaces. Use top finish coat manufacturers recommended products and procedures for preparation.
 - .4 Prepare masonry and concrete surfaces to CGSB 85-GP-31. Refer to MPI Architectural Paint Specification Manual Surface Preparation and the Paint Manufacturers Recommended Instructions.
 - .5 Prepare wallboard surfaces to CGSB 85-GP-33. Fill minor cracks with plaster patching compound. Refer to MPI Architectural Paint Specification Manual Surface Preparation.

3.1 GENERAL PREPARATION OF SURFACES (CONT'D)

- .6 Prepare concrete floors to CGSB 85-GP-32. Refer to MPI Architectural Paint Specification Manual Surface Preparation.
- .7 Prepare copper piping and accessories to CGSB 85-GP-20. Refer to MPI Architectural Paint Specification Manual Surface Preparation.
- .8 Apply prime coat on wood scheduled for paint finish before installation.
- .9 Back prime wood scheduled for transparent finish. Do not prime surfaces scheduled for transparent finish.
- .10 The basic standards for preparing metal substrates and cleaning shall be to the Society for Protective Coatings (SSPC) and the National Association of Corrosion Engineers International (NACE) Standards SP1 to SP14, and as per the Manufacturers recommendations.

3.2 APPLICATION

- .1 In accordance with manufacturer's printed instructions and manufacturers Site representative.
- .2 With suitable, clean equipment in good condition.
- .3 Clean all structure, services, ducts, diffusers, destratification fans, prior to painting. Do not paint any dirty surface.
- .4 In dust-free suitable conditions on the surfaces free from machine, tool or sandpaper marks, insects, grease, or any other condition liable to impair finished work to prevent production or good results.
- .5 Even, uniform in sheen, colour and texture, free from brush or roller marks, well brushed or rolled in and free of crawls, runs, join marks or other defects.
- .6 Painting coats are intended to cover surfaces perfectly; if in painter's opinion, formula specified is inadequate to provide a first class finished surface, report to the Architect before commencing work. Surfaces imperfectly covered shall receive additional coats at no additional cost.
- .7 Use paint unadulterated. Use same brand of paint for primer, intermediate and finish coats. Factory mix all paints.
- .8 Paint finish shall be applied by roller except in the case of wood trim, door frames, base board and similar work of small surface area which shall be painted by brush. Do not use roller for applying finish other than paint.

3.2 APPLICATION (CONT'D)

- .9 Spray painting will not be permitted unless specifically approved in writing by the Architect in each instance. Architect may withdraw approval at any time and prohibit spray painting for reasons such as carelessness, poor masking or protection measures drifting paint fog, disturbance to other Trades or failure to obtain a dense, even, opaque finish. Spray painting shall be full double coat, i.e. at least two passes for each coat. Do not use spray or roller on wood or metal surfaces, brush only unless approved in writing by Architect.
- .10 Finish edges of doors with paint or stain treatment as required to match face of door. Seal hidden edges of wood doors with one coat of shellac and one coat gloss varnish or two coats paint. Repaint tops and edges of wood doors after fitting.
- .11 Even up stained woodwork in colour as required by nature of wood and as directed by Architect. Apply same finish on trim, fitments, cupboards and other protecting ledges as on surrounding work, disregard sight lines.
- .12 Carefully hand smooth and sandpaper wood between coats (including priming). Apply one coat sealer before applying first coat print filler to knots or sap blemishes on wood surfaces to receive paint or stain finish.
- .13 Remove rust, oil, grease and loose shop paint from metal work by brushing or with wire brushes and make good shop coat before proceeding with final finish. Feather out edges to make touch up patches inconspicuous.
- .14 After first coat, fill nail holes, splits and scratches, using putty coloured to match finish.
- .15 Clean castings with wire brush before application of first paint coat.
- .16 Clean galvanized metal surfaces thoroughly with xylol. Do not etch galvanized metal. Use zinc rich primer. This includes metal door frames and the like with wiped zinc coating.
- .17 Remove form oil or parting compounds from concrete surfaces. Use Xylol or approved compound.
- .18 Where clean finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- .19 Back prime interior woodwork with enamel primer sealer paint.
- .20 Back prime exterior woodwork with exterior primer paint.
- .21 Pigmented (Opaque) Finishes: Completely cover substrate to a smooth, opaque surface of uniform finish, colour, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be accepted.

3.2 APPLICATION (CONT'D)

- .22 Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even lustre. Provide a finish free of laps, cloudiness, colour irregularity, runs, brush marks, orange peel, nail holes of other surface imperfections.
- .23 During the application of paint to the underside of exposed steel deck, structure and mechanical and electrical components this contractor is to ensure the provision of adequate lighting to enable a consistent, even and thorough coating.
- .24 Conform with Architect's colour schedule and exactly match approved samples.

3.3 FACILITY SERVICES

- .1 Commence Work when mechanical and electrical installation is complete in the area concerned.
- .2 Do not paint plated or other pre-finished surfaces, unless otherwise noted.
- .3 Unless otherwise specified or noted, paint "unfinished" conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and texture to match adjacent surfaces, in the following areas:
 - .1 Where exposed-to-view in exterior and interior areas.
 - .2 In high humidity interior areas.
 - .3 In mechanical and electrical rooms.
- .4 Remove finished louvres, grilles, covers, and access panels on mechanical and electrical components from location and paint separately. Finish paint primed equipment to colour as selected by Consultant.
- .5 Paint the inside of air ducts, convection, and baseboard heating cabinets where visible behind louvres, grilles and diffusers for a minimum of 460 mm or beyond sight line, whichever is greater with primer and one coat of matt black (non-reflecting) paint.
- .6 Paint the inside of light valance gloss white.
- .7 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
- .8 Paint red or band fire protection piping and sprinkler lines in accordance with mechanical specifications requirements. Keep sprinkler heads free of paint.
- .9 Paint yellow or band natural gas piping in accordance with mechanical specification requirements.

3.3 FACILITY SERVICES (CONT'D)

- .10 Back prime and paint face and edges of plywood service panels a semi-gloss, grey colour before installation of telephone and electrical equipment. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .11 Paint exterior steel electrical light standards. Do not paint outdoor transformers and substation equipment.
- .12 Colour code equipment, piping, conduit, and exposed ductwork in accordance with colour schedule. Colour band and identify with flow arrows, names, and numbering.
- .13 In unfinished areas, leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .14 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by equipment manufacturer.
- .15 Use heat resistant epoxy paint on pipes and surfaces where operating surface temperature exceeds 65 degrees C.
- .16 Paint exposed piped and ducts and their supports and related items in colours to suit colour coding adopted by Owner, to Architect's later instructions. Refer to Mechanical Division 20 for further instruction.

3.4 REPAIRS

- .1 Cracks occurring in walls or ceilings requiring patching during "Warranty Period" shall be repainted in such a way that the patch is not visible at a distance of 3'-0".
- .2 If patch painting is not acceptable, repaint entire wall, or ceiling.
- .3 Patch and make good existing damaged masonry surfaces: Provide smooth, brush grade patching compound for cracks in masonry. Spot Prime: WL700GLSB - Masonry Patch And Seal Brush-Grade, Smooth.

3.5 FORMULAE

- .1 The finish called for is eggshell, semi-gloss or gloss may be ordered for specific applications at no additional charge. On drywall eggshell shall be mixed with flat to provide low sheen to hide imperfections to Architect's approval or method agreed between Architect and material manufacturer's representative.

3.5 FORMULAE (CONT'D)

.2 INTERIOR WORK

Drywall	1	Coat Latex primer
	2	Coats Latex paint (where paint noted). Gloss Level 2 (Velvet) Gloss Level 3 (Eggshell) Gloss Level 5 (Semi-Gloss) Prime all walls whether paint scheduled at this time or not.
Concrete Block Interior	1	Coat block filler. Apply at maximum coverage of 80 sq.ft. per gallon
	2	Coats Latex paint. Gloss Level 2 (Velvet) Gloss Level 3 (Eggshell) Gloss Level 5 (Semi-Gloss)
Cast-In-Place Concrete (not floors)	1	Coat alkali resistant primer.
	2	Coats Latex paint Gloss Level 2 (Velvet) Gloss Level 3 (Eggshell) Gloss Level 5 (Semi-Gloss)
Concrete Floors (Epoxy Finish)	1	Abrade surface to grit 60 roughness
	1	Coat application Amerlock-2 high performance epoxy coating
Concrete Floors (Enamel Paint Finish)	2	Coat application
Woodwork (Opaque Finish)	1	Coat wood primer
	2	Coats Latex trim enamel Gloss Level 5 (Semi-Gloss)
Woodwork (Natural Finish)	1	Coat paste-filler
	3	Coats varnish
	2	Coats varnish satin finish

3.5 FORMULAE (CONT'D)

Ferrous Metal	1	Coat metal primer
	2	Coats enamel
Shop Primed Ferrous Metal	2	Touch-up prime coat where damaged
		Coats enamel
Galvanized Metal	1	Coat zinc rich primer to touch up galvanized only
	1	Coat galvanized iron primer
	2	Coats enamel
Insulation on Pipes & Ducts	1	Coat standard latex primer/ sealer – reference
	2	Coat enamel
Mechanical Equipment	1	Coat alkyd enamel undercoat
	1	Coat enamel
Piping, conduit & ductwork (uncoated)	1	Coat metal primer
	1	Coat enamel, gloss
PVC primer for pipes	1	Primer: .09403429 - UMA BRAND WH 3.78L
Surfaces behind grilles	2	Coats vinyl latex matt within 12" of grille black

NOTE: Use heat resistant paint where required.

3.5 FORMULAE (CONT'D)

.3 EXTERIOR WORK

Concrete Block	1	Coat block filler. Apply at maximum coverage of 80 sq.ft. per gallon.
	2	Coats Latex paint. Latex - Gloss Level 1 (Flat) Gloss Level 3/4 (Low Sheen) Gloss Level 5 (Semi-Gloss)

Galvanized Steel	1	Coat zinc rich primer to touch up zinc coat only
	1	Coat Galvanized iron primer
	2	Coats exterior enamel

Ferrous Metals Structural Steel	2	Coats exterior alkyd enamel

NOTE: Touch up shop primer and field welds using zinc rich primer.

Wood Stain	2	Coat Olympic Semi-transparent stain

3.6 COLOUR SCHEDULE

.1 Refer to the Colour, Material & Finish Schedules on Drawings

3.7 MAINTENANCE MATERIALS

- .1 Provide one sealed, 5 Gallon Pail capacity c/w pour spout, of each product in each colour used in the Work for Owner's use in maintenance Work.
- .2 Container to be new fully labelled with manufacturer's name, type of paint, colour and area of application.

END OF SECTION

DIVISION 10 - SPECIALITIES

PART 1 - GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 RELATED WORK SPECIFIED ELSEWHERE

- .1 Finish Carpentry Section 06 20 00
- .2 Gypsum Board Section 09 21 16

1.2 REFERENCES

- .1 AA Designation System for Aluminum Finishes.
- .2 ANSIA208.1-2009: Particleboard.
- .3 ASTM A653/A653M-23: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .4 ASTM B221M-21: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
- .5 PEI 1002: Manual and Performance Specifications for Porcelain Enamel Wiring Surfaces.
- .6 CAN/ULC-S102-2018 (REV1): Standard Method of Test for Surface Bruning Characteristics of Building Materials and Assemblies.
- .7 CAN/ULC-S706.1-2020: Standard for Wood Fibre Insulating Boards for Buildings.

1.3 SHOP DRAWINGS

- .1 Submit Shop Drawings as specified in Section 01 33 00.
- .2 Shop Drawings: Project-specific drawings, illustrating materials, layouts, component dimensions and thicknesses, details of connections and fastening, trim, hardware and shop-applied finishes.

1.4 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Samples: A composite sample of markerboard and tackboard; minimum 1 000 x 1 000 mm size; illustrating quality of each material, trim pieces and method of joining adjacent panels.

1.5 CLOSE-OUT SUBMITTALS

- .1 Submit closeout submittals as specified in Section 01 78 00.
- .2 Maintenance Data: Manufacturer's standard maintenance and cleaning guidelines; sufficient quantity for inclusion in operation and maintenance manuals.
- .3 Apply removable maintenance instruction labels to each markerboard.

1.6 WARRANTY

- .1 Submit extended warranty in accordance with General Conditions of the Contract.
- .2 Manufacturer's Extended Warranty: Warrant markerboards for a period of 10 years against defects other than those due to normal usage and wear, including fading, crazing, chipping, peeling and surface becoming slick, glassy or otherwise unsuitable for use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 ASI Visual Display Products, Inc.
 - .2 Claridge.
 - .3 Delta Products, Ltd.
 - .4 Global School Products Inc.
 - .5 Martack Specialties Ltd.
- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 DESCRIPTION

- .1 Use matching components sourced from a single manufacturer's series of Products.

2.3 REGULATORY REQUIREMENTS

- .1 Test Products for fire performance to CAN/ULC-S102.

2.4 MATERIALS

- .1 Extruded Aluminum: To ASTM B221M, 6063 alloy, T5 temper.
- .2 Sheet Steel: To ASTM A653/A653M, Commercial Steel (CS), Types A, B and C.

2.4 MATERIALS (CONT'D)

- .3 Cork: Natural cork, Tan colour.
- .4 Fibreboard: To CAN/ULC-S706.1, Type I; Impregnated, sound absorbing type.
- .5 Particleboard: To ANSI A208.1, Grade M-2.

2.5 COMPONENTS

- .1 Markerboard: Sandwich type construction, as follows:
 - .1 Face Panel: 0.76 mm thick electroplated steel; Vit-Rite porcelain enamel writing surface, acid-resistant, washable surface; White colour.
 - .2 Core: 11 mm impregnated sound absorbing fibreboard.
 - .3 Back-up Balancing Sheet: 0.4 mm thick galvanized steel.
- .2 Tackboards: 13 mm thick; factory laminated; as follows:
 - .1 Tackable Surface: 6 mm thick cork.
 - .2 Back-up Panel: 6 mm thick particleboard.
- .3 Aluminum Trim: 1.5 mm thick extruded aluminum profiles; eg. Series 9300 by ASI Visual Display Products, Inc., comprised of:
 - .1 Perimeter and divider trim.
 - .2 Concealed mechanical joining system, with integral slotted PVC insert laminated into ends of panels, and 2.0 mm thick galvanized steel spline.
 - .3 Marker trays with contour fitting end castings; flat and non-protruding types as noted on Drawings.
- .4 Horizontal Sliding Trim: 1.5 mm thick extruded aluminum, eg. Series 9300 by ASI Visual Display Products, Inc., comprised of:
 - .1 Continuous one-piece head with integral map rail and fully enclosed single or double track section as required by Drawings.
 - .2 Two 4-wheel moulded nylon rollers per panel.
 - .3 Tubular jamb sections rigidly attached to top and bottom sections complete with shock absorbing and noise-reducing rubber bumpers.

2.5 COMPONENTS (CONT'D)

- .4 Single tubular sill section, and support angle with single or double rigid vinyl guide for sliding panels.

2.6 FABRICATION

- .1 Markerboards: Factory laminate core to face panel and back-up balancing sheet under heat and pressure.
 - .1 Provide permanent music score lines to one markerboard in each Music Room.
- .2 Tackboards: Factory laminate tackable surface to back-up panel under mechanical pressure, using a waterproof adhesive.
- .3 Sliding Tackboards:
 - .1 Provide white painted back surface for horizontal sliding tackboard units.
 - .2 Fabricate sliding tackboards with adequate steel reinforcing to ensure they will remain wrap-free.

2.7 FINISHES

- .1 Porcelain Enamel Panels: To PEI 1002; gloss factor of 6-8 measured by 45 degree.
- .2 Aluminum: To AA-A41; clear etches and anodized 0.051 mm satin finish, free from extruding draw marks and surface scratches.
- .3 Galvannealed Coating on Sheet Steel: To ASTM A653/A653M, Coating Designation ZF-120; wiped zinc-iron coating, with streak-free matte grey appearance.

PART 3 – EXECUTION

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Verify millwork units designated to incorporate visual display surfaces are installed.

3.2 INSTALLATION

- .1 Install Products to a rigid, straight, square and plumb installation, with horizontal lines level.
- .2 Securely attach aluminum trims to ensure fastenings are concealed.
- .3 Adhere tackboards to wall surface with approved adhesive applied egg-sized blobs at approximately 200 mm OC. Press tackboards firmly into adhesive, ensuring proper adhesion.

3.2 **INSTALLATION (CONT'D)**

- .4 Joint markerboards together using concealed mechanical joining system. Ensure flush butt joints with hairline appearance.

3.3 **ADJUSTING**

- .1 Leave visual display boards in a state suitable for immediate use by Owner.

3.4 **CLEANING**

- .1 Refer to Section 01 74 00.
- .2 Clean down, remove dirt and leave elements in a first class condition.

END OF SECTION

DIVISION 10 - SPECIALITIES

PART 1 - GENERAL

1.1 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.2 DESCRIPTION

- .1 Work Included: To complete special items as shown or specified and summarized but not restricted to:
 - .1 Architectural Fencing.
 - .2 Demonstration Mirror.

1.3 RELATED WORK SPECIFIED ELSEWHERE

.1	Rough Carpentry	Section 06 10 00
.2	Gypsum Board	Section 09 21 16
.3	Painting - Finish painting	Section 09 91 00
.4	Electrical	Division 26 - 28

1.4 QUALITY ASSURANCE

- .1 Reference Standards: Reference standards quoted in this Section refer to:
 - .1 ASTM A525-75, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
 - .2 CGSB Specification 1-GP-109998C, Paint, Acid and Alkali Resistant Black.
 - .3 CGSB Specification 1-GP-121M, Coating, Vinyl, Pretreatment, for Metals (Vinyl Wash Primer).

CSA Standard G164-9165, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.5 SUBMITTALS

- .1 Submit shop drawings, samples and maintenance instructions for Work of this Section as specified for each specialty product.
- .2 Submit in accordance with specification Section 01 33 00.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- .1 Package or crate, and brace products to prevent distortion in shipment and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings.
- .2 Deliver products to location at building site designated by Contractor.

PART 2 - PRODUCTS

2.1 SPECIALTY PRODUCTS

- .1 Provide reinforcing, fastenings and anchorage required for building in of products.
- .2 Insulate between dissimilar metals, and metal and masonry materials to prevent electrolysis, with bituminous paint.
- .3 Prime Paint on Steel:

For finishing under Work of other Sections shall meet specifications 1-GP-40M for oil alkyd type structural steel primer, 1-GP-48 for steel marine primer, 1-GP-121 for vinyl wash primer, or 1-GP-132 for zinc chromate primer as applicable for specified finish treatments.
- .4 Specified materials are minimum acceptable quality. Manufacturer's standards exceeding specified quality will be accepted.

2.2 LIST AND DESCRIPTION OF PRODUCTS

.1 Architectural Fencing & Gate

- .1 Industrial strength fencing "Titan Architectural Fence" by Fortress Building Products. Or approved Alternate.
- .2 Fence to be flat top and bottom design with three rails, height 58".
- .3 Fully pre-assembled with Fortress Armour 20 year manufacturer's warranty
- .4 Fence to come complete with all hardware and accessories for a complete installation.
- .5 Colour black.
- .6 Refer to drawings for fence layout and gate location.

PART 3 – EXECUTION

3.1 PREPARATION

- .1 Verify substrate surfaces are solid, free from surface water, dust, oil, grease, projections and other foreign matter detrimental to performance.
- .2 Items to be built-in: Provide information and templates required for installation of work of this Section, and assist or supervise, or both, the setting of anchorage devices, and construction of other work incorporated with products specified in this Section in order that they function as intended.
- .3 Verify there is adequate supports and/or blocking in gypsum wall assemblies prior to installation of wall mounting items.

3.2 INSTALLATION: GENERAL

- .1 Install miscellaneous specialties level and securely and rigidly anchored to substrate in accordance with authorities having jurisdiction, reviewed shop drawings, and manufacturer's written instructions.
- .2 Isolate dissimilar metals and metal to concrete or masonry with 2 coats of bituminous paint.
- .3 After installation, adjust miscellaneous specialties in accordance with manufacturer's written instructions.
- .4 Install items plumb, straight and level to a tolerance of 1:500.
- .5 Securely fix items in place with concealed fasteners.

3.3 ADJUSTMENT AND CLEANING

- .1 Verify under Work of this Section that installed products function properly and adjust them accordingly to ensure satisfactory operation.
- .2 Refinish damaged or defective Work so that no variation in surface appearance is discernible. Refinish work at site only if approved.

END OF SECTION

DIVISION 12 - FURNISHINGS

PART 1 - GENERAL

1.0 CONTRACT DOCUMENTS

- .1 The Instructions to Bidders, the General Conditions of CCDC 2 - 2020, Supplementary Conditions and all Sections of Division 01 apply to and form part of this section of the specification.

1.1 RELATED WORK SPECIFIED ELSEWHERE

- .1 Gypsum Board Assemblies Section 09 21 16

1.2 REFERENCES

- .1 AAMA 2604-22: Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (With Coil Coating Appendix).
- .2 ASTM B209/B209M-21a: Standard Specifications for Aluminum and Aluminum-Alloy Sheet and Plate.
- .3 ASTM B221M-21: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
- .4 Canada Consumer Products Safety Act, SOR/2019-97: Corded Window Coverings Regulations.
- .5 NFPA 701-2004: Methods of Fire Tests for Flame Propagation of Textiles and Films.
- .6 CAN/ULC-S109-14 (R2019): Standard Method for Flame Tests of Flame-Resistant Fabrics and Films.
- .7 ANSI/WCMA A100.1-2018: American National Standard for Safety of Corded Window Covering Products.

1.3 PRODUCT DATA

- .1 Submit Product data as specified in Section 01 33 00.
- .2 Product Data: Manufacturer's standard data sheets, indicating materials, components and accessories, component sizes, available fabrics and finishes, and installation instructions.

1.4 SHOP DRAWINGS

- .1 Submit Shop Drawings as specified in Section 01 33 00.

1.4 SHOP DRAWINGS (CONT'D)

- .2 Shop Drawings: Project-specific drawings, illustrating wall opening dimensions, shade sizes, operator details, top rail, anchorage details, joint locations, hardware and accessory details, conditions between adjacent units, corner conditions and required clearances.

1.5 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Verification Samples: Duplicate samples of the following:
 - .1 Shade Fabric: 200 x 200 mm size samples of each specified fabric.
 - .2 Visually-Exposed Components: 300 mm long samples of each visually-exposed component, illustrating material, colour, surface texture and sheen.
 - .3 Metal Finish: 50 x 100 mm size samples, illustrating specified finish and colour.

1.6 SOURCE QUALITY CONTROL SUBMITTALS

- .1 Submit source quality control submittals as specified in Section 01 33 00.
- .2 Fire Test Reports: Manufacturer's standard fire test reports, prepared by independent testing agency deemed acceptable by authorities having jurisdiction, indicating fire hazard classification of shade fabric meets regulatory requirements.

1.7 CLOSE-OUT SUBMITTALS

- .1 Submit closeout submittals as specified in Section 01 78 00.
- .2 Operation and Maintenance Data: Manufacturer's standard operating instructions and maintenance and cleaning guidelines; sufficient quantity for inclusion in operation and maintenance manual.

1.8 QUALIFICATIONS

- .1 Supplier: A manufacturer-certified firm, approved to supply specified Products, and to honour warranty claims.
- .2 Installer: A manufacturer-certified firm, trained and experienced in installing specified Products.

1.9 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Protect Products with suitable heavy weight wrapping before delivery to Place of the Work.

1.9 DELIVERY, STORAGE AND HANDLING (CONT'D)

- .3 Store Products at Place of the Work in a designated area, allowing for natural ventilation over finished surfaces.

1.10 WARRANTY

- .1 Submit extended warranty in accordance with General Conditions of the Contract.
- .2 Extended Warranty: For a period of 10 years, covering complete replacement cost of defective Product, including removal and disposal of defective assembly, and installation of replacement Product. Covered defects to include the following:
 - .1 Fading of shade fabric colour,
 - .2 Shrinkage of shade fabric,
 - .3 Loss of flame-retardant properties of shade fabric,
 - .4 Punctures, rips or tears in shade fabric, and
 - .5 Mechanical failure of operating mechanisms.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- .1 Manufacturers having Products considered acceptable for use:
 - .1 Altex Inc.
 - .2 Glamour Line" by JMC Emerald Corp.
 - .3 Or Approved Alternate.

2.2 DESCRIPTION

- .1 Roller Window Shades: Manual wand-controlled operation, single sprocket roller shade, rectangular-shaped, with infinite positioning; each unit consisting of two end brackets, shade roller tube, cassette fascia, exposed hembar and sun control fabric; powder coated finish; sizes as indicated on Drawings.

2.3 DESIGN CRITERIA

- .1 Basis of Design: Newton High-Speed Lite-Lift with Fascia by Altex Inc.

2.3 DESIGN CRITERIA (CONT'D)

- .2 Design manual roller window shades to operate without any exposed cords or chains, in accordance with Canada Consumer Product Safety Act SOR/2019-97 and ANSI/WCMA A100.1.
- .3 Design system to allow lowering shade by pulling on hembar without damaging clutch or spring.
- .4 Design system with embedded upper limit stop device to ensure constant upper position and avoid shade being over lifted.
- .5 Design system to be operable with one hand, from any height while sitting.
- .6 Design system to be operated using two wands per roller, as follows:
 - .1 Front Wand: To raise shade.
 - .2 Rear Wand: To lower shade.

2.4 PERFORMANCE CRITERIA

- .1 Fire Classification of Fabrics: Flame-retardant and fire-resistant to CAN/ULC-S109 and NFPA 701.
- .2 Required Lifting Force: Minimum 1.134 kg and maximum 1.814 kg to raise or lower shade.
- .3 Operating Speed: ≥ 1.0 m/s.
- .4 Durability: $\geq 5\,500$ cycles.

2.5 MATERIALS

- .1 Extruded Aluminum: To ASTM B221M, 6063 alloy, T5 temper; unless specified otherwise.
- .2 Sheet Aluminum: To ASTM B209/B209M, 3003 alloy, H14 temper.
- .3 Sun Control Fabric (SCF); Vinyl-coated polyester yarn, consisting of 79 percent vinyl and 21 denier polyester core yarn; with antimicrobial coating; tensioned prior to heat setting; colour as selected by Consultant.
 - .1 SCF-1: 3 percent openness factor.
 - .2 SCF-2: 5 percent openness factor.
- .4 Bituminous Coating: Fibrous asphalt emulsion.
- .5 Screw Fasteners: Non-corrosive type, size as recommended by shade manufacturer.

2.6 COMPONENTS

- .1 End Bracket: 77 x 96 mm, two-piece moulded ABS construction; 64 mm OD nylon Drive sprocket; finish to match fascia colour.

2.6 COMPONENTS (CONT'D)

- .2 Shade Roller Tube: 1.52 mm thick extruded aluminum with 3 internal 4.82 mm high continuous fins spaced 120 degrees apart.
- .3 Cassette: Two-piece interlocking 1.9 mm thick extruded aluminum housing, rectangular profile.
- .4 Fascia: 1.7 mm thick extruded aluminum complete with three continuous screw flute.
- .5 Drive Assembly: Factory set for size and travel of shades, field adjustable; complete with built-in shock absorber.
- .6 Wand: Extruded aluminum, with powder coated finish to match assembly.
- .7 Hem Bar: 32 x 19 mm size, extruded aluminum, with upper groove to secure shading fabric; complete with high-impact nylon plugs inserted into each end.

2.7 FINISHES

- .1 Powder Coated Finish on Metal Components: To AAMA 2604; electrostatically sprayed polymer powder, factory-applied to 0.05 mm dry film thickness; colour as selected by Consultant.

PART 3 – EXECUTION

3.1 PREPARATION

- .1 Apply heavy coat of bituminous paint on surfaces of aluminum surfaces placed in direct contact with concrete, mortar, plaster or dissimilar metals.
- .2 Supply fastenings and anchors required to be built in to adjacent work to other Sections.

3.2 INSTALLATION

- .1 Install Products inside window openings level, plumb, and square.
- .2 Install Products parallel with window plane.
- .3 Install Products rigidly coupled and adequately anchored.
- .4 Maintain uniform clearances, and accurate alignment levels.
- .5 Conform to manufacturer's Product data and accepted Shop Drawings.

3.2 **INSTALLATION (CONT'D)**

- .6 Conceal brackets and rollers with closure panels for full width of opening.

3.3 **TOLERANCES**

- .1 Gap variation Along Perimeter: ≤ 6 mm per 2 440mm of shade height.
- .2 Offset from Level: ≤ 3 mm.
- .3 Conform to manufacturer's edge clearance requirements for shades exceeding a 1:3 width-to-height ratio.

3.4 **ADJUSTING**

- .1 Adjust Products to ensure smooth and trouble free operation without binding.
- .2 Adjust shade and fabric to hang flat without buckling or distortion.
- .3 Leave shades in raised position upon completion.

3.5 **CLEANING**

- .1 Refer to Section 01 74 00.
- .2 Clean exposed surfaces using non-abrasive materials and methods.

3.6 **DEMONSTRATION**

- .1 Refer to Section 01 79 00.
- .2 Demonstrate proper operation and maintenance of roller shades.

END OF SECTION

Division 21 Fire Suppression

Common Contract Requirements for Fire Suppression

- 21 02 51 Fire Protection General Requirements
- 21 02 61 Fire Protection Occupancy Requirements

Fire Suppression Sprinkler Systems

- 21 13 13 Wet Pipe Fire Suppression

Division 22 Plumbing

Contract Requirements for Plumbing

- 22 02 51 Plumbing General Requirements
- 22 02 61 Plumbing Occupancy Requirements

Common Work Results for Plumbing

- 22 05 11 Plumbing Work Requirements
- 22 05 21 Plumbing Demolition and Renovation
- 22 05 34 Plumbing Bases, Hangers, and Supports (Indoor)
- 22 05 53 Identification of Plumbing Services

Commissioning for Plumbing

- 22 05 65 Plumbing Contractor Commissioning Requirements

Plumbing Insulation

- 22 07 19 Plumbing Piping Insulation

Facility Water Distribution

- 22 11 16 Domestic Water Piping – Copper
- 22 11 20 Backflow and Cross Connection Measures
- 22 11 31 Potable Water Auxiliary Equipment

Facility Sanitary Sewerage

- 22 13 13 Sanitary Drains
- 22 13 16 Sanitary Waste and Vent Piping – Cast Iron and Copper
- 22 13 17 Sanitary Waste and Vent Piping – Plastic
- 22 13 23 Sanitary Interceptors

Fire Extinguishers

- 22 37 13 Portable Fire Extinguishers

Plumbing Fixtures Combined With Drawing Schedule

- 22 44 13 Plumbing Fixtures Combined With Drawing Schedule

Division 23 Heating, Ventilating, and Air Conditioning (HVAC)

Common Contract Requirements for HVAC

- 23 02 51 HVAC General Requirements
- 23 02 61 HVAC Occupancy Requirements

Common Work for HVAC

- 23 05 11 General HVAC Work Requirements
- 23 05 21 HVAC Demolition and Renovation
- 23 05 34 Bases, Hangers and Supports (Indoor)
- 23 05 35 Bases, Hangers, and Supports (Outdoor)
- 23 05 49 HVAC Vibration and Noise Control Measures
- 23 05 53 Identification of HVAC Services

Testing, Adjusting, and Balancing

- 23 07 11 Testing, Adjusting, and Balancing (TAB) of HVAC Systems

Commissioning for HVAC

- 23 08 11 HVAC Contractor Commissioning Requirements

HVAC Insulation

- 23 10 13 Duct Insulation
- 23 10 19 HVAC Piping Insulation

Facility Fuel Piping

- 23 11 23 Facility Natural-Gas & Propane Piping

Refrigerant Piping

- 23 23 13 Refrigerant Piping and Specialties

HVAC Water Treatment

- 23 25 13 Water Treatment for Closed-Loop Hydronic Systems

HVAC Ducts and Casings

- 23 31 13 Metal Ducts

Air Plenums and Chases

- 23 32 13 Fabricated, Metal Air Plenums

Air Duct Accessories

- 23 33 13 Duct Accessories
- 23 33 14 Volume-Control Dampers
- 23 33 16 Fire Dampers
- 23 33 17 Smoke Control Dampers
- 23 33 18 Operating Dampers
- 23 33 46 Flexible Ducts
- 23 33 53 Duct Liners

HVAC Fans

- 23 34 23 Packaged Exhausters

Air Outlets and Inlets

23 37 13 Diffusers, Registers, and Grilles

23 37 23 Louvres, Intakes, and Exhaust

Ventilation Hoods

23 38 13 Commercial-Kitchen Hoods

Indoor Central-Station Air-Handling Units

23 75 24 Custom Outdoor, Indirect Fired Make-Up Air Unit (Heat only)

Convection Heating and Cooling Units

23 82 23 Hydronic Unit Ventilators

23 82 29 Radiators, Convectors, and Cabinet Heaters

Division 25 Integrated Automation

Control Systems

25 40 11 Building Control System

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

- .1 Conform to Division 1 General Conditions and to all sections of Mechanical Division.
- .2 Furnish labour, materials, and equipment necessary for completion of work as described in contract documents.
- .3 Unless specifically indicated, all materials and equipment provided under this contract shall be new and shall be manufactured in the project year.
- .4 The term “Mechanical Contractor” shall remain active and shall mean a “single contractor” performing plumbing, drainage, heating, cooling, ventilation, and control services.
- .5 When quoting as a subcontractor this contractor shall explicitly state the services, they are providing i.e. Mechanical (all services), Plumbing (water and drainage systems) or HVAC (including hydronic and air systems).
- .6 Contractors shall be explicit to identify whether Fire Protection is included or omitted from the mechanical scope.

1.2 INTENT

- .1 Mention herein or indication on Drawings of articles, materials, operations or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated: and, performance of each operation prescribed with furnishing of necessary labour, equipment, and incidentals for fire protection work.
- .2 Where used, words “Section” and “Division” shall also include other Subcontractors engaged on site to perform work to make building and site complete in all respects.
- .3 Where used, word “supply” shall mean furnishing to site in location required or directed complete with accessory parts.
- .4 Where used, word “install” shall mean secured in place and connected up for operation as noted or directed.
- .5 Where used, word “provide” shall mean supply and install as each is described above.

1.3 REGULATIONS, PERMITS, AND FEES

- .1 All materials and quality of work shall meet all current and latest Provincial, Municipal and Fire Marshall requirements, regulations, codes, and by-laws in force in the area of the project.

- .2 Each contractor shall give all necessary notices, obtain all necessary permits, and pay all fees in order that the work shown or specified may be carried out. Each contractor shall furnish any certificates necessary as evidence that the work installed conforms with the laws and regulations of all authorities having jurisdiction.
- .3 In the event that changes, or alterations are required on completed work by authorized inspectors, these changes shall be made at the contractor's expense.
- .4 Special equipment which does not have a standard CSA label shall be inspected by the local electrical authority having jurisdiction and the Approval Certificate shall be submitted to the Consultant as soon as possible. All costs and fees for inspections shall be borne by this contractor.

1.4 DRAWINGS

- .1 The drawings and this specification have been assembled together as a responsibility of the consultant. The same is true for the other consultants, i.e. architect, structural engineer, civil engineer, fire protection engineer, electrical engineer, etc.
- .2 The drawings and specifications are not assembled together for responsibility/division between subcontractors. The division of work between subcontractors remains the responsibility of the buildings' contractor (also known as the prime contractor or general contractor).
- .3 All subcontractors are encouraged to perform work amicably utilizing all of the drawings and specifications published by all of the consultants.
- .4 Fire protection drawings do not show architectural, structural, plumbing, mechanical and related details. Take information involving accurate measurement of building from building drawings, or at building. Make, without additional charge, any necessary changes, or additions to runs of piping, conduits, and ducts to accommodate structural conditions. Location of pipes and other equipment may be altered by Consultant without extra charge provided change is made before installation and does not necessitate major additional material.
- .5 As work progresses and before installing piping and any other fittings and equipment which may interfere with interior treatment and use of building, provide detail drawings, or obtain directions for exact location of such equipment and fitment's.
- .6 Install piping clear structural members and any fireproofing. Locate work to permit installation of specified insulation. Do not remove or damage structural fireproofing. Leave space to permit fireproofing and insulation to be inspected and repaired.
- .7 Before commencing work, check and verify all sizes, locations, grade and invert elevations, levels, and dimensions to ensure proper and correct installation.
- .8 Locate all fire protection piping and equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.

- .9 In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install piping and other work so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose.
- .10 Relocate equipment and/or material installed but not coordinated with work of other Sections and/or installed incorrectly as directed, without extra charge.
- .11 Where drawings are done in metric and product not available in metric, the corresponding imperial trade size shall be utilized.

1.5 INTERFERENCE AND COORDINATION DRAWINGS

- .1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the constructed spaces provided.
- .2 Prepare drawings to indicate co-ordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are coordinated.
- .3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.
- .4 Upon consultant's request submit copies of interference drawings to consultant.
- .5 Due to the nature of the building and the complexity of the building systems provide the following:
 - .1 Interference drawings, showing coordination of architectural, structural, plumbing, mechanical, and electrical systems for the consultant's review prior to fabrication.
 - .2 Detailed layout drawings, clearly showing fasteners and hangers.
- .6 Provide CAD drawings (minimum file version AutoCAD 2013) in addition to hard copies.

1.6 QUALITY ASSURANCE

- .1 Perform work in accordance with applicable provisions of local Code and NFPA requirements. Ordinances, and adoptions thereof for all fire protection systems. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
- .2 In case of differences between building codes, provincial laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Consultant in writing of such differences.

1.7 EXAMINATION

- .1 Site Reviews
 - .1 Examine premises to understand conditions which may affect performance of work of this Division before submitting proposals for this work.

- .2 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.
- .2 Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

1.8 SEQUENCING, SCHEDULING, AND COORDINATION

- .1 It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of Contract Documents. Anything not clear or in conflict will be explained by making application to Consultant. Should conditions arise where certain changes would be advisable, secure Consultant's approval of these changes before proceeding with work.
- .2 Coordinate work of various trades in installing interrelated work. Before installation of fire protection items, make proper provision to avoid interferences in a manner approved by Consultant. Each Contractor shall refer to all sections of the specification for their responsibilities with other trades. Changes required in work specified in Fire Protection Division caused by neglect to do so shall be made at no cost to Owner.
- .3 Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, starters, motors, control components, and to clear openings of doors and access panels.
- .4 Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by Fire Protection Division.
- .5 Be responsible for required cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of Consultant. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.
 - .1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.
 - .2 Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
- .6 Adjust locations of pipes, equipment, fixtures, etc., to accommodate work from interferences anticipated and encountered. Determine exact route and location of each pipe prior to fabrication.

- .1 Make offsets, transitions, and changes in direction of pipes as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
- .7 Slots and openings through floors, walls, and ceilings shall be provided by this contractor but performed by a trade specializing in this type of work. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.9 REQUEST FOR INFORMATION (RFI) PROCEDURES

- .1 RFIs shall be submitted to the consultant a minimum of two (2) weeks prior to answer being required. Failure to submit an RFI in a timely manner will forfeit delay claims and schedule extension requests by the contractor.
- .2 All RFIs will be submitted with the following information:
 - .1 RFI number
 - .2 Name of project
 - .3 Date of initiation
 - .4 Date response required by (minimum two (2) weeks)
 - .5 Subject
 - .6 Submitter's name
 - .7 Drawing/specification reference
 - .8 Photograph of the issue (if applicable)
 - .9 Description of the issue
 - .10 Contractor's proposed resolution

1.10 SHOP DRAWINGS AND PRODUCT DATA

- .1 Furnish complete catalog data for manufactured items of equipment to be used in the Work to Consultant for review within 14 days after award of Contract.
- .2 Upon receipt of reviewed shop drawing, product is to be ordered immediately.
- .3 Provide a complete list of shop drawings to be submitted prior to first submission.
- .4 Before submitting to the Consultant, review all shop drawings to verify that the products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers, and similar data and that it has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The Contractor's review of each shop drawings shall be indicated by stamp, date and signature of a qualified and responsible person possessing by the appropriate authorization.
- .5 If material or equipment is not as specified or submittal is not complete, it will be rejected by Consultant.

- .6 Additional shop drawings required by the contractor for maintenance manuals, site copies etc., shall be photocopies of the "reviewed" shop drawings. All costs to provide additional copies of shop drawings shall be borne by the contractor.
- .7 **Submit all shop drawings for the project as a package. Partial submittals will not be accepted.**
- .8 Catalog data or shop drawings for equipment, which are noted as being reviewed by Consultant or their Engineer shall not supersede Contract Documents.
- .9 Review comments of Consultant shall not relieve this Division from responsibility for deviations from Contract Documents unless Consultant's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.
- .10 Check work described by catalog data with Contract Documents for deviations and errors.
- .11 Shop drawings and product data shall show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances. e.g., access door swing spaces.
- .12 Shop drawings and product data shall be accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify as to current model production.
 - .5 Certification of compliance to applicable codes.
- .13 State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. List on catalog covers page numbers of submitted items. Underline applicable data.
- .14 Shop drawings shall be submitted electronically as per the following directions:
 - .1 Electronic Submissions:
 - .1 Electronically submitted shop drawings shall be prepared as follows:
 - .1 Use latest software to generate PDF files of submission sheets.
 - .2 Scanned legible PDF sheets are acceptable. Image files are not acceptable.
 - .3 PDF format shall be of sufficient resolution to clearly show the finest detail.
 - .4 PDF page size shall be standardized for printing to letter size (8.5"x11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11"x17".

- .5 Submissions shall contain multiple files according to section names as they appear in Specification.
- .6 File names shall include consultant project number and description of shop drawing section submitted.
- .7 Each submission shall contain an index sheet listing the products submitted, indexed in the same order as they appear in the Specification. Include associated PDF file name for each section.
- .8 On the shop drawing use an “electronic mark” to indicate what is being provided.
- .9 **Each file shall bear an electronic representation of the “company stamp” of the contractor. If not stamped the file submission will not be reviewed.**
- .2 Email submissions shall include subject line to clearly identify the consultants project number and the description of the shop drawings submitted.
- .3 Electronic attachments via email shall not exceed 10MB. For submissions larger than 10MB, multiple email messages shall be used. Denote related email messages by indicating “1 of 2” and “2 of 2” in email subject line for the case of two messages.
- .4 Electronic attachments via web links (URL) shall directly reference PDF files. Provide necessary access credentials within link or as username/password clearly identified within body of email message.
- .5 On site, provide one (1) copy of the “reviewed” shop drawings in a binder as noted above.
- .6 Contractor to print copies of “reviewed” shop drawings and compile into maintenance manuals in accordance with requirements detailed in this section.

1.11 EQUIPMENT NAMEPLATE DATA

- .1 Between the manufactures design published literature, the shop drawing submission literature, and the nameplate data on the equipment, they can all read differently.
- .2 Most of the confusion and differences are coming out of the electrical power installation.
- .3 The contractors installing and connecting the equipment are responsible for the coordination of this data through the construction period.
- .4 The contractors shall share and/or request this information through out the project and monitor/make adjustments, provide recommendations accordingly based on any discrepancies.
- .5 The contractors are responsible for any cost associated with the changing data.
- .6 The final installation must meet the “Nameplate Data” on the equipment on site.

1.12 OPERATION AND MAINTENANCE MANUAL

- .1 Provide operation and maintenance data for incorporation into manual as in submittals' requirements.
- .2 Operation and maintenance manual to be approved by, and final copies deposited with, Consultant before final inspection.
- .3 Submit one (1) copy of Operation and Maintenance Manual to Consultant for review and approval. Submission of individual data will not be accepted unless directed by Consultant. Submission can be done electronically in PDF format or as a hard copy.
 - .1 Electronic submission/pdf file is required to be bookmarked. Any submission received without bookmarking will be immediately returned as unacceptable.
 - .2 Hard copy submission shall be in a three-ring binder (minimum 50 mm (2") ring) and labelled as 'Operation and Maintenance Manual' with project name and location. Dividers are to be used for binder organization.
- .4 Make changes as required and re-submit as directed by Consultant.

1.13 AS-BUILT DRAWINGS

- .1 Site records:
 - .1 Contractor shall provide two (2) sets of reproducible fire protection drawings. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include changes to existing fire protection systems, control systems, and low voltage control wiring.
 - .2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection at all times.

1.14 WARRANTIES

- .1 In addition to guarantee specified in General Conditions, guarantee fire protection systems to be free from defects that may develop from failure to construct system in accordance with Contract Documents.
- .2 Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record "start-up" date of each piece of equipment on certificate. Include certificates as part of Operation and Maintenance Manual.
- .3 Warranty period shall start from date of ready for takeover. Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .3 Warranty Duration:
 - .1 Two (2) year warranty period applies unless otherwise noted.

- .4 Warranty Coverage:
 - .1 Applies to parts and labour.

1.15 READY FOR TAKEOVER

- .1 Complete the following to the satisfaction of the consultant prior to request for ready for takeover:
 - .1 As-built Drawings
 - .2 Maintenance Manuals
 - .3 System Start up
 - .4 Instructions to Owners.

1.16 REVISION TO CONTRACT

- .1 Provide the following:
 - .1 Itemized list of material with associated costs.
 - .2 Labour rate and itemized list of labour for each item.
 - .3 Copy of manufacturers/supplier's invoice if requested.

1.17 DELIVERY, STORAGE, AND HANDLING

- .1 Follow Manufacturer's directions in delivery, storage, and protection, of equipment and materials. Contractor to include all costs associated with delivery storage and handling in tender price.
- .2 Deliver equipment and material to site and tightly cover and protect against dirt, water, chemical, and other environment damaging conditions but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.
- .3 Remove any damaged materials from site.

1.18 TESTS

- .1 Give 48 hours written notice of date for tests.
- .2 Insulate or conceal work only after testing and approval by Consultant.
- .3 Conduct tests in presence of Consultant.
- .4 Bear costs including retesting and making good.
 - .1 Test fire systems in accordance with authorities having jurisdiction and as specified elsewhere.
- .5 Test fire systems in accordance with authorities having jurisdiction (AHJ) NFPA requirements and as specified elsewhere.
- .6 Equipment: test as specified in relevant sections.

- .7 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.

1.19 TRIAL USAGE

- .1 Consultant or owner may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Trial usage to apply to all fire protection.

1.20 ELECTRICAL

- .1 Electrical work to conform to Electrical Division including the following:
 - .1 Power wiring and conduit is specified in Electrical Division except for conduit, wiring and connections below 50 V which are related to control systems. Follow Electrical Division for installation methods, quality of materials, and workmanship.
 - .2 Electrically operated equipment shall be C.S.A. approved label. Special Inspection Label of Provincial Authority having jurisdiction will be accepted in lieu of C.S.A. approval. Each motor shall have an approved starter. Starter will be supplied and installed by Electrical Division unless otherwise indicated.

1.21 PIPING AND EQUIPMENT SUPPORTS

- .1 Equipment supports supplied by equipment manufacturer shall follow the manufacturer's recommendation.
- .2 Piping and equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of - Structural Steel Section. Submit structural calculations with shop drawings.

1.22 SLEEVES

- .1 Pipe sleeves: at points where pipes pass through masonry, concrete or fire rated assemblies and as indicated. Grout sleeves in place.
- .2 Schedule 40 steel pipe.
- .3 Sleeves with annular fin continuously welded at midpoint:
 - .1 Through foundation walls.
 - .2 Where sleeve extends above finished floor.
 - .3 Through fire rated walls and floors.
- .4 Sizes: minimum 6 mm (1/4") clearance all around, between sleeve and uninsulated pipe or between sleeve and insulation.
- .5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors.

- .6 Fill voids around pipes:
 - .1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.
 - .2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.
 - .3 Ensure no contact between copper tube or pipe and ferrous sleeve.
 - .4 Fill future-use sleeves with lime plaster or other easily removable filler.
 - .5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+Amdt-Mar-78.
- .7 Provide minimum 20 gauge duct sleeves where ducts pass through masonry concrete or fire rated assemblies. Maintain minimum 25 mm clearance all around or to the requirements of the authority having jurisdiction. Seal at wall as indicated.

1.23 FIRE STOPPING

- .1 This contractor shall work with all other contractors on the project in providing one common method of fire stopping all penetrations made in fire rated assemblies.
- .2 Approved fire stopping and smoke seal material in all fire separations and fire ratings within annular space between pipes, ducts, insulation and adjacent fire separation and/or fire rating.
- .3 Do not use cementitious or rigid seals around penetrations for pipe or other fire protection items piercing walls, floors, etc.
- .4 Insulated pipes and ducts: ensure integrity of insulation and vapour barrier at fire separation.
- .5 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases. Ensure continuity and integrity of fire separation.
- .6 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.
- .7 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation. Provide "fire wrap" blanket around services penetrating fire walls. Extent of blanket must correspond to ULC recommendations.
- .8 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.
- .9 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.
- .10 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes. Exposed surfaces are to be acceptable to consultant prior to application of finish.

- .11 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.
- .12 Install material and components in accordance with ULC certification, manufacturers instructions and local authority.
- .13 Submit product literature and installation material on fire stopping in shop drawing and product data manual. Maintain copies of these on site for viewing by installers and consultant.
- .14 Manufacturer of product shall provide certification of installation. Submit letter to the consultant.
- .15 Acceptable alternate manufacturers to approval of local authority:
 - .1 Minnesota Mining and Manufacturing
 - .2 Fyresleeve Industries Inc.
 - .3 General Electric Pensil Firestop Systems
 - .4 International Protective Coatings Corp.
 - .5 Rectorseal Corporation (Metacaulk)
 - .6 Proset Systems
 - .7 3M
 - .8 AD Systems
 - .9 Hilti
- .16 Ensure firestop manufacturer representative performs onsite inspections and certifies installation. Submit inspection reports/certification at time of substantial completion.

1.24 ESCUTCHEONS

- .1 On pipes and ductwork passing through walls, partitions, floors and ceilings in exposed finished areas and on water and drain pipes inside millwork and cabinets.
- .2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.
- .3 Outside diameter to cover opening or sleeve.
- .4 Inside diameter to fit around finished pipe.

1.25 PAINTING

- .1 Refer to Section Interior Painting and specified elsewhere.
- .2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.
- .3 Apply two coats of paint to exposed piping service in mechanical room, electrical, and service rooms. Base colour shall be red.
- .4 Prime and touch up marred finished paintwork to match original.

- .5 Restore to new condition, or replace equipment at discretion of consultant, finishes which have been damaged too extensively to be merely primed and touched up.

1.26 ACCESS DOORS

- .1 Provide access doors to concealed fire protection equipment for operating, inspecting, adjusting and servicing.
- .2 Flush mounted 600 x 600 mm (24" x 24") for body entry and 300 x 300 mm (12" x 12") for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.
- .3 Material:
 - .1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Consultant.
 - .2 Remaining areas: use prime coated steel.
 - .3 Fire rated areas: provide ULC listed access doors.
 - .4 Washrooms or high moisture area ceilings: Aluminum with mill finish suitable for painting.
- .4 Installation:
 - .1 Locate so that concealed items are accessible.
 - .2 Locate so that hand or body entry (as applicable) is achieved.
- .5 Acceptable Manufacturers:
 - .1 Le Hage
 - .2 Zurn
 - .3 Acudor
 - .4 Nailor Industries Inc.

1.27 REPAIRS, CUTTING, AND RESTORATION

- .1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.
- .2 Each Section of this Division shall bear expense of cutting, patching, and repairing to install their work and/or replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
- .3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.
- .4 All patching, painting and making good of the existing walls, floors, ceilings, partitions and roof will be at the expense of this Contractor, but performed by the Contractor specializing in the type of work involved unless otherwise noted.

1.28 EXISTING SYSTEMS

- .1 Connections into existing systems to be made at time approved by Consultant. Request written approval of time when connections can be made.
- .2 Be responsible for damage to existing plant by this work.

1.29 CLEANING

- .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units prior to turn over to owner.
- .2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition including replacement of all filters in all air and piping systems.

1.30 DISCONNECTION AND REMOVAL

- .1 Disconnect and/or remove equipment, piping, etc. as indicated.
- .2 Cap and conceal all redundant and obsolete connections.

1.31 INTEGRATED LIFE SAFETY SYSTEMS TESTING

- .1 Fire protection systems in this building, including but not limited to flow switches, valves, fire pumps, etc. will be subject to Integrated Life Safety Systems testing.
- .2 The Fire Protection Contractor shall co-ordinate with the Integrated Life Safety Systems Testing Agent as follows:
 - .1 Confirm which fire protection systems are to be included as part of the testing process.
 - .2 Verify in writing to the Integrated Life Safety Systems Testing Agent that fire protection commissioning of the affected systems/devices is complete prior to the scheduled testing date(s).
 - .3 Participate in the Integrated Life Safety Systems Testing to confirm proper operation of all associated systems.
 - .4 This Contractor shall work with the Integrated Life Safety Systems Testing Agent to reset all systems back to normal operating mode after the testing is complete.
- .3 Include all costs associated with Integrated Life Safety System Testing in the tender value.
- .4 Refer to Division 1/Division 26 Integrated Life Safety Systems Testing specifications for additional information/requirements.

1.32 IDENTIFICATION OF SYSTEMS

- .1 Identify contents by background colour marking, pictogram (as necessary), legend, direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

- .2 Background colour marking and legends for piping systems:

CONTENTS	BACKGROUND COLOUR	
	MARKING	LEGEND
Fire protection water	Red	FIRE PROT. WTR
Sprinklers	Red	SPRINKLERS

1.33 FUNCTIONAL PERFORMANCE TESTS

- .1 This Contractor shall be responsible for the Functional Performance Tests. These tests ensure that all equipment and systems operate in accordance with design intent. Test the systems through all possible modes of operation.
- .2 The function performance test shall be:
- .1 Test piping systems.
- .2 Test all valves and flow switches.
- .3 Other test that maybe a requirement of NFPA.
- .3 All test shall be recorded and presented to the Consultant and Owner.
- .4 Include all test results in the Operation and Maintenance Manuals.

Part 2 Not Used

Part 3 Not Used

END OF SECTION

Part 1 General

1.1 OCCUPANCY REQUIREMENTS

- .1 The contractor shall provide the following documentation to the consultant's satisfaction prior to receiving occupancy. Failure to provide the proper documentation will result in the occupancy not being granted. List of required documentation:
 - .1 Final Certificates (required prior to consultant's release of conformance letter):
 - .1 NFPA-13 Contractors Material and Test Certificate (sprinkler)
 - .2 Sprinkler Design Engineers' Letter

Part 2 Not Used

Part 3 Not Used

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 NFPA 13 latest edition, Installation of Sprinkler Systems.
- .3 Ontario Fire Code.
- .4 Ontario Building Code.
- .5 Factory Mutual guidelines.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with general requirements in accordance with NFPA 13, working plans and design requirements.
- .2 Shop drawings shall be approved by authority having jurisdiction prior to submission.
- .3 Submit to Consultant for general review and information only.
- .4 Submitted drawings shall be reproducible. Do not submit marked up prints.
- .5 Drawings shall be in AutoCad format.

1.3 SAMPLES

- .1 Submit samples in accordance with general requirements.
- .2 Submit samples of following:
 - .1 Each type of sprinkler head.
 - .2 Signs.

1.4 ENGINEERING DESIGN CRITERIA

- .1 Design system in accordance with Ontario Fire Marshall, local authority having jurisdiction, Owner's underwriters as required, and NFPA 13, NFPA 20, and NFPA 45 using following parameters:
 - .1 To suit occupancy as indicated.
 - .2 Pipe size and layout: Hydraulic design.
 - .3 Conduct flow and pressure test of water supply in vicinity of project to obtain criteria for bases of design in accordance with NFPA 13. Indicate location and flow on shop drawings.
 - .4 System zoning as indicated in accordance with NFPA 13.
 - .5 Provide complete drawings and calculations stamped by a qualified professional engineer registered in the Province of Ontario.

- .6 Professional Engineer shall provide on site review and certification for local building code review.
- .2 System shall be approved by Ontario Fire Marshall, local authority, and Owner's underwriter prior to shop drawing submission.

1.5 COMMISSIONING & INTEGRATED TESTING OF FIRE PROTECTION & LIFE SAFETY SYSTEMS

- .1 Sprinkler Contractor to perform services with the Fire Commissioning Agent (FCA) to meet their requirements for administration, verification, and final sign-off.
- .2 The Fire Commissioning Agent (FCA) is being retained by the Electrical Contractor, however; this Contractor's work to satisfy the FCA requirements shall be included in the tender price.
- .3 The Sprinkler Contractor at a minimum must include for:
 - .1 Providing FCA with all documentation of design and shop drawings.
 - .2 Provide documents for sequence of operation and maintenance of system.
 - .3 Movement of all valves and accessories to confirm Alarm/Supervisory/Trouble at the fire panel.
 - .4 Create flow at all initiating devices to verify detection at the fire panel.
 - .5 Testing and operation of any fire pumps.
 - .6 Other items that may be requested by the FCA.
 - .7 Re-commissioning of any items that may have failed.
 - .8 Putting the system back into proper operation after tests are completed.
- .4 All work is to be performed in accordance with NFPA 3 2010 Edition. Special consideration to be given to Figure A3.3.16 (b) for Sequence of Operation Form required to be completed in conjunction with the FCA and submitted to the Consultant's prior to occupancy.
- .5 The work to be performed by this Contractor is also described in NFPA 3 table A.5.1.1 as labelled "Construction Stage" and "Occupancy Stage".

1.6 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements.

1.7 MAINTENANCE MATERIALS

- .1 Provide maintenance materials in accordance with general requirements.
- .2 Provide spare sprinklers and tools as required by NFPA 13.

1.8 PERMITS AND FEES

- .1 Obtain and pay for all permits, fees, and inspections as required by authority having jurisdiction.

1.9 EQUIPMENT

- .1 ULC listed and labeled.

1.10 STORAGE

- .1 Store in original packaging with manufacturers' labels and seals intact.
- .2 Store in dry secure location.
- .3 Damaged material and/or equipment shall be replaced.

Part 2 Products

2.1 PIPE, FITTINGS, AND VALVES

- .1 Pipe and Fittings:
 - .1 25 mm (1"): Schedule 40 steel pipe with screwed fittings.
 - .2 32 mm (1¼") to 50 mm (2"):
 - .1 Schedule 40 steel pipe with screwed fittings or,
 - .2 Schedule 10 steel pipe with roll grooved fittings.
 - .3 65 mm (2½") and larger: Schedule 10 steel pipe with roll grooved fittings.
- .2 Valves:
 - .1 ULC listed for fire protection service.
 - .2 Up to NPS 2: bronze, screwed ends, OS&Y gate.
 - .3 NPS 2 1/2 and over: cast iron, flanged or roll grooved ends, indicating butterfly valve.
 - .4 Swing check valves.
 - .5 Ball drip.
- .3 Pipe hangers:
 - .1 ULC listed for fire protection services.

2.2 SPRINKLER HEADS

- .1 General: to NFPA 13 and ULC listed for fire services.
- .2 Indicate type and location of sprinkler heads on drawings. Co-ordinate sprinkler heads location with other trades.
- .3 Locate sprinkler heads in acoustic tile ceiling in centre of tile.

- .4 Provide sprinkler heads as follows:
 - .1 Upright bronze: Exposed with no ceilings.
 - .2 Concealed fusible link type brass pendent with ring and cup in ceiling and brass coverplate. Coverplate finish selected by Consultant. Concealed heads installed in unsupervised areas (corridors, washrooms).
 - .3 White semi-recessed fusible link type brass pendent with adjustable, recessed escutcheon ring and cup. Sprinkler and escutcheon cup. Finish selected by Consultant. Semi-recessed heads installed in supervised areas (classrooms, offices, seminar rooms, etc.).
 - .4 Sprinkler heads with O-ring design shall not be used.
 - .5 Provide guards on upright sprinkler heads in all storage rooms, in the gymnasium and on heads below 1800 mm AFF.
- .5 Provide sprinkler heads under all equipment/ductwork over 1200 mm wide.

2.3 DOCUMENTATION

- .1 Prepare documentation as indicated.
- .2 Provide documentation based on tender documents. Coordinate sprinkler drawings with all trades.
- .3 Provide one hard copy and one electronic copy of As Built drawings acceptable to Consultant prior to final payment.

Part 3 Execution

3.1 INSTALLATION

- .1 Install, inspect and test to acceptance in accordance with NFPA 13 and FC 403.
- .2 Install excess pressure pump across alarm valve in accordance with manufacturer's instructions.
- .3 Pipe a bypass complete with indicating valve, between Fire department connection and sprinkler main downstream of DCVA. Bypass shall be sized to allow flow test of system demand as per NFPA 13 forward flow test through the backflow preventor.
- .4 Testing to be witnessed by authority having jurisdiction.
- .5 Space hangers and support of sprinkler piping in accordance with N.F.P.A. regulations.
- .6 Hydrostatically test systems at 350kPa in excess of normal working pressure, but not less than 1.4 MPA for two hours without loss under supervision of authority having jurisdiction and NFPA requirements.
- .7 Provide hydraulic pump, temporary connections and labour required for tests.
- .8 Protect exposed work, in accordance with 'Painting' section.

- .9 Do not cover or conceal piping accessories or work prior to inspection and approval by authorities having jurisdiction.
- .10 Adjust equipment to satisfaction of authority having jurisdiction and Consultant.
- .11 Protect equipment during painting. Replace damaged and painted components.
- .12 Co-ordinate the sprinkler piping and equipment with that of other trades on the job. Mains and branches shall be run so as not to interfere with building's structure, mechanical, or electrical installations. Branch piping above ceilings is to run in joist space or minimum 300 mm above ceiling. Provide drops at head locations only. All exposed piping to run in joist space.
- .13 Guarantee that the systems and equipment be installed in accordance with all Local and Provincial by-laws and the rules and regulations of the Insurance Underwriters and the Building Code of Ontario.
- .14 Provide a flow test for each system on the remote inspectors test connection using methods approved by the local fire department and local water commission. Report the test results in writing to the Consultant.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

- .1 This section covers items common to all sections of Plumbing Division.
- .2 Conform to Division 1 General Conditions.
- .3 Furnish labour, materials, and equipment necessary for completion of work as described in contract documents.
- .4 Unless specifically indicated, all materials and equipment provided under this contract shall be new and shall be manufactured in the project year.
- .5 The term “Mechanical Contractor” shall remain active and shall mean a “single contractor” performing plumbing, drainage, heating, cooling, ventilation, and control services.
- .6 When quoting as a subcontractor this contractor shall explicitly state the services they are providing i.e. Mechanical (all services), Plumbing (water and drainage systems) or HVAC (including hydronic and air systems).
- .7 Contractors shall be explicit to identify whether Fire Protection is included or omitted from the mechanical scope.

1.2 INTENT

- .1 Mention herein or indication on Drawings of articles, materials, operations or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated: and, performance of each operation prescribed with furnishing of necessary labour, equipment, and incidentals for plumbing work.
- .2 Where used, words “Section” and “Division” shall also include other Subcontractors engaged on site to perform work to make building and site complete in all respects.
- .3 Where used, word “supply” shall mean furnishing to site in location required or directed complete with accessory parts.
- .4 Where used, word “install” shall mean secured in place and connected up for operation as noted or directed.
- .5 Where used, word “provide” shall mean supply and install as each is described above.

1.3 REGULATIONS, PERMITS, AND FEES

- .1 All materials and quality of work shall meet all current and latest Provincial, Municipal and Fire Marshall requirements, regulations, codes, and by-laws in force in the area of the project.

- .2 Each contractor shall give all necessary notices, obtain all necessary permits, and pay all fees in order that the work shown or specified may be carried out. Each contractor shall furnish any certificates necessary as evidence that the work installed conforms with the laws and regulations of all authorities having jurisdiction.
- .3 In the event that changes, or alterations are required on completed work by authorized inspectors, these changes shall be made at the contractor's expense.
- .4 Special equipment which does not have a standard CSA label shall be inspected by the local electrical authority having jurisdiction and the Approval Certificate shall be submitted to the Consultant as soon as possible. All costs and fees for inspections shall be borne by this contractor.

1.4 DRAWINGS

- .1 The drawings and this specification have been assembled together as a responsibility of the consultant. The same is true for the other consultants, i.e. architect, structural engineer, civil engineer, fire protection engineer, electrical engineer, etc.
- .2 The drawings and specifications are not assembled together for responsibility/division between subcontractors. The division of work between subcontractors remains the responsibility of the buildings' contractor (also known as the prime contractor or general contractor).
- .3 All subcontractors are encouraged to perform work amicably utilizing all of the drawings and specifications published by all of the consultants.
- .4 Plumbing and Mechanical Drawings do not show structural and related details. Take information involving accurate measurement of building from building drawings, or at building. Make, without additional charge, any necessary changes, or additions to runs of piping, conduits, and ducts to accommodate structural conditions. Location of pipes, ducts, conduits and other equipment may be altered by Consultant without extra charge provided change is made before installation and does not necessitate major additional material.
- .5 As work progresses and before installing piping, ductwork, heating units, registers, diffusers, fixtures and any other fittings and equipment which may interfere with interior treatment and use of building, provide detail drawings, or obtain directions for exact location of such equipment and fittings.
- .6 Plumbing and Mechanical Drawings indicate general location and route of pipes, ducts and conduits which are to be installed. Where required work is not shown or only shown diagrammatically, install same at maximum height in space to conserve head room (minimum 2200 mm (88") clear) and interfere as little as possible with free use of space through which they can pass. Follow building lines, conceal piping, conduits and ducts in furred spaces, ceilings and walls unless specifically shown otherwise. Install work close to structure so furring will be small as practical.

- .7 Install piping and ductwork to clear structural members and any fireproofing. Locate plumbing work to permit installation of specified insulation. Do not remove or damage structural fireproofing. Leave space to permit fireproofing and insulation to be inspected and repaired.
- .8 Before commencing work, check and verify all sizes, locations, grade and invert elevations, levels, and dimensions to ensure proper and correct installation. Verify existing/municipal services.
- .9 Locate all plumbing, mechanical, and electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.
- .10 In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install piping and other work so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose.
- .11 Relocate equipment and/or material installed but not co-ordinated with work of other Sections and/or installed incorrectly as directed, without extra charge.
- .12 Where drawings are done in metric and product not available in metric, the corresponding imperial trade size shall be utilized.

1.5 INTERFERENCE AND COORDINATION DRAWINGS

- .1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the constructed spaces provided.
- .2 Prepare drawings to indicate co-ordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are coordinated.
- .3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.
- .4 Upon consultant's request submit copies of interference drawings to consultant.
- .5 Due to the nature of the building and the complexity of the building systems provide the following:
 - .1 Interference drawings, showing coordination of architectural, structural, plumbing, mechanical, and electrical systems for the consultant's review prior to fabrication.
 - .2 Detailed layout drawings, clearly showing fasteners and hangers.
- .6 Provide CAD drawings (minimum file version AutoCAD 2013) in addition to hard copies.

1.6 QUALITY ASSURANCE

- .1 Perform work in accordance with applicable provisions of local Plumbing Code, Gas Ordinances, and adoptions thereof for all plumbing systems. Provide materials and labor necessary to comply with rules, regulations, and ordinances.

- .2 In case of differences between building codes, provincial laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Consultant in writing of such differences.

1.7 ALTERNATES AND SUBSTITUTIONS

- .1 Each bidder may elect to use "Alternate or equal Equipment" manufacturers from lists of Alternates where listed. Include for any additional costs including all costs for revisions to electrical contract to suit Alternate used. Prices are not required in Tender for Alternates listed except where specifically noted as "Separate Price" in which case contractor will complete the Supplementary Tender Form.
- .2 It is responsibility of this Division to ensure "Alternate Equipment" fits space allocated and gives performance specified. If an "Alternate Equipment" nor "equal" specified product unit is proposed and does not fit space allotted in Consultant's opinion, supply of specified described equipment will be required without change in Contract amount. Should electrical characteristics for "alternate" or "equal" equipment differ from equipment specified it shall be the responsibility of the equipment manufacturer to pay all costs associated with the revisions to the electrical contract. Only manufacturers listed will be accepted for their product listing. All other manufacturers shall be quoted as substitution stating conditions and credit amount.
- .3 If pipe or item, of size or weight indicated, is unobtainable, supply next larger size or heavier weight without additional charge.

1.8 EXAMINATION

- .1 Site Reviews
 - .1 Examine premises to understand conditions which may affect performance of work of this Division before submitting proposals for this work.
 - .2 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.
- .2 Drawings:
 - .1 Plumbing and Mechanical Drawings show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
 - .2 Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing, Mechanical, and Fire Protection Drawings.
 - .3 Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories, which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

- .3 Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

1.9 SEQUENCING SCHEDULING AND COORDINATION

- .1 It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of Contract Documents. Anything not clear or in conflict will be explained by making application to Consultant. Should conditions arise where certain changes would be advisable, secure Consultant's approval of these changes before proceeding with work.
- .2 Coordinate work of various trades in installing interrelated work. Before installation of plumbing items, make proper provision to avoid interferences in a manner approved by Consultant. Each Contractor shall refer to all sections of the specification for their responsibilities with other trades. Changes required in work specified in Plumbing Division caused by neglect to do so shall be made at no cost to Owner.
- .3 Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, starters, motors, control components, and to clear openings of doors and access panels.
- .4 Furnish and install inserts and supports required by Plumbing Division unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by Plumbing Division.
- .5 Be responsible for required excavation, backfilling, cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of Consultant. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.
 - .1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.
 - .2 Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
 - .3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

- .6 Adjust locations of pipes, ducts, equipment, fixtures, etc., to accommodate work from interferences anticipated and encountered. Determine exact route and location of each pipe and duct prior to fabrication.
 - .1 Make offsets, transitions, and changes in direction of pipes, ducts, and electrical raceways as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
 - .2 Furnish and install traps, air vents, sanitary vents, pull boxes, etc., as required to affect these offsets, transitions, and changes in direction.
- .7 Slots and openings through floors, walls, ceilings, and roofs shall be provided by this contractor but performed by a trade specializing in this type of work. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.10 REQUEST FOR INFORMATION (RFI) PROCEDURES

- .1 RFIs shall be submitted to the consultant minimum two (2) weeks prior to answer being required. Failure to submit an RFI in a timely manner will forfeit delay claims and schedule extension requests by the contractor.
- .2 All RFIs will be submitted with the following information:
 - .1 RFI number
 - .2 Name of project
 - .3 Date of initiation
 - .4 Date response required by (minimum two (2) weeks)
 - .5 Subject
 - .6 Submitter's name
 - .7 Drawing/specification reference
 - .8 Photograph of the issue (if applicable)
 - .9 Description of the issue
 - .10 Contractor's proposed resolution

1.11 CONTRACT BREAKDOWN

- .1 Provide breakdown of contract exclusive of HST to acceptance of consultants prior to first draw submission.
- .2 Provide labour and material cost for each item.
- .3 Breakdown shall indicate total contract amount.
- .4 Contract breakdown shall be as follows as a minimum.
 - .1 Mobilization and shop drawings (max. \$2,000.00)
 - .2 Demolition
 - .3 Inside buried plumbing and drainage

- .4 Above grade rough-in plumbing and drainage
- .5 Plumbing fixtures
- .6 Plumbing equipment
- .7 Piping insulation
- .8 Firestopping
- .9 Plumbing contractor closeout requirements (min. of 3% for the first \$500,000.00, 1% from \$500,000.00 to \$5,000,000.00, and 0.5% beyond. Shall not be less than \$5,000.00).
- .5 Progress claims, when submitted are to be itemized against each item of the contract breakdown, this shall be done in table form showing contract amount, work complete to date, previous draw, amount this draw and balance.
- .6 **Mobilization amount may only be drawn when all required shop drawings have been reviewed by the consultant.**

1.12 SHOP DRAWINGS AND PRODUCT DATA

- .1 Furnish complete catalog data for manufactured items of equipment to be used in the Work to Consultant for review within 14 days after award of Contract.
- .2 Upon receipt of reviewed shop drawing, product is to be ordered immediately.
- .3 Provide a complete list of shop drawings to be submitted prior to first submission.
- .4 Before submitting to the Consultant, review all shop drawings to verify that the products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers, and similar data and that it has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The Contractor's review of each shop drawings shall be indicated by stamp, date and signature of a qualified and responsible person possessing by the appropriate authorization.
- .5 If material or equipment is not as specified or submittal is not complete, it will be rejected by Consultant.
- .6 Additional shop drawings required by the contractor for maintenance manuals, site copies etc., shall be photocopies of the "reviewed" shop drawings. All costs to provide additional copies of shop drawings shall be borne by the contractor.
- .7 **Submit all shop drawings for the project as a package. Partial submittals will not be accepted.**
- .8 Catalog data or shop drawings for equipment, which are noted as being reviewed by Consultant or their Engineer shall not supersede Contract Documents.

- .9 Review comments of Consultant shall not relieve this Division from responsibility for deviations from Contract Documents unless Consultant's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.
- .10 Check work described by catalog data with Contract Documents for deviations and errors.
- .11 Shop drawings and product data shall show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances. e.g., access door swing spaces.
- .12 Shop drawings and product data shall be accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify as to current model production.
 - .5 Certification of compliance to applicable codes.
- .13 State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. List on catalog covers page numbers of submitted items. Underline applicable data.
- .14 Shop drawings shall be submitted electronically as per the following directions:
 - .1 Electronic Submissions:
 - .1 Electronically submitted shop drawings shall be prepared as follows:
 - .1 Use latest software to generate PDF files of submission sheets.
 - .2 Scanned legible PDF sheets are acceptable. Image files are not acceptable.
 - .3 PDF format shall be of sufficient resolution to clearly show the finest detail.
 - .4 PDF page size shall be standardized for printing to letter size (8.5"x11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11"x17".
 - .5 Submissions shall contain multiple files according to section names as they appear in Specification.
 - .6 File names shall include consultant project number and description of shop drawing section submitted.
 - .7 Each submission shall contain an index sheet listing the products submitted, indexed in the same order as they appear in the Specification. Include associated PDF file name for each section.

- .8 On the shop drawing use an “electronic mark” to indicate what is being provided.
- .9 **Each file shall bear an electronic representation of the “company stamp” of the contractor. If not stamped the file submission will not be reviewed.**
- .2 Email submissions shall include subject line to clearly identify the consultants project number and the description of the shop drawings submitted.
- .3 Electronic attachments via email shall not exceed 10MB. For submissions larger than 10MB, multiple email messages shall be used. Denote related email messages by indicating “1 of 2” and “2 of 2” in email subject line for the case of two messages.
- .4 Electronic attachments via web links (URL) shall directly reference PDF files. Provide necessary access credentials within link or as username/password clearly identified within body of email message.
- .5 On site, provide one (1) copy of the “reviewed” shop drawings in a binder as noted above.
- .6 Contractor to print copies of “reviewed” shop drawings and compile into maintenance manuals in accordance with requirements detailed in this section.

1.13 EQUIPMENT NAMEPLATE DATA

- .1 Between the manufactures design published literature, the shop drawing submission literature, and the nameplate data on the equipment, they can all read differently.
- .2 Most of the confusion and differences are coming out of the electrical power installation.
- .3 The contractors installing and connecting the equipment are responsible for the coordination of this data through the construction period.
- .4 The contractors shall share and/or request this information through out the project and monitor/make adjustments, provide recommendations accordingly based on any discrepancies.
- .5 The contractors are responsible for any cost associated with the changing data.
- .6 The final installation must meet the “Nameplate Data” on the equipment on site.

1.14 OPERATION AND MAINTENANCE MANUAL

- .1 Provide operation and maintenance data for incorporation into manual as in submittals’ requirements.
- .2 Operation and maintenance manual to be approved by, and final copies deposited with, Consultant before final inspection.

- .3 Submit one (1) copy of Operation and Maintenance Manual to Consultant for approval. Submission of individual data will not be accepted unless directed by Consultant. Submission can be done electronically in PDF format or as a hard copy.
 - .1 Electronic submission/PDF file is required to be bookmarked. Any submission received without bookmarking will be immediately returned as unacceptable.
 - .2 Hard copy submission shall be in a three-ring binder (minimum 50 mm (2") ring) and labelled as 'Operation and Maintenance Manual' with project name and location. Dividers are to be used for binder organization.
- .4 Make changes as required and re-submit as directed by Consultant.
- .5 Operation data to include:
 - .1 Control schematics for each system including environmental controls.
 - .2 Description of each system and its controls.
 - .3 Operation instruction for each system and each component.
 - .4 Description of actions to be taken in event of equipment failure.
 - .5 Valves schedule and flow diagram.
 - .6 Colour coding chart.
 - .7 Spare parts equipment list.
 - .8 Manufacturers standard or extended warranty information.
- .6 Maintenance data shall include:
 - .1 Servicing, maintenance, operation, and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .7 Performance data to include:
 - .1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified elsewhere.
 - .4 Testing, adjusting and balancing reports as specified in Testing, Adjusting and Balancing Section.
 - .5 Copy of all substantial performance final certificates.
- .8 Miscellaneous data to include:
 - .1 Letter of contractor's warranty and guarantee.
 - .2 WRDSB Project Asset and Warranty Card for all assets replaced, newly installed, and removed.
 - .3 Index sheet.
 - .4 Tabbed format for each section.
 - .5 Manufacturers approved shop drawings.

- .6 Spare parts list and source.
- .7 List of Manufacturers and suppliers address for each piece of equipment.
- .9 Final Submittals:
 - .1 Upon acceptance of Operation and Maintenance Manual by the Consultant, provide the following:
 - .1 Provide two (2) copies of final Operation and Maintenance Manuals, as well as a PDF file of the entire approved manual on a USB stick. Only one (1) USB stick is to be provided containing both the approved manual and as-built drawings.

1.15 AS-BUILT DRAWINGS

- .1 Site records:
 - .1 Contractor shall provide two (2) sets of reproducible plumbing drawings. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include changes to existing plumbing systems, control systems, and low voltage control wiring.
 - .2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection at all times.
- .2 As-built drawings submittal for TAB and review:
 - .1 Prior to start of Testing, Adjusting, and Balancing (TAB), finalize production of as-built drawings.
 - .2 Identify **each drawing** in lower right-hand corner in letters at least 3 mm (1/8") high as follows: - "AS-BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW PLUMBING SYSTEMS AS INSTALLED" (Company Name) (Signature of Contractor) (date).
 - .3 TAB to be performed using as-built drawings.
 - .4 Submit copy to Consultant for review and approval. When returned, make corrections as directed.
- .3 As-built drawings final submittal:
 - .1 Once approved, submit completed, reproducible paper as-built drawings as well as a scanned PDF file copy on USB stick with Operation and Maintenance Manuals.

1.16 WARRANTIES

- .1 In addition to guarantee specified in General Conditions, guarantee plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.

- .2 Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record "start-up" date of each piece of equipment on certificate. Include certificates as part of Operation & Maintenance Manual.

Warranty period shall start from date of ready for takeover. Warranty start date based on shipment date, start up date, substantial completion date, etc. are not applicable.

- .4 Warranty Duration:

.1 Two (2) year warranty period applies unless otherwise noted.

- .5 Warranty Coverage:

.1 Applies to parts and labour.

1.17 READY FOR TAKEOVER

- .1 Complete the following to the satisfaction of the consultant prior to request for ready for takeover.

- .1 As-built Drawings
- .2 Maintenance Manuals
- .3 System Start up
- .4 TAB Reports
- .5 Plumbing Systems Commissioning
- .6 Instructions to Owners

1.18 REVISION TO CONTRACT

- .1 Provide the following:
- .1 Itemized list of material with associated costs.
 - .2 Labour rate and itemized list of labour for each item.
 - .3 Copy of manufacturers/supplier's invoice if requested.

1.19 DELIVERY, STORAGE, AND HANDLING

- .1 Follow Manufacturer's directions in delivery, storage, and protection, of equipment and materials. Contractor to include all costs associated with delivery storage and handling in tender price.
- .2 Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or environmental damages but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.
- .3 Remove all damaged materials from site.

1.20 DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS

- .1 If designated substances and/or hazardous materials are suspected or identified cease all work in the immediate area in accordance with OHSA and notify consultant.

- .2 Each contractor and on site employee of the contractor shall have “asbestos awareness training”.**
- .3 The Contractor shall ensure that employees who may come into contact with designated substances and/or hazardous materials due to the nature of the work that they perform, have received training that enables them to recognize designated substances and/or hazardous materials and that enables them to react in accordance with the Occupational Health and Safety Act and regulations thereto should contact with designated substances and/or hazardous materials occur during the course of their work.**
- .4 It is the responsibility of the contractor to review the designated substances and/or hazardous materials book in the building prior to starting any work.**
- .5 Existing occupied buildings (depending upon their age) may contain designated substances and/or hazardous materials in thermal insulating materials and some manufactured products, such as vinyl asbestos floor tile. Any insulating materials, on pipes, fittings, boilers, tanks, ductwork, etc. may contain designated substances and/or hazardous materials and shall not be disturbed.**
- .6 A survey of each building documenting the location and condition of designated substances and/or hazardous materials -containing materials is available for your mandatory review prior to commencing any work on premises.**

1.21 ENERGY EFFICIENCY

- .1 The systems of this building must achieve the energy efficiency levels by conforming to ANSI/ASHRAE/IESNA 90.1 “Energy Standard for Buildings Except Low-Rise Residential Buildings” and Chapter 2 of Division 3 of SB-10 prescriptive method from the Ontario Building Code.**
- .2 All equipment, products, and installations must conform to the Codes and Standards.**

END OF SECTION

Part 1 General

1.1 OCCUPANCY REQUIREMENTS

- .1 The contractor shall provide the following documentation to the consultant's satisfaction prior to receiving occupancy. Failure to provide the proper documentation will result in the occupancy not being granted. List of required documentation:
 - .1 Final Certificates (required prior to consultant's release of conformance letter).
 - .1 Potable Water Test (Refer to domestic water piping – Copper section – Part 3)

Part 2 Products

2.1 Not Used

Part 3 Execution

3.1 Not Used

END OF SECTION

Part 1 General

1.1 TESTS

- .1 Give 48 hours written notice of date for tests.
- .2 Insulate or conceal work only after testing and approval by Consultant.
- .3 Conduct tests in presence of Consultant.
- .4 Bear costs including retesting and making good.
- .5 Piping:
 - .1 General: maintain test pressure without loss for 4 h unless otherwise specified.
 - .2 Test drainage, waste and vent piping to Ontario Building Code and authorities having jurisdiction.
 - .3 Test domestic hot, cold and recirculation water piping at 1-1/2 times system operating pressure or minimum 860 kPa (124.8 psi), whichever is greater.
- .6 Equipment: test as specified in relevant sections.

1.2 SYSTEM START UP

- .1 Provide adjusting testing and start up of all equipment prior to testing and balancing (TAB) specified elsewhere.
- .2 Provide consultant with written notice verifying all equipment operation and installation is complete.
- .3 Start up shall be in presence of the following: owner or representative, contractor, building automation systems (BAS) contractor, and manufacturer's representative. Each person shall witness and sign off each piece of equipment. Consultant's attendance will be determined by consultant.
- .4 Simulate system start up and shut down and verify operation of each piece of equipment.
- .5 Arrange with all parties and provide 72 hours notice for start up procedure.
- .6 Arrange with building automation systems contractor to sequence all components and ensure system operation.

1.3 COMMISSIONING

- .1 Co-ordinate and direct each step of the commissioning process and recommend acceptance or non-acceptance to the Owner/Owner's Representative.
- .2 Prepare, in writing, documentation of any deficiencies discovered during the commissioning process. Submit to consultant and Owner/Owner's Representative.

- .3 The Commissioning Process is detailed in *ASHRAE Guideline 1-1996 HVAC Commissioning Process*. The commissioning plan may be modified to reflect the actual construction schedule and design.
- .4 Provide a pre-functional test of all plumbing system and sub-system elements, including control devices, shall be checked for the following:
 - .1 Verify that each element has been properly installed, properly identified, and that all connections (including electrical) have been made correctly.
 - .2 Verify that each element has been checked for proper lubrication, drive rotation, belt tension, control sequence, flow direction, or other conditions which may cause damage or reduce system performance.
 - .3 Verify that tests, meter readings, and specific plumbing/mechanical/electrical performance characteristics agree with those required by equipment or system manufacturer.
 - .4 Controls calibration to be completed in accordance with the specification.
 - .5 The TAB shall be done in accordance with the specifications.
- .5 Reports:
 - .1 The contractor shall be responsible for recording, documenting, and maintaining detailed inspection and testing data on the test documentation reports. The data record shall be comprehensive and concise.
 - .2 All data must be recorded as soon as possible during the course of the inspection and testing.
 - .3 All documentation shall have the date, time, and names of persons participating in the inspection and testing.
- .6 Plumbing System Execution:
 - .1 Operate equipment and systems shall be tested in the presence of the owner's representative and the consultant to demonstrate compliance with specified requirements. To minimize the time of Commissioning Team members, testing shall be done in four seasonal single blocks of time insofar as possible.
 - .2 Notify the consultant, in writing, fourteen (14) days prior to tests scheduled under requirements of this Section.
 - .3 Testing shall be conducted under specified design operating conditions as recommended or approved by the consultant.
 - .4 All elements of systems shall be tested to demonstrate that total systems satisfy all requirements of these Specifications. Testing shall be accomplished on hierarchical basis. Test each piece of equipment for proper operation, followed by each sub-system, followed by entire system, followed by any inter-ties of other major systems.
 - .5 All special testing materials and equipment shall be provided by the appropriate contractor.
 - .6 Provide three copies of all test reports and records to the consultant.

- .7 The verification testing procedures shall address all operating characteristics of all plumbing equipment and systems.

1.4 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTION

- .1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .2 Plumbing contractor to schedule and coordinate the demonstration all on the same day, starting at a pre-approved time and continuing consequently until complete.
- .3 Where specified elsewhere in this Division, qualified manufacturers' representatives who are knowledgeable about the project to provide demonstrations and instructions.
- .4 Use operation and maintenance manual, as-built drawings, audio visual aids, etc. as part of instruction materials.
- .5 Instruction duration time requirements as specified in appropriate sections.
- .6 Where deemed necessary, Consultants may record these demonstrations on video tape for future reference.

1.5 TRIAL USAGE

- .1 Consultant or owner may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Trial usage to apply to following equipment and systems:
 - .1 Domestic water
 - .2 Plumbing and drainage.

1.6 DEFICIENCIES

- .1 During the course of construction, the consultants will monitor construction and provide written reports of work progress, discussions, and instruction to correct work.
- .2 Instruction to correct work shall be done within the work period before the next review.
- .3 The contractor shall not conceal any work until inspected.
- .4 The contractor shall expedite 100% complete rough-in work and have inspected prior to concealing services and equipment especially above ceiling.
- .5 Upon completion of the project the consultant will do a final review. Upon receiving the final inspection report, the contractor must correct and sign back the inspection report indicating the deficiencies are completed. A re-inspection will only be done once consultant receives this in writing.

1.7 EQUIPMENT INSTALLATIONS

- .1 Unions or flanges: provide for ease of maintenance and disassembly.

- .2 Space for servicing, disassembly and removal of equipment and components: provide as recommended by manufacturer or as indicated.
- .3 Equipment drains: pipe to floor drains.
- .4 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.

1.8 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to equipment unless specified or indicated otherwise. Coordinate with block coursing (if applicable).
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install plumbing equipment at following heights unless indicated otherwise.

- .1 Backflow preventors 900 – 1200 (3'– 4') to centerline of unit

Also follow direction of architectural drawings and where discrepancies occur clarify prior to rough-in.

1.9 ANCHOR BOLTS AND TEMPLATES

- .1 Supply anchor bolts and templates for installation by other Divisions.

1.10 PROTECTION OF OPENINGS

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

1.11 ELECTRICAL

- .1 Electrical work to conform to Electrical Division including the following:
 - .1 Supplier and installer responsibility and related plumbing responsibility is indicated in Equipment Schedule on plumbing/mechanical and/or electrical drawings.
 - .2 Power wiring and conduit is specified in Electrical Division except for conduit, wiring and connections below 50 V which are related to control systems. Follow Electrical Division for quality of materials and workmanship.
 - .3 Electrically operated equipment shall be C.S.A. approved label. Special Inspection Label of Provincial Authority having jurisdiction will be accepted in lieu of C.S.A. approval. Each motor shall have an approved starter. Starter will be supplied and installed by Electrical Division unless otherwise indicated.

1.12 CONTROL WIRING

- .1 Furnish and install all components, devices, and control wiring for all plumbing, fire protection, HVAC equipment, HVAC systems, lighting, and other electrical loads to make all equipment operable to satisfaction of owner and consultant and to manufacturer's requirements and recommendations.
- .2 All electrical wiring and installations shall comply with local and national electrical codes.
- .3 Supply and install wiring as required for all devices and systems. Install wiring in EMT conduit and otherwise comply with all requirements of the Electrical Division. Approved plenum wire may be used for sensor and network communication wiring where it complies with appropriate building codes and regulatory authorities.
- .4 All wiring concealed in walls and chases, and all exposed wiring shall be run in conduit.
- .5 Provide recessed conduit and backer boxes where controls are wall mounted. Surface mounted boxes and conduit are acceptable in service rooms.
- .6 Free-run plenum rated cable shall be run in cable hangers where provided by Electrical Division or tied neatly to pipe and duct hangers in the ceiling. Avoid wiring that droops. Follow building lines and do not run wiring "as the crow flies".

1.13 MOTORS

- .1 Provide high efficiency motors for plumbing equipment.
- .2 If delivery of specified motor will delay delivery or installation of any equipment, install motor approved by Consultant for temporary use. Final acceptance of equipment will not occur until specified motor is installed.
- .3 Motors under 373 W, (1/2 hp): speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, voltage as indicated.
- .4 Motors 373 W, (1/2 hp) and larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40°C (72°F), 3 phase, voltage as indicated.

1.14 PIPING AND EQUIPMENT SUPPORTS

- .1 Fabricate from structural grade steel meeting requirements of - Structural Steel Section. Submit structural calculations with shop drawings.
- .2 Mount base mounted equipment on chamfered edge housekeeping pads, minimum of 100 mm (4") high and 150 mm (6") larger than equipment dimensions all around. Concrete specified elsewhere.
- .3 Where housekeeping pads incorporate existing pads provide 10 mm dowels into existing pads. New pad height shall match existing.

1.15 SLEEVES

- .1 Pipe sleeves: at points where pipes pass through masonry, concrete or fire rated assemblies and as indicated. Grout sleeves in place.
- .2 Schedule 40 steel pipe.
- .3 Sleeves with annular fin continuously welded at midpoint:
 - .1 Through foundation walls.
 - .2 Where sleeve extends above finished floor.
 - .3 Through fire rated walls and floors.
- .4 Sizes: minimum 6 mm (1/4") clearance all around, between sleeve and uninsulated pipe or between sleeve and insulation.
- .5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors.
- .6 Fill voids around pipes:
 - .1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.
 - .2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.
 - .3 Ensure no contact between copper tube or pipe and ferrous sleeve.
 - .4 Fill future-use sleeves with lime plaster or other easily removable filler.
 - .5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+Amdt-Mar-78.
- .7 Provide minimum 20 gauge duct sleeves where ducts pass through masonry concrete or fire rated assemblies. Maintain minimum 25 mm clearance all around or to the requirements of the authority having jurisdiction. Seal at wall as indicated.

1.16 FIRE STOPPING

- .1 This contractor shall work with all other contractors on the project in providing one common method of fire stopping all penetrations made in fire rated assemblies.
- .2 Approved fire stopping and smoke seal material in all fire separations and fire ratings within annular space between pipes, ducts, insulation and adjacent fire separation and/or fire rating.
- .3 Do not use cementitious or rigid seals around penetrations for pipe(s) or other equipment at all wall, floor, or ceiling penetrations.
- .4 Insulated pipes and ducts: ensure integrity of insulation and vapour barrier at fire separation.
- .5 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases. Ensure continuity and integrity of fire separation.

- .6 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.
- .7 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation. Provide "fire wrap" blanket around services penetrating fire walls. Extent of blanket must correspond to ULC recommendations.
- .8 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.
- .9 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.
- .10 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes. Exposed surfaces are to be acceptable to consultant prior to application of finish.
- .11 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.
- .12 Install material and components in accordance with ULC certification, manufacturers instructions and local authority.
- .13 Submit product literature and installation material on fire stopping in shop drawing and product data manual. Maintain copies of these on site for viewing by installers and consultant.
- .14 Manufacturer of product shall provide certification of installation. Submit letter to the consultant.
- .15 Acceptable Alternate Manufacturers to approval of local authority:
 - .1 Minnesota Mining and Manufacturing
 - .2 Fryesleeve Industries Inc.
 - .3 General Electric Pensil Firestop Systems
 - .4 International Protective Coatings Corp.
 - .5 Rectorseal Corporation (Metacaulk)
 - .6 Proset Systems
 - .7 3M
 - .8 AD Systems
 - .9 Hilti
- .16 Ensure firestop manufacturer representative performs onsite inspections and certifies installation. Submit inspection reports/certification at time of substantial completion.

1.17 ESCUTCHEONS

- .1 On pipes and ductwork passing through walls, partitions, floors and ceilings in exposed finished areas and on water and drain pipes inside millwork and cabinets.

- .2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.
- .3 Outside diameter to cover opening or sleeve.
- .4 Inside diameter to fit around finished pipe.

1.18 PAINTING

- .1 Refer to Section Interior Painting and specified elsewhere.
- .2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.
- .3 Apply two coats of paint to exposed piping service in service room(s). Base colour as specified in Pipe Identification Section.
- .4 Prime and touch up marred finished paintwork to match original.
- .5 Restore to new condition, or replace equipment at discretion of consultant, finishes which have been damaged too extensively to be merely primed and touched up.

1.19 ACCESS DOORS

- .1 Provide access doors to concealed plumbing equipment for operating, inspecting, adjusting and servicing.
- .2 Flush mounted 600 x 600 mm (24" x 24") for body entry and 300 x 300 mm (12" x 12") for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.
- .3 Material:
 - .1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Consultant.
 - .2 Remaining areas: use prime coated steel.
 - .3 Fire rated areas: provide ULC listed access doors.
 - .4 Washrooms or high moisture area ceilings: Aluminum with mill finish suitable for painting.
- .4 Installation:
 - .1 Locate so that concealed items are accessible.
 - .2 Locate so that hand or body entry (as applicable) is achieved.
- .5 Acceptable Manufacturers:
 - .1 Le Hage
 - .2 Zurn
 - .3 Acudor
 - .4 Nailor Industries Inc.

1.20 DIELECTRIC COUPLINGS

- .1 General:
 - .1 To be compatible with and to suit pressure rating of piping system.
 - .2 Where pipes of dissimilar metals are joined.
- .2 Pipes NPS 50 mm (2") and under: isolating unions.
- .3 Pipes NPS 65 mm (2 1/2") and over: isolating flanges.

1.21 DRAIN VALVES

- .1 Locate at low points and at section isolating valves unless otherwise specified.
- .2 Minimum NPS 20 mm (3/4") unless otherwise specified: bronze, with hose end male thread and complete with vacuum air breaker and chain with cap.
- .3 Drain valves on potable water systems shall be complete with vacuum breaker.

1.22 REPAIRS, CUTTING, AND RESTORATION

- .1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.
- .2 Each Section of this Division shall bear expense of cutting, patching, and repairing to install their work and/or replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
- .3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.
- .4 All patching, painting and making good of the existing walls, floors, ceilings, partitions and roof will be at the expense of this Contractor, but performed by the Contractor specializing in the type of work involved unless otherwise noted.

1.23 EXISTING SYSTEMS

- .1 Connections into existing systems to be made at time approved by Consultant. Request written approval of time when connections can be made.
- .2 Be responsible for damage to existing plant by this work.

1.24 CLEANING

- .1 Clean interior and exterior of all systems including strainers.
- .2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition.

1.25 DISCONNECTION AND REMOVAL

- .1 Disconnect and/or remove equipment, piping, etc. as indicated.

- .2 Cap and conceal all redundant and obsolete connections.
- .3 Provide a list of equipment to be removed to the owner, for his acceptance of same. Remove all equipment from site, which the owner does not retain.
- .4 Store equipment to be retained by owner on site where directed by consultant.

1.26 OWNER SUPPLIED EQUIPMENT

- .1 Connect to equipment supplied by the owner and make operable.

1.27 DEMOLITION

- .1 The general requirements are indicated on the drawings and on the outline specification in Division 1.
- .2 The general execution of the demolition is to be carried out in a clean and efficient manner.
- .3 Demolition of existing ceiling, walls etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.
- .4 All openings or holes created by removal of existing plumbing systems which are not being reused are to be patched with the same material surrounding surfaces.
- .5 All new holes and openings to facilitate plumbing systems are to be patched to match surrounding surfaces.
- .6 Protect all existing furnishings materials and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.
- .7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.
- .8 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.
- .9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, invert elevations, etc., immediately after moving on site. Should for any reason the information obtained necessitates changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Divisions.

1.28 EXISTING SYSTEM DRAINAGE

- .1 Drain all existing piping and drainage systems including all related equipment as required to facilitate system renovations.

- .2 Disposal of existing system shall be to the requirements of the local and/or provincial regulations.

1.29 DOMESTIC HW SYSTEM BALANCING

- .1 Meet all requirements as specified for balancing of hydronic systems.
- .2 Locations of equipment measurements: To include, but not be limited to, following as appropriate: Inlet and outlet of each heater, tank, pump, circulator, at each controller, controlled device.
- .3 At each circuit setter balancing valve.
- .4 Locations of systems measurements to include, but not be limited to, following as appropriate: main, main branch, branch, sub-branch.

1.30 COOPERATION WITH OTHER TRADES

- .1 Give full cooperation to other trades and furnish in writing to other trades, with copies to the engineer, any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.
- .2 Where plumbing work will be installed in close proximity to, or will interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment. Prepare composite working drawings and sections at a suitable scale, not less than ¼ inches = 1-foot – 0-inches, clearly showing how the plumbing work is to be installed in relation to the work of other trades. If work is installed before coordinating with other trades, or if it causes any interference with work of other trades, make the necessary changes in the work to correct the conditions and bear all costs.
- .3 Furnish to other trades necessary templates, patterns, setting drawings, and shop details for the proper installation of work and for coordinating adjacent work.

1.31 WATERPROOFING SEAL MATERIALS

- .1 Modular, expanding mechanical seal assemblies consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and pipe sleeve or wall opening, assembled with stainless steel bolts and pressure plates and designed so when bolts are tightened the links expand to seal the opening watertight. Select seal assemblies to suit pipe size and sleeve size or wall opening size.
- .2 Standard of quality assurance manufacturers are:
 - .1 Thunderline Corp. (Power Plant Supply Co.) "Link Seal" Model S-316
 - .2 The Metraflex Co. "MetraSeal" type ES
 - .3 Or approved equivalent.

1.32 SLEEVE, CUT, AND FORMED OPENING LOCATION DRAWINGS

- .1 Prepare and submit for review, drawings indicating size and location of required sleeves, recesses, and formed openings in poured or precast concrete work.

- .2 Such drawings are to be completely and accurately dimensioned and relate sleeve, recesses, and formed openings to suitable grid lines and elevation datum, and are to take into account structural items such as grade beams, column caps, and column drop slabs.
- .3 Begin to prepare such drawings immediately upon notification of acceptance of bid and award of Contract.

1.33 SUSTAINABLE CONSTRUCTION

- .1 Construction Waste Management:
 - .1 Recycle all waste materials to avoid land fill sites where possible.
 - .2 All metal contents shall be recycled.
 - .3 All cardboard and paper shall be recycled.
 - .4 All plastic packaging shall be recycled.
 - .5 All wood shall be directed to the appropriate recycled wood section at the landfill site.
- .2 This contractor is responsible for their own waste management system and cost associated with the disposal. This can be their own on site system, daily removal, back to shop, or a communal system shared with other contractors on site.
- .3 In all cases the cost to remove materials on site are the cost of this contractor.

1.34 FREEZE PROTECTION

- .1 Do not run lines in outside walls, or locations where freezing may occur. Piping next to outside walls shall be in furred spaces with insulation between the piping and the outside wall. Insulation of piping shall not be considered freeze protection.

1.35 SCAFFOLDING, RIGGING, AND HOISTING

- .1 Provide all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished; remove same from premises when no longer required. Conform to OSHA requirements and standards.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

- .1 Conform to the General Provisions of General Requirements Section.
- .2 This project is one of a retrofit nature in part, and which will require some demolition.
- .3 Allow for all remedial work in areas indicated on the drawings and as generally defined in the relevant sections of the specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- .1 Electrical Division.

1.3 SCOPE OF WORK

- .1 The scope of work is essentially the selected disconnection and/or removal of services and/or equipment, piping, ductwork, etc. as indicated or required to complete the work.

Part 2 Products

2.1 GENERAL

- .1 This Division is to liaise with the Owners or Consultant for equipment being removed that may be suitable for reuse to that specified or handed over to the Owner.
- .2 This Division is to take full responsibility for any special tools or equipment required to disassemble or remove material from building.

Part 3 Execution

3.1 GENERAL

- .1 The general requirements are indicated on the drawings and on the outline specification in Division 1.
- .2 The general execution of the demolition is to be carried out in a clean and efficient manner.
- .3 Demolition of existing ceilings, walls, etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.
- .4 All openings or holes created by removal of existing plumbing systems which are not being reused are to be patched with the same material surrounding surfaces.
- .5 All new holes and openings to facilitate plumbing systems are to be patched to match surrounding surfaces.

- .6 Protect all existing furnishings, materials, and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.
- .7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.
- .8 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.
- .9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, invert elevations, etc., immediately after moving on site. Should for any reason the information obtained necessitate changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.
- .10 Disconnect and/or remove equipment, piping, ductwork, etc. as indicated.
- .11 Cap and conceal all redundant and obsolete connections.
- .12 Provide a list of equipment to be removed to the Owner, for their acceptance of same. Remove all equipment from site which the Owner does not retain.
- .13 Maintain equipment to be retained by Owner on site where directed by Consultant.
- .14 Demolition of all parts of the work must be completed within the confines of the work area and in such a way as the dust produced and risk to injury of will not adversely affect the building users.
- .15 Demolished areas of the existing building will remain in their current use in some cases. Demolition in these areas must be kept to the minimum required to complete the work.
- .16 Demolition shall take place within areas isolated from all other areas with appropriate hoarding, scaffolding, netting, fencing or other means of security between building users and the work.
- .17 Co-ordinate making safe electrical devices, capping plumbing and removal of fixtures prior to commencement of demolition.
- .18 All piping and equipment to be removed and/or abandoned shall be drained prior to capping and/or abandoning. Disposal of all liquids shall be to the approval of authority of having jurisdiction and/or provincial regulations.

3.2 EXISTING SYSTEM DRAINAGE

- .1 Drain all existing piping systems including all related equipment as required to facilitate system renovations.
- .2 Disposal of existing system shall be to the requirements of the local and/or provincial regulations.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)
 - .1 ANSI/ASME B31.1, Power Piping, (SI Edition).
- .3 American Society for Testing and Materials (ASTM)
 - .1 ASTM A 125, Specification for Steel Springs, Helical, Heat-Treated.
 - .2 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM A 563, Specification for Carbon and Alloy Steel Nuts.
- .4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
 - .1 MSS SP-58, Pipe Hangers and Supports - Materials, Design, Manufacture Selection, Application, and Installation.

1.2 DESIGN REQUIREMENTS

- .1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
- .2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP-58.
- .3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
- .4 Design hangers and supports to support systems under all conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
- .5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment to be in accordance with MSS SP-58.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with general requirements.
- .2 Submit shop drawings and product data for following items:
 - .1 All bases, hangers and supports.
 - .2 Connections to equipment and structure.
 - .3 Structural assemblies.

1.4 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 GENERAL

- .1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS-SP-58.
- .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.2 PIPE HANGERS

- .1 Finishes:
 - .1 Pipe hangers and supports: to ANSI & ULC requirements
 - .2 Ensure steel hangers in contact with copper piping are copper plated.
- .2 Upper attachment structural: Suspension from upper flange of I-Beam or joist.
 - .1 Cold piping NPS 50 mm (2") maximum: Ductile iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.
 - .1 Rod: 10 mm (3/8") UL listed
 - .2 Cold piping NPS 65 mm (2 1/2") or greater, all hot piping: Malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed & FM approved.
- .3 Upper attachment structural: Suspension from upper flange of I-Beam.
 - .1 Cold piping NPS 50 mm (2") maximum: Ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed.
 - .2 Cold piping NPS 65 mm (2 1/2") or greater, all hot piping: Malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nuts.
- .4 Upper attachment to concrete.
 - .1 Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm (1/4") minimum greater than rod diameter.
 - .2 Concrete inserts: wedge shaped body with knockout protector plate ULC listed.
Note: Rapidex and Siporex are not considered concrete. Should one of these systems be encountered, piping/ductwork and/or equipment shall be supported from adjacent walls or from supplemental steel provided by this contractor attached to the adjacent walls/structure.

- .5 Shop and field-fabricated assemblies.
 - .1 Trapeze hanger assemblies: ASME B31.1.
 - .2 Steel brackets: ASME B31.1.
- .6 Hanger rods: threaded rod material to MSS SP-58.
 - .1 Ensure that hanger rods are subject to tensile loading only.
 - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
- .7 Pipe attachments: material to MSS SP-58.
 - .1 Attachments for steel piping: carbon steel.
 - .2 Attachments for copper piping: copper plated black steel.
 - .3 Use insulation shields for all piping.
 - .4 Oversize pipe hangers and supports to accommodate thermal insulation. Provide 1.5 mm (16 gauge) saddles.
- .8 Adjustable clevis: material to MSS SP-58 UL listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
 - .1 Ensure "U" has hole in bottom for rivetting to insulation shields.

2.3 RISER CLAMPS

- .1 Steel or cast iron pipe: black carbon steel to MSS-SP-58, type 42, UL listed.
- .2 Copper pipe: carbon steel copper plated to MSS-SP-58, type 42.
- .3 Bolts: to ASTM A 307.
- .4 Nuts: to ASTM A 563.

2.4 INSULATION PROTECTION SHIELDS

- .1 Insulated cold piping:
 - .1 64 kg/m² (13.12 lbs/ft²) density insulation plus insulation protection shield to: MSS SP-69, galvanized sheet carbon steel. Length designed for maximum 3 m (10') span.
- .2 Insulated hot piping:
 - .1 Curved plate 300 mm (12") long, with edges turned up, welded-in centre plate for pipe sizes NPS 300 mm (12") and over, carbon steel to comply with MSS SP-58.

2.5 MANUFACTURER

- .1 Acceptable Manufacturers:
 - .1 Grinnell
 - .2 Anvil
 - .3 Myatt
 - .4 Taylor

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with:
 - .1 Manufacturer's instructions and recommendations.
- .2 Clamps on riser piping:
 - .1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.
 - .2 Bolt-tightening torques to be to industry standards.
 - .3 Steel pipes: Install below coupling or shear lugs welded to pipe.
 - .4 Cast iron pipes: Install below joint.
- .3 Clevis plates:
 - .1 Attach to concrete with 4 minimum concrete inserts at each corner.
- .4 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

3.2 HANGER SPACING

- .1 Plumbing piping: most stringent requirements of Canadian Plumbing Code, Provincial Code, or authority having jurisdiction.
- .2 Copper piping: up to NPS 15 mm (1/2"): every 1.5 m (5').

- .3 Within 300 mm (12") of each elbow and:

Maximum Pipe Size: NPS	Spacing Steel	Maximum Spacing Copper
up to 32 mm (1 1/4")	2.1 m (7')	1.8 m (6')
40 mm (1 1/2")	2.7 m (9')	2.4 m (8')
50 mm (2")	3.0 m (10')	2.7 m (9')
65 mm (2 1/2")	3.6 m (12')	3.0 m (10')
80 mm (3")	3.6 m (12')	3.0 m (10')
90 mm (3 1/2")	3.9 m (13')	3.3 m (11')
100 mm (4")	4.2 m (14')	3.6 m (12')
125 mm (5")	4.8 m (16')	
150 mm (6")	5.1 m (17')	

3.3 HANGER INSTALLATION

- .1 Install hanger so that rod is vertical under operating conditions.
- .2 Adjust hangers to equalize load.
- .3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.
- .4 Do "NOT" support piping, ductwork and equipment from roof deck, on bottom chord of floor and/or roof joist and/or from OWSJ bridging. Provide structural member between joist.

3.4 HORIZONTAL MOVEMENT

- .1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4mm (5/32") from vertical.
- .2 Where horizontal pipe movement is less than 15 mm (1/2"), offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.5 FINAL ADJUSTMENT

- .1 Adjust hangers and supports:
 - .1 Ensure that rod is vertical under operating conditions.
 - .2 Equalize loads.
- .2 Adjustable clevis:
 - .1 Tighten hanger load nut securely to ensure proper hanger performance.
 - .2 Tighten upper nut after adjustment.

- .3 C-clamps:
 - .1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
- .4 Beam clamps:
 - .1 Hammer jaw firmly against underside of beam.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.
 - .2 CAN/CGSB-24.3, Identification of Piping Systems.
- .3 Canadian Standards Association (CSA).
 - .1 Natural Gas and Propane Installation Code CSA B149.1.
- .4 National Fire Protection Association
 - .1 NFPA 13, Installation of Sprinkler Systems.
 - .2 NFPA 14, Standpipe and Systems.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with General Requirements.
- .2 Product data to include paint colour chips, all other products specified in this section.

1.3 PRODUCT LITERATURE

- .1 Submit product literature in accordance with General Requirements.
- .2 Product literature to include nameplates, labels, tags, lists of proposed legends.

Part 2 Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

- .1 Metal or plastic lamicoid nameplate mechanically fastened to each piece of equipment by manufacturer.
- .2 Lettering and numbers to be raised or recessed.
- .3 Information to include, as appropriate:
 - .1 Equipment: Manufacturer's name, model, size, serial number, capacity.
 - .2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

- .1 Colours:
 - .1 Black letters, white background (except where required otherwise by applicable codes).

- .2 Construction:
- .1 3 mm (1/8") thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.

.3 Sizes:

- .1 Conform to following table:

Size	No. of Sizes mm (")	Height of Line mm (")	Letters mm (")
1	10 x 50 (3/8" x 2")	1 (3/64")	3 (1/8")
2	15 x 75 (1/2" x 3")	1 (3/64")	6 (1/4")
3	15 x 75 (1/2" x 3")	2 (5/64")	3 (1/8")
4	20 x 100 (3/4" x 4")	1 (3/64")	10 (3/8")
5	20 x 100 (3/4" x 4")	2 (6/64")	6 (1/4")
6	20 x 200 (3/4" x 8")	1 (3/64")	10 (3/8")
7	25 x 125 (1" x 5")	1 (3/64")	15 (1/2")
8	25 x 125 (1" x 5")	2 (5/64")	10 (3/8")
9	32 x 200 (1 1/4" x 8")	1 (3/64")	20 (3/4")

- .2 Use maximum of 25 letters/numbers per line.

.4 Locations:

- .1 Equipment in Mechanical Rooms: Use size #9.
- .2 Equipment above ceiling: use size #1 riveted to ceiling suspension system.

2.3 EXISTING IDENTIFICATION SYSTEMS

- .1 Apply existing identification system to new work.
- .2 Where existing identification system does not cover for new work, use identification system specified this section.

2.4 IDENTIFICATION OF PIPING SYSTEMS

- .1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.
- .2 Legend:
- .1 Block capitals to sizes and colours listed in CAN/CGSB-24.3.
- .3 Arrows showing direction of flow:
- .1 Outside diameter of pipe or insulation less than 75 mm (3"): 100 mm (4") long x 50 mm (2") high.
- .2 Outside diameter of pipe or insulation 75 mm (3") and greater: 150 mm (6") long x 50 mm (2") high.
- .3 Use double-headed arrows where flow is reversible.

- .4 Extent of background colour marking:
 - .1 To full circumference of pipe or insulation.
 - .2 Length to accommodate pictogram, full length of legend and arrows.
- .5 Materials for background colour marking, legend, arrows:
 - .1 Pipes and tubing 20 mm (3/4") and smaller: Waterproof and heat-resistant pressure sensitive plastic marker tags.
 - .2 All other pipes: Pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150°C (300°F) and intermittent temperature of 200°C (395°F).
- .6 Colours and Legends:
 - .1 Where not listed, obtain direction from Consultant.
 - .2 Colours for legends, arrows: To following table:

Background colour:	Legend:	Arrows:
Yellow	White	Black
Green	White	Black
Red	White	Black
- .7 Background colour marking and legends for piping systems:

CONTENTS	BACKGROUND COLOUR	
	MARKING	LEGEND
Domestic hot water supply	Green	DOM. HW SUPPLY
Dom. HW recirculation	Green	DOM. HW CIRC
Domestic cold water supply	Green	DOM. CWS
Domestic tempered supply	Green	DOM. TEMPERED
Trap Primer	Green	TRAP PRIMER
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT

2.5 VALVES, CONTROLLERS

- .1 Brass tags with 15 mm (1/2") stamped identification data filled with black paint.
- .2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.
- .3 Provide adhesive coloured tab (max. size 15 mm) indication on ceiling to locate valves/equipment above. Same applies to grid. Colour to be approved by consultant.

2.6 LANGUAGE

- .1 Identification to be in English.

Part 3 Execution

3.1 TIMING

- .1 Provide identification only after all painting specified has been completed.

3.2 INSTALLATION

- .1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.
- .2 Provide ULC and/or CSA registration plates as required by respective agency.

3.3 NAMEPLATES

- .1 Locations:
 - .1 In conspicuous location to facilitate easy reading and identification from operating floor.
- .2 Standoffs:
 - .1 Provide for nameplates on hot and/or insulated surfaces.
- .3 Protection
 - .1 Do not paint, insulate or cover in any way.

3.4 LOCATION OF IDENTIFICATION ON PIPING SYSTEMS

- .1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels not more than 1.7 m (5'-8") intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
- .2 Adjacent to each change in direction.
- .3 At least once in each small room through which piping or ductwork passes.
- .4 On both sides of visual obstruction or where run is difficult to follow.
- .5 On both sides of separations such as walls, floors, partitions.
- .6 Where system is installed in pipe chases, ceiling spaces, galleries, other confined spaces, at entry and exit points, and at each access opening.
- .7 At beginning and end points of each run and at each piece of equipment in run.
- .8 Identification to be easily and accurately readable from usual operating areas and from access points.

- .1 Position of identification to be approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 VALVES, CONTROLLERS

- .1 Valves and operating controllers, except at plumbing fixtures, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.
- .2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Consultant. Provide one copy (reduced in size if required) in each operating and maintenance manual.
- .3 Number valves in each system consecutively. Where existing numbering system is installed start new numbering system at 100.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND AS-BUILT DRAWINGS

- .1 Conform to General Requirements Section for shop drawings and as-built drawings requirements.

1.2 INSTALLATION INSPECTION AND EQUIPMENT VERIFICATION

- .1 The Plumbing Contractor shall co-ordinate with the Consultant who will inspect the plumbing installation.
- .2 The Plumbing Contractor shall complete the equipment verification forms for each piece of equipment. The forms shall be included in the operating and maintenance manual. The equipment data shall include:
 - .1 Manufacturers name, address and telephone number
 - .2 Distributors name, address and telephone number
 - .3 Make, model number and serial number
 - .4 Pumps - RPM, impeller sizes, rated flow
 - .5 Electrical - volts, amps, fuse size, overload size
 - .6 Any other special characteristics.

1.3 PLUMBING AND DRAINAGE SYSTEM TESTING

- .1 The plumbing and drainage system shall be tested in accordance with the Plumbing Code under the Ontario Water Resources Act and the specification.
- .2 The Mechanical Contractor shall notify the Building Inspector when systems are available for testing. The Mechanical Contractor shall document all tests performed and shall arrange for the Building Inspector to sign for tests completed. The forms shall be forwarded to the Consultant.

1.4 THE CONTRACTOR'S TESTING OF PIPING SYSTEMS

- .1 Test all piping systems in accordance with all applicable plumbing codes and General Requirements section.
- .2 All tests for the systems shall be performed in the presence of the Consultant or Commissioning Consultant. Complete the testing forms and forward to the Consultant.

1.5 THE INDEPENDENT CONTRACTORS TESTING AND BALANCING OF WATER SYSTEMS

- .1 Conform with the specification section, Testing, Adjusting and Balancing.
- .2 The Independent Contractor shall be hired by the plumbing contractor and shall report to the Commissioning Consultant.

1.6 CLOSEOUT SCHEDULE

- .1 The Plumbing Contractor shall include the schedule for all tests and equipment start-up tests in the construction schedule.
- .2 All testing forms and reports associated with the plumbing systems shall be directed to the Consultant with copies to the Owner and Consultant.
- .3 The forms and reports to be issued shall include:
 - .1 Shop drawings, issued and accepted
 - .2 Equipment verification forms
 - .3 Testing forms
 - .4 Reports resulting from tests
 - .5 Testing schedule
 - .6 Equipment Start-up Forms

1.7 OPERATION AND MAINTENANCE MANUAL

- .1 Conform to General Requirements section for the Operating and Maintenance Manual requirements.

1.8 OPERATOR TRAINING

- .1 Conform to General Requirements section for requirements for Instruction to Operating Staff.
- .2 The training shall be conducted in a classroom and at the equipment or system.
- .3 Training will begin when the operating and maintenance manuals have been delivered to The Owner and approved by the Consultant.
- .4 Each training session shall be structured to cover:

The operating and maintenance manual

 - .1 Operating procedures
 - .2 Maintenance procedures
 - .3 Trouble-shooting procedures
 - .4 Spare parts required
 - .5 Submit a course outline to the Consultant before training commences. Provide course documentation for up to eight people.
- .5 The training sessions shall be scheduled and co-ordinated by the Plumbing Contractor.
- .6 Training shall be provided for the following systems:

<u>System</u>	<u>Minimum Training Times</u>
Water Sewer Treatment Systems	2 hours

1.9 PLUMBING SYSTEM DEMONSTRATION AND TURNOVER

- .1 Refer to General Requirements section, Mechanical Project Completion.
- .2 The system demonstration and turnover to The Owner shall occur when:
 - .1 The installation is complete
 - .2 The acceptance test conducted by the Mechanical Consultant has been completed successfully
 - .3 The Commissioning Consultant system performance testing has been completed successfully
 - .4 Training has been completed
 - .5 Operating and Maintenance Manuals have been accepted
 - .6 Shop-drawings have been updated
 - .7 As-built drawings have been completed
- .3 The systems demonstration shall be conducted by the Mechanical Contractor and the manufacturers. The demonstration shall cover a demonstration of equipment installation and operation.

1.10 WARRANTIES

- .1 Equipment and system warranties shall not begin until the system demonstration and turnover has been conducted successfully and accepted by The Owner.
- .2 The Mechanical Contractor shall fill out the warranty form listing the equipment and systems and the start and finishing dates for warranty.
- .3 Refer to the general conditions specification section for the requirements during the warranty period.

1.11 CLOSEOUT PROCESS ALLOCATION

- .1 The mechanical contractor closeout process shall be as follows:
 - .1 3% for the first \$500,000 of contract value.
 - .2 1% of the contract value for value between \$500,000 to \$5,000,000.
 - .3 0.5% of contract value for the value in excess of \$5,000,000.
 - .4 Minimum Allocation for Close Out Documents is \$5,000.
- .2 The Mechanical Contractor shall submit all test and verification forms. The Consultant will use these forms to calculate percentage complete.
- .3 The monies shall not be paid out until the performance testing, O & M manuals, systems demonstration, and training including all required paperwork have been completed to the satisfaction of the consultant. Refer to General Requirements section for contract breakdown.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 Canadian General Standards Board (CGSB)
 - .1 ASTM C553, Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - .2 CGSB 51-GP-52Ma, Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
 - .3 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketing Sheet, for Insulating Pipes, Vessels and Round Ducts.
- .3 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .4 American Society for Testing and Materials (ASTM)
 - .1 ASTM C547, Type I and IV, Standard Specifications for Mineral Fibre Pipe Insulation.
 - .2 ASTM C 335, Test Method for Steady State Heat Transfer Properties of Pipe Insulation.
 - .3 ASTM C177, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus.
 - .4 ASTM C518, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - .5 ASTM C 921, Practice for Determining the Properties Jacketing Materials for Thermal Insulation.
 - .6 ASTM C1695, Standard Specification for Fabrication of Flexible, Removable, and Reusable Blanket Insulation for Hot Service.
 - .7 ASTM C1729 Standard Specification for Aluminium Jacketing for Insulation.
- .5 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).
 - .1 ASHRAE Standard 90.1.
- .6 Manufacturer's Trade Associations
 - .1 Thermal Insulation Association of Canada (TIAC), North American Commercial and Industrial Insulation Standards.

1.2 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with general requirements.

- .2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for pipe, fittings, valves, and jointing recommendations.
- .3 Submit properly completed detail plates from the North American Commercial and Industrial Insulation Standards manual, applicable to installation types required by this specific section.

1.3 INSTALLATION INSTRUCTIONS

- .1 Submit manufacturer's installation instructions in accordance with general requirements.
- .2 Installation instructions to include procedures to be used, installation standards to be achieved.

1.4 QUALIFICATIONS

- .1 Installer to have successfully completed apprenticeship program.
- .2 Installer to be specialist in performing work of this section and have at least three (3) years successful experience in this size and type of project, qualified to standards of TIAC.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .2 Protect from weather, construction traffic.
- .3 Protect against damage from any source.
- .4 Store at temperatures and conditions required by manufacturer.

1.6 DEFINITIONS

- .1 For purposes of this section:
 - .1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
 - .2 "EXPOSED" - will mean "not concealed" as defined herein.
 - .3 "ASJ+" – All Service Jacket – vapor retarder laminate of aluminium foil inner layer, reinforced with fiberglass scrim, bonded to a bleached kraft paper, with outer poly film leaving no paper exposed.
 - .4 "ASJ" – All Service Jacket (no outer film) – vapor retarder laminate of aluminium foil inner layer, reinforced with fiberglass scrim, bonded to a bleached kraft paper outer layer.

Part 2 Products

2.1 MATERIAL LIMITATIONS

- .1 Products shall not contain formaldehyde, asbestos, lead, mercury or mercury compounds or PBDE fire retardants.

2.2 FIRE AND SMOKE RATING

- .1 In accordance with CAN/ULC-S102:
 - .1 Maximum flame spread rating: 25.
 - .2 Maximum smoke developed rating: 50.

2.3 INSULATION

- .1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C (75°F) mean temperature when tested in accordance with ASTM C335, ASTM C177 or ASTM C518.
- .3 Type A-1: Rigid moulded or wound mineral fibre with factory applied vapour retarder jacket.
 - .1 Mineral fibre: to ASTM C547 Type I and IV.
 - .2 Jacket: to ASTM C1136, Type I, II, III, IV, X.
 - .3 Maximum "k" factor: to ASTM C547.
- .4 Materials:
 - .1 All materials must be supplied by the same manufacturer.
 - .2 Acceptable Manufacturers:
 - .1 Johns Manville
 - .2 Knauf
 - .3 Manson
 - .4 Owens Corning

2.4 INSULATION SECUREMENT

- .1 Tape: Self-adhesive, aluminum, reinforced, 50 mm (2") wide minimum.
- .2 Contact adhesive: Quick setting.
- .3 Canvas adhesive: Washable.

2.5 CEMENT

- .1 Thermal insulating and finishing cement:
 - .1 Hydraulic setting or Air drying on mineral wool, to ASTM C 449M.

2.6 VAPOUR RETARDER LAP ADHESIVE

- .1 Water based, fire retardant type, compatible with insulation.

2.7 INDOOR VAPOUR RETARDER FINISH

- .1 Compatible with insulation.

2.8 JACKETS

- .1 Polyvinyl Chloride (PVC):
 - .1 Minimum thickness: 20 mm (0.020")
 - .2 One-piece moulded type [and sheet] to CAN/CGSB-51.53 with pre-formed shapes as required.
 - .3 Colours: white.
 - .4 Minimum service temperatures: -29°C (-20°F).
 - .5 Maximum service temperature: 65°C (150°F).
 - .6 Moisture vapour transmission: 0.05 perm.
 - .7 Fastenings:
 - .1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
 - .2 Tacks are not to be used below ambient temperature (cold) operating systems.
 - .3 Pressure sensitive vinyl tape of matching colour.

2.9 CAULKING FOR JACKETS

- .1 Caulking: Silicone clear caulking.

Part 3 Execution

3.1 PRE-INSTALLATION REQUIREMENT

- .1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed, and certified.
- .2 Surfaces to be clean, dry, free from foreign material.

3.2 INSTALLATION

- .1 Install in accordance with TIAC, North American Commercial and Industrial Insulation Standards.
- .2 Apply materials in accordance with manufacturers' instructions and this specification.
- .3 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
 - .1 Hangers, supports to be outside vapour retarder jacket.

- .4 Supports, Hangers:
 - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.
- .5 Below ambient/chilled water installation:
 - .1 All pipes, valves, strainers, flanges, unions, and other pipe system components and spec must be properly insulated with correctly completed vapor retarder applied.
 - .2 All insulation material must have properly installed and sealed vapor retarding jacket, including circumferential and longitudinal seams.
 - .3 All penetrations, tears, and punctures must be repaired and sealed with a vapor retarding material with a 0.02 or lower perm rating.
 - .4 Vapor stops must be installed at 18' intervals at all pipe insulation termination points including fittings, flanges, and other changes in direction or other types of piping specialties.
 - .5 All fitting insulation must be of the same type, thickness, and density of the pipe insulation, be premoulded insulation covers or fabricate from the same material as the pipe insulation. Full thickness must be maintained over all fitting surfaces. Blanket insulation with a factory applied vapor retarder facing is unacceptable.
 - .6 A complete vapor retarder must be installed on insulation over fittings before applying final finish. Vapor retarder must extend onto and be sealed to the vapor retarder of the pipe insulation.
 - .7 Additional fitting covers, PVC, or metal must have a vapor retarder seal applied to all longitudinal and circumferential seams in addition to the vapor retarder applied to the fitting insulation.
 - .8 Additional field applied to jackets must not use staples, screws, tacks, or rivets for attachment to avoid puncturing vapor retarder underneath.
 - .9 Insulating support inserts are to be high compressive strength insulation with a rigid shield. No calcium silicate is to be used for insulation on below-ambient operation piping.

3.3 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

- .1 Application: At expansion joints, valves, primary flow measuring elements, flanges, and unions at equipment.
- .2 Flexible removable blanket insulation covers are not acceptable for below-ambient (cold) operation piping systems. Rigid removable insulation jackets that are vapor retarder exterior material, that can be vapor sealed at the seams, are acceptable on below-ambient (cold) operation piping systems.
- .3 Design: To permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.

- .4 Insulation:
- .1 Insulation, fastenings and finishes: same as system.
- .2 Jacket: As per adjacent insulation.

3.4 INSTALLATION OF ELASTOMERIC INSULATION

- .1 Insulation to remain dry at all times. Overlaps to manufacturers instructions. Ensure tight joints.
- .2 Provide vapour retarder as recommended by manufacturer.

3.5 PIPING INSULATION SCHEDULES

- .1 Includes valves, valve bonnets, strainers, flanges, and fittings unless otherwise specified.
- .2 Install insulator and jackets to applicable TIAC codes.
- .3 Insulate ends of capped piping with type and thickness indicated for capped service.
- .4 Thickness of insulation to be as listed in following table:
- .1 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.
- .2 All storm piping including all vertical and horizontal piping shall be insulated.

Application	Type	Pipe sizes through (NPS) and insulation thickness mm (")				
		to	32 (1¼")	50 (2")	105 (4")	200 (8")
		25 (1")	40 (1½")	80 (3")	150 (6")	& over
Domestic Water Piping	A-1	25 (1")	25 (1")	40 (1½")	40 (1½")	40 (1½")
Cooling Coil cond. Drain	A-1	25 (1")	25(1")	25 (1")	25 (1")	25 (1")
Horizontal Cast Iron	A-1/A-5	N/A	N/A	25 (1")	25 (1")	25 (1")
Sanitary Piping						
Trap Primer Piping	A-1	15 (½")	15 (½")	25 (1")		

- .5 Finishes: Conform to the following table:

Application	Piping	Valves & Fittings
Exposed indoors	PVC	PVC
Concealed indoors	N/A	PVC

- .6 Connection: To appropriate TIAC code.
- .7 Finish attachments: SS bands, @ 150 mm (6") oc. seals: closed.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ANSI/ASME B16.15, Cast Copper Alloy Threaded Fittings, Classes 125 and 250.
- .3 ANSI B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
- .4 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
- .5 ANSI B16.24, Cast Copper Alloy, Pipe Flanges and Flanged Fittings: Classes 150, 300, 600, 900, 1500, and 2500.
- .6 ASTM B88M, Specification for Seamless Copper Water Tube (Metric).
- .7 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
- .8 MSS-SP-71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.
- .9 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

1.2 SHOP DRAWINGS

- .1 Submit shop drawing data in accordance with general requirements.

1.3 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 PIPING

- .1 Domestic hot, cold and recirculation systems, within building.
 - .1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.

2.2 FITTINGS

- .1 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI B16.24.
- .2 Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15.
- .3 Cast copper, solder type: to ANSI B16.18.
- .4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- .5 Tee drill NPS 25 mm (1") and larger.

2.3 JOINTS

- .1 Solder: 95/5.
- .2 Teflon tape: for threaded joints.
- .3 Dielectric connections between dissimilar metals: dielectric fitting to ASTM F1545, complete with thermoplastic liner.
- .4 Tee drill fittings shall be brazed with silver solder, 45% Ag - 15% Cu or copper phosphorous, 95% Cu, 5% P and non-corrosive flux.

2.4 VALVES

- .1 All valves shall be of commercial grade and of same manufacturer, Lead-Free.
- .2 Acceptable Manufacturers:
 - .1 Milwaukee
 - .2 Crane
 - .3 Kitz
 - .4 Apollo

2.5 BALL VALVES

- .1 All valves shall be of commercial grade and of same manufacturer.
- .2 NPS 80 mm (3") and under, soldered:
 - .1 To ANSI B16.18, Class 150.
 - .2 Bronze body, full port stainless steel ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon seat, steel lever handle, with NPT to copper adaptors.

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with Provincial Plumbing Code and local authority having jurisdiction.
- .2 Cut square, ream and clean tubing and tube ends, clean recesses of fittings and assemble without binding.
- .3 Assemble all piping using fittings manufactured to ANSI standards.
- .4 Install tubing close to building structure to minimize furring, conserve headroom and space. Group exposed piping and run parallel to walls.
- .5 Install CWS piping below and away from HWS and HWC and all other hot piping so as to maintain temperature of cold water as low as possible.

- .6 Connect to fixtures and equipment in accordance with manufacturers instructions unless otherwise indicated.
- .7 Bent tubing is not acceptable.

3.2 VALVES

- .1 Isolate equipment, fixtures and branches with ball valves.
- .2 Balance recirculation system using lockshield globe valves. Mark settings and record on as-built drawings on completion.

3.3 PRESSURE TESTS

- .1 Conform to requirements of general requirements.
- .2 Test pressure: greater of 1½ times maximum system operating pressure or 860 kPa (125 psi).

3.4 FLUSHING AND DISINFECTING

- .1 Maintain testable RP backflow preventor between municipal water and new plumbing system.
- .2 Ensure a minimum of 90% of plumbing fixtures are installed.
- .3 Flush water mains through available outlets with a sufficient flow of potable water to produce a velocity of 1.5 m/s, within pipe for 10 min, or until foreign materials have been removed and flushed water is clear with backflow protection.
- .4 Provide connections and pumps for flushing as required.
- .5 Open and close valves, and operate fixtures to ensure thorough flushing.
- .6 When flushing has been complete to satisfaction of Consultant introduce a strong solution of Chlorine into water system and ensure that it is distributed throughout entire system.
- .7 Rate of chlorine application to be proportional to rate of water entering pipe.
- .8 Chlorine injection to be close to point of filling water main or at building water service and to occur simultaneously.
- .9 Confirm adequate chlorine residual not less than 50 ppm has been obtained, leave system charged with chlorine solution for 24 h. After 24 h, further samples shall be taken to ensure that there is still not less than 10 ppm of chlorine residual remaining throughout system.
- .10 Upon 10 ppm confirmation and 24 hr elapsed time flush line to remove chlorine solution.

- .11 Measure chlorine residuals at extreme end of pipe-line being tested.
- .12 Perform bacteriological tests on water main, after chlorine solution has been flushed out. Take samples daily for minimum of two days. Should contamination remain or reoccur during this period, repeat disinfecting procedure. Specialist contractor shall submit certified copy of test results.
- .13 Take water samples at remote fixtures and service connections.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 CAN/CSA – B64.10/B64.10.1 – Selection and Installation of Backflow Preventers/Maintenance and Field Testing of Backflow Preventers.

1.2 SUBMITTALS

- .1 Complete the required cross connection survey form and submit to authority having jurisdiction. Provide a copy to the consultant.
- .2 Incorporate data into maintenance manual.

Part 2 Products

2.1 GENERAL

- .1 Provide backflow prevention devices in all new and existing fixtures and equipment as indicated and as required by the authority having jurisdiction.
- .2 Acceptable Manufacturers:
 - .1 Watts
 - .2 Wilkins

Part 3 Execution

3.1 INSTALLATION

- .1 Install devices in accordance with acceptable engineering practices, the requirements of the Ontario Building Code and the requirements of the authority having jurisdiction.

3.2 TESTING

- .1 Provide testing to requirements of authority having jurisdiction.
- .2 Provide copy of test report for each device in the maintenance manual.
- .3 Provide tag on each device.

- .4 Provide a list of devices complete with tag number on a framed chart. Locate chart in Water Entrance Room.
- .5 Provide additional testing on all devices at one year warranty period. Provide documentation to owner and consultant.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
- .3 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
- .4 PDI-WH201, Water Hammer Arresters.
- .5 CAN/CSA-B64 Series, Backflow Preventers and Vacuum Breakers.

1.2 SUBMITTALS

- .1 Submit shop drawings and product data in accordance with general requirements.
- .2 For shop drawings, indicate dimensions, construction details and materials.
- .3 For product data, indicate dimensions, construction details and materials for all items specified herein.

1.3 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements.
- .2 Data to include:
 - .1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.
 - .2 Details of operation, servicing and maintenance.
 - .3 Recommended spare parts list.

Part 2 Products

2.1 INTERIOR HOSE BIBB

- .1 20 mm (3/4") diameter brass construction, 200 psi, 180°F pressure and temperature limits, complete with hose connection, and wheel handle straight/angle pattern to suit.
- .2 Provide vacuum breaker complete with hose connection.
- .3 Acceptable Manufacturers:
 - .1 Exposed on wall; Watts BD series
 - .2 Surface mounted (piping in wall); Watts SC-3 series
 - .3 Delta
 - .4 Waltec

.5 Wilkins

.6 Emco

2.2 BACKFLOW PREVENTORS

.1 General Requirements:

.1 The backflow preventor shall prevent backflow by either backpressure or backsiphonage from a cross-connection between potable water lines and substances that are objectionable.

.2 To CAN/CSA-B64.

.3 Application: as indicated.

.2 Reduced Pressure Principle:

.1 Up to 50 mm (2"):

.1 Rated to 180°F and supplied with full port ball valves. The main body and access covers shall be bronze (ASTM B584), the seat ring and all internal polymers shall be NSF® Listed Noryl™, and the seat disc elastomers shall be SILICONE. The first and second check shall be orientated at a 45° angle up-wards and accessible for maintenance without removing the relief valve. Supplied with an air gap adapter.

.2 Acceptable Manufacturers:

.1 Watts 009 ½" - 2"

.2 Wilkins 975 XL ½" - 2"

.3 Conbraco 40-200 Series

.2 65 mm (2½") to 250 mm (10"):

.1 The reduced pressure principle backflow preventer shall be ASSE 1013 approved and supplied with full port gate valves. The main body and access covers shall be epoxy coated cast iron (ASTM A126 Class B), the seat ring and check valve shall be cast bronze (ASTM B584), the stem shall be stainless steel (ASTM A276) and the seat disc elastomers shall be EPDM. The first and second checks shall be accessible for maintenance without removing the relief valve or the entire device from the line.

.2 If installed indoors, the installation shall be supplied with an air gap adapter, strainer, and integral monitor switch.

.3 Acceptable Manufacturers:

.1 Watts 909 2½" - 10"

.2 Wilkins 975 2½"- 10" or 375 4"- 6"

.3 Conbraco 40-200 Series

2.3 HOSE BIBBS AND SEDIMENT FAUCETS

- .1 Bronze construction complete with integral back flow preventer, hose thread spout, replaceable composition disc, and chrome plated in finished areas.
 - .1 Acceptable Manufacturers:
 - .1 Watts BD series
 - .2 Emco
 - .3 Chicago
 - .4 Zurn

2.4 STRAINERS

- .1 860 kPa (125 psi), Y type with 20 mm (3/4") mesh, bronze or stainless steel removable screen.
- .2 NPS 50 mm (2") and under, bronze body, screwed ends, with brass cap.
 - .1 Acceptable Manufacturers:
 - .1 Watts Series 777SI
 - .2 Crane/Powers
 - .3 Colton 125 YTB
 - .4 Wilkins S Series
- .3 NPS 65 mm (2½") and over, cast iron body, flanged ends, with bolted cap.
 - .1 Acceptable Manufacturers:
 - .1 Watts 77F-D (77F-D-FDA for water service)
 - .2 Crane/Powers
 - .3 Colton 125 YTB
 - .4 Wilkins FS Series

2.5 OWNER SUPPLIED EQUIPMENT

- .1 The mechanical contractor shall supply and install all water, gas, condensate and sanitary piping to the owner supplied equipment. Connection to equipment shall be by this contractor.
- .2 Provide flexible riser stops to all sinks and ball valves to all other equipment.
- .3 Provide backflow preventors on equipment required by the local plumbing inspector.
- .4 Provide flexible gas piping to all gas equipment.
- .5 All equipment in store equipment schedule will be supplied and set in place by Mechanical Contractor unless otherwise noted.
- .6 Coordinate all rough-ins and connection with the supplier on site.
- .7 Owner supplied equipment includes existing relocated equipment.

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with provincial codes, and local authority having jurisdiction.
- .2 Install in accordance with manufacturer's instructions and as specified.

3.2 BACK FLOW PREVENTORS

- .1 Install in accordance with CAN/CSA-B64 Series, where indicated and elsewhere as required by code.
- .2 Pipe discharge to terminate over nearest drain and or service sink.
- .3 Provide test results in manual and leave tag with test results on device.

3.3 HOSE BIBBS AND SEDIMENT FAUCETS

- .1 Install at bottom of all risers, at low points to drain systems, and as indicated.

3.4 STRAINERS

- .1 Install with sufficient room to remove basket.
- .2 Strainer size to match pipe size.

3.5 COMMISSIONING

- .1 In context of this paragraph, "verify" to include "demonstrate" to Consultant.
- .2 Timing: commission only after start-up deficiencies rectified.
- .3 Access doors: verify size and location relative to items to be services.
- .4 Adjust to suit site conditions, including, but not necessarily limited to, following:
 - .1 Non-freeze wall, ground hydrants:
 - .1 Verify complete drainage.
 - .2 Verify operation of vacuum breaker.
 - .2 Water hammer arrestors:
 - .1 Verify accessibility.
 - .3 Backflow preventors, vacuum breakers:
 - .1 Verify installation of correct type to suit application.
 - .2 Adjust as necessary to ensure proper operation.
 - .3 Verify visibility of discharge.
 - .4 Pressure regulators:
 - .1 Adjust settings to suit installed locations, required flow rates.
 - .5 Hose bibbs, sediment faucets:
 - .1 Verify operation.

- .6 Water make-up assembly:
 - .1 Verify operation.
- .7 Water meters:
 - .1 Verify operation.
- .8 Pipeline strainers:
 - .1 Verify accessibility of basket.
 - .2 Clean out during commissioning until system clean.
- .5 Commissioning reports:
 - .1 Record all results on approved report forms.
 - .2 Include signature of tester and supervisor.
 - .3 To be countersigned by Consultant.
- .6 Verification:
 - .1 Notify Consultant 48 h before commencing tests.
 - .2 All tests and procedures to be witnessed by Consultant.
 - .3 All reported results subject to verification by consultant.
- .7 Training:
 - .1 Train O&M personnel in start-up, operation, monitoring, servicing, maintenance and shut-down procedures.
- .8 Demonstrations:
 - .1 Demonstrate full compliance with Design Criteria.
 - .2 Demonstrations also to show completeness of O&M personnel training.

3.6 WARRANTY

- .1 Warranty Start Date:
 - .1 Warranty period starts as of the date of Ready for Takeover.
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .2 Warranty Duration:
 - .1 Two (2) year warranty period applies.
- .3 Warranty Coverage:
 - .1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
- .3 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
- .4 CAN/CSA-B79, Commercial and Residential Drains and Cleanouts.

1.2 SUBMITTALS

- .1 Submit shop drawings and product data in accordance with general requirements.
- .2 For shop drawings, indicate dimensions, construction details and materials.
- .3 For product data, indicate dimensions, construction details and materials for all items specified herein.

1.3 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements.
- .2 Data to include:
 - .1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year, and capacity.
 - .2 Details of operation, servicing, and maintenance.
 - .3 Recommended spare parts list.

Part 2 Products

2.1 FLOOR DRAINS

- .1 Floor drains and trench drains: to CAN/CSA-B79.
- .2 Refer to schedule for types and acceptable manufacturer.

2.2 CLEANOUTS

- .1 Cleanout plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.
- .2 Wall access: face or wall type, stainless steel round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.
 - .1 Acceptable Manufacturers:
 - .1 Zurn ZSS-1469

- .2 Mifab C1400-RD
 - .3 Watts CO-480-RD-3
 - .4 Jay R. Smith 4710
- .3 Floor access: rectangular, round, as indicated, cast iron body and frame with adjustable secured 15 mm (½") thick flush mounted heavy duty nickel bronze top and:
Plugs: bolted bronze with neoprene gasket.
 - .1 Cover for VCT tile and linoleum floors: square polished nickel bronze with 15 mm (1/2") thick flush mounted heavy duty nickel bronze cover, complete with vandal-proof locking screws.
 - .1 Acceptable Manufacturers:
 - .1 Zurn ZN-1400-T – HD
 - .2 Mifab C1100-TS-6
 - .3 Watts CO-200-TS-1-6
 - .4 Jay R. Smith 4200-U
 - .2 Cover for ceramic tile floors: 15 mm (½") thick heavy duty nickel bronze square, cover complete with gasket, vandal-proof screws, for flush finish.
 - .1 Acceptable Manufacturers:
 - .1 Zurn ZN-1400 – T-HD or Zurn ZZN-1612
 - .2 Mifab C1100-S-6
 - .3 Watts CO-200-S-1-6
 - .4 Jay R. Smith SQ-4-1753-NBCO-SP-U-Y

2.3 FLAPPER TYPE BACKWATER VALVES

- .1 Coated extra heavy cast iron body with bronze seat, revolving bronze flapper and threaded cover.
 - .1 Acceptable Manufacturers:
 - .1 Zurn Z-1090
 - .2 Mifab BV1200-R
 - .3 Watts BV200
 - .4 Jay R. Smith 7012
- .2 Access: Surface access.
 - .1 Access pipe with cover: maximum 300 mm (12") depth.
 - .2 Steel housing with gasketed steel cover.
 - .3 Concrete access pit with cover, as indicated.
 - .4 Acceptable Manufacturers:
 - .1 Watts BV-230-R
 - .2 Jay R. Smith SQ-7-4680-420-LXH420

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with provincial codes, and local authority having jurisdiction.
- .2 Install in accordance with manufacturer's instructions and as specified.

3.2 CLEANOUTS

- .1 In addition to those required by code, and as indicated, install at base of all soil and waste stacks.
- .2 Bring cleanouts to wall or finished floor unless serviceable from below floor.
- .3 Building drain cleanout and stack base cleanouts: line size to maximum NPS 100 mm (4").

3.3 BACKWATER VALVES

- .1 Install where indicated.
- .2 Flapper type installed at 2% slope as per installation instructions.

3.4 COMMISSIONING

- .1 In context of this paragraph, "verify" to include "demonstrate" to Consultant.
- .2 Timing: Commission only after start-up deficiencies rectified.
- .3 Access doors: Verify size and location relative to items to be services.
- .4 Adjust to suit site conditions, including, but not necessarily limited to, following:
 - .1 Floor, hub and trench drains:
 - .1 Verify proper operation of trap primer, flushing features.
 - .2 Verify security and removability of strainers.
 - .2 Cleanouts:
 - .1 Verify covers are gastight, secure and easily removable.
 - .2 Verify that cleanout rods can probe as far as next cleanout.
 - .3 Backwater valves:
 - .1 Verify accessibility of cover, valve.
 - .4 Trap seal primers:
 - .1 Verify operation.
 - .2 Adjust flow rate to suit site conditions.
 - .5 Acid dilution devices:
 - .1 Verify operation.

- .5 Commissioning reports:
 - .1 Record all results on approved report forms.
 - .2 Include signature of tester and supervisor.
 - .3 To be countersigned by Consultant.
- .6 Verification:
 - .1 Notify Consultant 48 h before commencing tests.
 - .2 All tests and procedures to be witnessed by Consultant.
 - .3 All reported results subject to verification by consultant.
- .7 Training:
 - .1 Train O&M personnel in start-up, operation, monitoring, servicing, maintenance and shut-down procedures.
- .8 Demonstrations:
 - .1 Demonstrate full compliance with Design Criteria.
 - .2 Demonstrations also to show completeness of O&M personnel training.

3.5 WARRANTY

- .1 Warranty Start Date:
 - .1 Warranty period starts as of the date of Ready for Takeover.
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .2 Warranty Duration:
 - .1 Two (2) year warranty period applies.
- .3 Warranty Coverage:
 - .1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ASTM B32, Specification for Solder Metal.
- .3 ASTM B306, Specification for Copper Drainage Tube (DWV).
- .4 ASTM C564, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- .5 CAN/CSA-B70, Cast Iron Soil Pipe, Fittings and Means of Joining.
- .6 CAN/CSA-B125.3, Plumbing Fittings.

Part 2 Products

2.1 COPPER TUBE AND FITTINGS

- .1 Above ground sanitary, and vent, maximum 65 mm (2½") Type DWV copper to: ASTM B306.
 - .1 Fittings.
 - .1 Cast brass: to CAN/CSA B125.3.
 - .2 Wrought copper: to CAN/CSA B125.3.
 - .2 Solder: tin-lead, 50:50, to ASTM B32, type 50A.

2.2 CAST IRON PIPING AND FITTINGS

- .1 Above and below ground sanitary, and vent, minimum NPS 80 mm (3"), cast iron to: CAN/CSA-B70.
 - .1 Mechanical joints (vents)
 - .1 Neoprene or butyl rubber compression gaskets: to ASTM C564 or CAN/CSA-B70.
 - .2 Stainless steel clamps (2 band).
 - .2 Mechanical joints (sanitary)
 - .1 Heavy duty neoprene or butyl rubber compression gaskets to: ASTM C1540.
 - .2 Stainless steel clamps (4 band min).

2.3 VENT FLASHINGS

- .1 Thaler or equal spun aluminum complete with insulation, cap, and rubber gasket.

Part 3 Execution

3.1 APPLICATION

- .1 Install copper or cast iron drainage on first 10'-0" (3.0m) of all fixtures discharging waste above 110°F.

3.2 INSTALLATION

- .1 Install in accordance with Provincial Plumbing Code and local authority having jurisdiction.
- .2 Install above ground piping parallel and close to walls and ceilings to conserve headroom and space, and to grade as indicated.
- .3 Place Cleanouts
 - .1 Where shown on Drawings and near bottom of each stack and riser.
 - .2 At every 90 degree change of direction for horizontal lines.
 - .3 Every 15 m (50') of horizontal run.
 - .4 Extend clean out to accessible surface. Do not place cleanouts in carpeted floors. In such locations, use wall type cleanouts.
- .4 Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have a seal trap in connection with a complete venting system so gases pass freely to atmosphere with no pressure or syphon condition on water seal.
- .5 Vent entire waste system to atmosphere.
 - .1 Discharge 500 mm (20") above roof. Join lines together in fewest practicable number before projecting above roof.
 - .2 Set back vent lines so they will not pierce roof near an edge or valley.
 - .3 Venting shall be 7.5 m (25'-0") from any outdoor air intakes.
 - .4 Provide copper vent piping through roof as per detail.
- .6 Use torque wrench to obtain proper tension in cinch bands when using hubless cast iron pipe. Butt ends of pipe against centering flange of coupling.
- .7 Flash pipes passing through roof with 453 g (16 oz) sheet copper flashing fitted snugly around pipes and caulk between flashing and pipe with flexible waterproof compound.
 - .1 Flashing base shall be at least 600 mm (24") square.
 - .2 Flashing may be a 24 kg/m² (5 lb/ft²) lead flashing fitted around pipes and turned down into pipe 15 mm (½") with turned edge hammered against pipe wall.

- .8 Before piping is covered, conduct tests in presence of Consultant and correct leaks or defective work. Conduct test prior to placing floor slab but after backfill is placed.
- .1 Do not caulk threaded work.
- .2 Fill waste and vent system to roof level [a minimum of 3,100 mm - (10')] with water and show no leaks for 2 hours.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ASTM D2235, Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
- .3 ASTM D2564, Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.
- .4 CAN/CSA-B181.1, ABS Drain, Waste and Vent Pipe and Pipe Fittings.
- .5 CAN/CSA-B181.2, PVC and CPVC Drain, Waste and Vent Pipe and Pipe Fittings.
- .6 CAN/CSA-B182.1, Plastic Drain and Sewer Pipe and Pipe Fittings.

Part 2 Products

2.1 PIPING AND FITTINGS

- .1 Buried sanitary, and vent piping to:
 - .1 80 mm (3") and smaller: ABS drain waste and vent pipe to CAN/CSA-B181.1.
 - .2 100 mm (4") and larger: SDR-35 PVC drain waste and vent pipe to CAN/CSA-B181.2.
 - .3 Vent piping: any size, PVC-DWV plastic drain and sewer pipe and fittings CAN/CSA-B181.2.
- .2 Above grade sanitary and vent piping:
 - .1 80 mm (3") and smaller: IPEX: PVC-XFR drain waste and vent pipe to CAN/CSA-B181.2.
 - .2 100 mm (4") and larger: IPEX: PVC-XFR drain waste and vent pipe to CAN/CSA-B181.2.
 - .3 Vent piping: any size, IPEX: PVC-XFR plastic drain and sewer pipe and fittings CAN/CSA-B181.2.
- .3 Where piping pierces a fire separation an approved fire stop system to the approval of authority having jurisdiction shall be used.

2.2 JOINTS

- .1 Solvent weld for PVC: to ASTM D2564.
- .2 Solvent weld for ABS: to ASTM D2235.

2.3 EXPANSION

- .1 Provide solvent welded expansion joints as required by manufacturer's recommendations.

2.4 VENT FLASHINGS

- .1 Thaler Stack Jack spun aluminum complete with insulation, cap, and rubber gasket.

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with Provincial Plumbing Code and local authority having jurisdiction. Install in accordance with manufacturer's instructions.
- .2 Installation of underground pipe
 - .1 Provide all excavation, bedding, backfill, and compaction.
 - .2 Install materials in accordance with Manufacturer's instructions.
 - .3 Use jacks to make-up gasketed joints.
 - .4 Stabilize unstable trench bottoms.
 - .5 Bed pipe true to line and grade with continuous support from firm base.
 - .1 Bedding depth - 100 mm to 150 mm (4" to 6").
 - .2 Material and compaction to meet ASTM standard noted above.
 - .6 Excavate bell holes into bedding material so pipe is uniformly supported along its entire length. Blocking to grade pipe is forbidden.
 - .7 Trench width at top of pipe -
 - .1 Minimum 450 mm (18") or diameter of pipe plus 300 mm (12"), whichever is greater.
 - .2 Maximum - Outside diameter of pipe plus 600 mm (24").
 - .8 Piping and joints shall be clean and installed according to manufacturer's recommendations. Break down contaminated joints, clean seats and gaskets and reinstall.
 - .9 Do not use back hoe or power equipment to assemble pipe.
 - .10 Initial backfill shall be 300 mm (12") above top of pipe with material specified in referenced ASTM standard.
- .3 Place Cleanouts
 - .1 Where shown on Drawings and near bottom of each stack and riser.
 - .2 At every 90 degree change of direction for horizontal lines.
 - .3 Every 15 m (50') of horizontal run.
 - .4 Extend clean out to accessible surface. Do not place cleanouts in carpeted floors. In such locations, use wall type cleanouts

- .4 Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have a seal trap in connection with a complete venting system so gases pass freely to atmosphere with no pressure or syphon condition on water seal.
- .5 Before piping is covered, conduct tests in presence of Consultant and correct leaks or defective work. Conduct test prior to placing floor slab but after backfill is placed.
 - .1 Fill waste and vent system a minimum of 1.8 m (6') above finished floor with water and show no leaks for 2 hours.
 - .2 Conduct ball test in presence of consultant to ensure proper grade and clear of obstructions.
- .6 Install solvent welded expansion joints as per manufacturer's recommendation. Care is to be taken to accommodate ambient temperatures at time of install.
- .7 Vent entire waste system to atmosphere.
 - .1 Discharge 350 mm (14") above roof. Join lines together in fewest practicable number before projecting above roof.
 - .2 Set back vent lines so they will not pierce roof near an edge or valley.
 - .3 Venting shall be 7.5 m (25'-0") from any outdoor air intakes.
- .8 Flash pipes passing through roof with Thaler insulated Stack Jack flashing.
 - .1 Flashing base shall be at least 600 mm (24") square.
- .9 Install above ground piping parallel and close to walls and ceilings to conserve headroom and space, and to grade as indicated.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
- .3 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
- .4 CAN/CSA-B79, Commercial and Residential Drains and Cleanouts.
- .5 PDI-WH201, Water Hammer Arresters.
- .6 CAN/CSA-B64 Series, Backflow Preventers and Vacuum Breakers.

1.2 SUBMITTALS

- .1 Submit shop drawings and product data in accordance with general requirements.
- .2 For shop drawings, indicate dimensions, construction details and materials.
- .3 For product data, indicate dimensions, construction details and materials for all items specified herein.

1.3 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements.
- .2 Data to include:
 - .1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.
 - .2 Details of operation, servicing and maintenance.
 - .3 Recommended spare parts list.

Part 2 Products

2.1 HYDROMECHANICAL GREASE INTERCEPTORS (PLASTIC)

- .1 Hydromechanical type interceptor, tested and rated in accordance with the Environmental Protection Act (EPA), complete with fire resistant polypropylene construction for mounting flush with floor with aluminum non-skid covers on floor complete with flow control fitting suitably vented, and extension.
- .2 Capacity:
 - .1 Refer to Schedules.
 - .2 Flow Rate: Refer to schedule
 - .3 Grease Holding Capacity: 45 kg (100 lbs)

- .3 The unit shall be able to treat effluent to less than 100 mg/litre of oil and grease.
- .4 Provide extensions as required to suit finished floor elevation and installed depth.
- .5 Provide secondary flow control devices for all interceptors that serve fixtures installed more than one storey above unit.
- .6 Acceptable Manufacturers:
 - .1 Canplas Endura
 - .2 MIFAB (with confirmation of CSA Compliance)
 - .3 JRC Plastic Interceptors and Pit Boxes (Tel: 1-416-453-2364) (with confirmation of CSA compliance)
 - .4 Jonespec (with confirmation of CSA compliance)
 - .5 Contour (with confirmation of CSA compliance)

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with provincial codes, and local authority having jurisdiction.
- .2 Install in accordance with manufacturer's instructions and as specified.

3.2 INTERCEPTORS

- .1 Install with sufficient space, as indicated, for ease of maintenance.

3.3 COMMISSIONING

- .1 In context of this paragraph, "verify" to include "demonstrate" to Consultant.
- .2 Timing: commission only after start-up deficiencies rectified.
- .3 Access doors: verify size and location relative to items to be services.
- .4 Adjust to suit site conditions, including, but not necessarily limited to, following:
 - .1 Grease interceptors:
 - .1 Activate, using manufacturer's recommended activation procedures and materials.
- .5 Commissioning reports:
 - .1 Record all results on approved report forms.
 - .2 Include signature of tester and supervisor.
 - .3 To be countersigned by Consultant.

- .6 Verification:
 - .1 Notify Consultant 48 h before commencing tests.
 - .2 All tests and procedures to be witnessed by Consultant.
 - .3 All reported results subject to verification by consultant.
- .7 Training:
 - .1 Train O&M personnel in start-up, operation, monitoring, servicing, maintenance and shut-down procedures.
- .8 Demonstrations:
 - .1 Demonstrate full compliance with Design Criteria.
 - .2 Demonstrations also to show completeness of O&M personnel training.

END OF SECTION

- .1 Stored pressure rechargeable type with hose and shut off nozzle, ULC labelled for A, B and C class protection as indicated. Size of extinguishers shall be as follows:
 - .1 Kitchen Type 'K' 10 lb 20BC rating
- .2 Acceptable Manufacturers:
 - .1 Wilson & Cousins
 - .2 National

2.2 CABINETS

- .1 Recessed mounted type of a size sufficient to contain all necessary components. Tub to be constructed of 1.5 mm (16 gauge) steel and finished with Wilco "Pro-Tech" Premier white painted finish. Adjustable frame comprising of 180° opening door and trim to be separate assembly adaptable to any type of finished wall. Trim to have 6 mm (1/4") return on outer edges with full length semi-concealed piano hinge, and Corbin style latching device.
- .2 Doors and trim to be 1.5 mm (16 gauge) white painted finish. Door glass to be 6 mm (1/4") Duo Lite Safety Glass.
- .3 Cabinet to maintain fire resistive rating of construction in which they occur.
- .4 Do not provide cabinets for mechanical room and service area fire extinguishers unless indicated.
- .5 Acceptable Manufacturers:
 - .1 Wilson & Cousins Model IE - 105R (5 and 10 lb. Class)
 - .2 National

2.3 IDENTIFICATION

- .1 Identify extinguishers in accordance with recommendations of NFPA 10.
- .2 Attach tag or label to extinguishers indicating month and year of installation and provide space for the addition of recording service dates.

2.4 FIRE BLANKET

- .1 100% non-combustible fire retardant glass fibre, non-toxic, non-conductor, cleanable complete with straps.
- .2 Size: 1 m x 1 m (40" x 40").
- .3 Cabinet to be surface mounted, 400 mm x 300 mm (16" x 12").
- .4 Mount on wall in kitchen area where indicated or directed on site by consultant.
- .5 Acceptable Manufacturers:
 - .1 National FB 4040 blanket, FB 6078 MC cabinet
 - .2 Wilson & Cousins

Part 3 Execution

3.1 INSTALLATION

- .1 Provide portable fire extinguisher cabinets and mount in wall during construction. Cabinet to be surface or recessed mounted as indicated on the drawings. Install cabinets so that the door will not obstruct normal traffic when open.

- .2 Hang extinguishers in cabinets with wall mounting bracket.
- .3 Prior to installing the extinguisher cabinets, confirm the mounting height and exact location with the Consultant. Mount extinguisher so top of unit is not more than 1.5 m (5').
- .4 Install wall mounted fire extinguishers complete with wall mounting bracket where indicated and/or directed on site by consultant.
- .5 Caulk perimeter of fire extinguisher cabinets after acceptance.

3.2 TESTS

- .1 Fire protection equipment shall be tested to the requirements of NFPA10, NFPA13, NFPA14 and comply with the requirements of the authorities having jurisdiction.

3.3 NFPA 96 HOOD

- .1 10 BC rated fire extinguisher next to each NFPA 96 hood.

3.4 FIRE BLANKET

- .1 Hang blanket on wall in cabinet as indicated, to manufacturers' recommendations.
- .2 Fire blanket next to each NFPA 96 hood mounted on wall.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 CAN/CSA B45S1, Supplement #1 to CAN/CSA B-45 Series Plumbing Fixtures.
- .3 CAN/CSA-B45 Series, CSA Standards on Plumbing Fixtures.
- .4 CAN/CSA-B125.3, Plumbing Fittings.
- .5 CAN/CSA-B651, Accessible Design for the Built Environment.

1.2 SHOP DRAWINGS

- .1 Submit shop drawings and product data in accordance with general requirements.
- .2 Indicate, for all fixtures and trim:
 - .1 Dimensions, construction details, roughing-in dimensions.
 - .2 Factory-set water consumption per flush at recommended pressure.
 - .3 For water closets, urinals: minimum pressure required for flushing.

1.3 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data including monitoring requirements for incorporation into manual specified in general requirements.
- .2 Include:
 - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
 - .2 Details of operation, servicing, maintenance.
 - .3 List of recommended spare parts.

1.4 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

- .1 Install rough-in for equipment supplied by others, complete with valves on hot and cold water supplies, waste and vent.
- .2 Equipment installed by others.
 - .1 Connect with unions.
- .3 Equipment not installed.
 - .1 Capped with valves for future connection by others.

Part 2 Products

2.1 MANUFACTURED UNITS

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.
- .3 Exposed plumbing brass to be chrome plated.
- .4 Number, locations: Architectural drawings to govern.
- .5 Fixtures in any one location to be product of one manufacturer and of same type.
- .6 Trim in any one location to be product of one manufacturer and of same type.

2.2 FIXTURE CARRIERS

- .1 Provide factory manufactured floor-mounted carrier systems for all wall-mounted fixtures.
- .2 Acceptable Manufacturers:
 - .1 Zurn
 - .2 Smith
 - .3 Ancon

2.3 PLUMBING FIXTURES

- .1 Refer to plumbing fixture schedule on the drawings for fixture type, manufacturer, trim, drainage supply, and accessories.

2.4 FIXTURE PIPING

- .1 Hot and cold water supplies to each fixture/faucet:
 - .1 Chrome plated flexible supply pipes each with screwdriver stop, reducers, escutcheon and chrome plated nipple.
 - .2 Acceptable Manufacturers:
 - .1 Delta 47T900 Series
 - .2 McGuire
- .2 Waste:
 - .1 Open grid strainer, or pop up as indicated, offset open grid strainer on Barrier-Free fixtures, cast brass fittings with tubular piping, chrome plated, rubber gasket compression fitting, and overflow flange.
 - .2 Acceptable Manufacturers:
 - .1 Delta 33T200 Series
 - .2 McGuire

- .3 'P' Traps:
 - .1 Cast brass P trap with cleanout on each fixture not having integral trap.
 - .2 Chrome plated in all exposed places.
 - .3 Acceptable Manufacturers:
 - .1 Delta 33T300 Series
 - .2 McGuire

Part 3 Execution

3.1 INSTALLATION

- .1 Mounting heights:
 - .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified. Confirm mounting height(s) with consultant prior to rough-in.
 - .2 Wall-hung fixtures: measured from finished floor.
 - .3 Physically Barrier-Free: to comply with most stringent of either NBCC or CAN/CSA B651.

3.2 ADJUSTING

- .1 Conform to water conservation requirements specified this section.
- .2 Adjustments.
 - .1 Adjust water flow rate to design flow rates.
 - .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
 - .3 Adjust flush valves to suit actual site conditions.
 - .4 Adjust urinal flush timing mechanisms.
 - .5 Adjust water cooler, drinking fountain flow stream to ensure no spillage.
 - .6 Automatic flush valves for water closets and urinals: set controls to prevent unnecessary flush cycles during silent hours.
- .3 Checks.
 - .1 Water closets, urinals: flushing action.
 - .2 Aerators: operation, cleanliness.
 - .3 Vacuum breakers, backflow preventors: operation under all conditions.
 - .4 Wash fountains: operation of flow-actuating devices.
 - .5 Refrigerated water coolers: operation, temperature settings.
- .4 Thermostatic controls.
 - .1 Verify temperature settings, operation of control, limit and safety controls.

- .5 Floor and wall mounted fixtures: caulk to floor or wall using silicone caulking to make water tight, colour to match fixture.
- .6 Counter mounted fixtures: lay fixtures into bead of caulking to ensure excess moisture does not reach the cut edge of the countertop. Clean excess caulking off outside the sink.

3.3 WARRANTY

- .1 Warranty Start Date:
 - .1 Warranty period starts as of the date of Ready for Takeover.
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

- .1 This section covers items common to all sections of Heating, Ventilation, and Air Conditioning (HVAC) Division.
- .2 Conform to Division 1 General Conditions.
- .3 Furnish labour, materials, and equipment necessary for completion of work as described in contract documents.
- .4 Unless specifically indicated, all materials and equipment provided under this contract shall be new and shall be manufactured in the project year.
- .5 The term “Mechanical Contractor” shall remain active and shall mean a “single contractor” performing plumbing, drainage, heating, cooling, ventilation, and control services.
- .6 When quoting as a subcontractor this building contractor shall explicitly state the services they are providing i.e. Mechanical (all services), Plumbing (water and drainage systems) or HVAC (including hydronic and air systems).
- .7 Contractors shall be explicit to identify whether Fire Protection is included or omitted from the mechanical scope.

1.2 INTENT

- .1 Mention herein or indication on Drawings of articles, materials, operations or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated: and performance of each operation prescribed with furnishing of necessary labour, equipment, and incidentals for HVAC work.
- .2 Where used, words “Section” and “Division” shall also include other Subcontractors engaged on site to perform work to make building and site complete in all respects.
- .3 Where used, word “supply” shall mean furnishing to site in location required or directed complete with accessory parts.
- .4 Where used, word “install” shall mean secured in place and connected up for operation as noted or directed.
- .5 Where used, word “provide” shall mean supply and install as each is described above.

1.3 REGULATIONS, PERMITS, AND FEES

- .1 All materials and quality of work shall meet all current and latest Provincial, Municipal and Fire Marshall requirements, regulations, codes, and by-laws in force in the area of the project.

- .2 Each contractor shall give all necessary notices, obtain all necessary permits, and pay all fees in order that the work shown or specified may be carried out. Each contractor shall furnish any certificates necessary as evidence that the work installed conforms with the laws and regulations of all authorities having jurisdiction.
- .3 In the event that changes, or alterations are required on completed work by authorized inspectors, these changes shall be made at the contractor's expense.
- .4 Special equipment which does not have a standard CSA label shall be inspected by the local electrical authority having jurisdiction and the Approval Certificate shall be submitted to the Consultant as soon as possible. All costs and fees for inspections shall be borne by this contractor.

1.4 DRAWINGS

- .1 The drawings and this specification have been assembled together as a responsibility of the consultant. The same is true for the other consultants, i.e. architect, structural engineer, civil engineer, fire protection engineer, electrical engineer, etc.
- .2 The drawings and specifications are not assembled together for responsibility/division between subcontractors. The division of work between subcontractors remains the responsibility of the buildings' contractor (also known as the prime contractor or general contractor).
- .3 All subcontractors are encouraged to perform work amicably utilizing all of the drawings and specifications published by all of the consultants.
- .4 Plumbing and HVAC Drawings do not show structural and related details. Take information involving accurate measurements of building from building drawings, or at building. Make, without additional charge, any necessary changes, or additions to runs of piping, conduits, and ducts to accommodate structural conditions. Location of pipes, ducts, conduits and other equipment may be altered by Consultant without extra charge provided change is made before installation and does not necessitate major additional material.
- .5 As work progresses and before installing piping, ductwork, heating units, registers, diffusers, fixtures and any other fittings and equipment which may interfere with interior treatment and use of building, provide detail drawings, or obtain directions for exact location of such equipment and fitments.
- .6 Plumbing and HVAC drawings indicate general location and route of pipes, ducts and conduits which are to be installed. Where required work is not shown or only shown diagrammatically, install same at maximum height in space to conserve head room (minimum 2200 mm (88") clear) and interfere as little as possible with free use of space through which they can pass. Follow building lines, conceal piping, conduits and ducts in furred spaces, ceilings and walls unless specifically shown otherwise. Install work close to structure so furring will be small as practical.

- .7 Install piping and ductwork to clear structural members and any fireproofing. Locate HVAC work to permit installation of specified insulation. Do not remove or damage structural fireproofing. Leave space to permit fireproofing and insulation to be inspected and repaired.
- .8 Before commencing work, check and verify all sizes, locations, grade and invert elevations, levels, and dimensions to ensure proper and correct installation. Verify existing/municipal services.
- .9 Locate all HVAC and electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.
- .10 In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install piping and other work so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose.
- .11 Relocate equipment and/or material installed but not co-ordinated with work of other Sections and/or installed incorrectly as directed, without extra charge.
- .12 Where drawings are done in metric and product not available in metric, the corresponding imperial trade size shall be utilized.

1.5 INTERFERENCE AND COORDINATION DRAWINGS

- .1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the constructed spaces provided.
- .2 Prepare drawings to indicate co-ordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are coordinated.
- .3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.
- .4 Upon consultant's request submit copies of interference drawings to consultant.
- .5 Due to the nature of the building and the complexity of the building systems provide the following:
 - .1 Interference drawings, showing coordination of architectural, structural, plumbing, HVAC, and electrical systems for the consultant's review prior to fabrication.
 - .2 Detailed layout drawings, clearly showing fasteners and hangers.
- .6 Provide CAD drawings (minimum file version AutoCAD 2013) in addition to hard copies.

1.6 QUALITY ASSURANCE

- .1 Perform work in accordance with applicable provisions of local plumbing code, gas ordinances, and adoptions thereof for all HVAC systems. Provide materials and labor necessary to comply with rules, regulations, and ordinances.

- .2 In case of differences between building codes, provincial laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Consultant in writing of such differences.

1.7 ALTERNATES AND SUBSTITUTIONS

- .1 Throughout HVAC Divisions are lists of "Alternate and equal Equipment" manufacturers acceptable to Consultant if their product meets characteristics of specified described equipment.
- .2 Each bidder may elect to use "Alternate or equal Equipment" manufacturers from lists of Alternates where listed. Include for any additional costs including all costs for revisions to electrical contract to suit Alternate used. Prices are not required in Tender for Alternates listed except where specifically noted as "Separate Price" in which case contractor will complete the Supplementary Tender Form.
- .3 It is responsibility of this Division to ensure "Alternate Equipment" fits space allocated and gives performance specified. If an "Alternate Equipment" nor "equal" specified product unit is proposed and does not fit space allotted in Consultant's opinion, supply of specified described equipment will be required without change in Contract amount. Should electrical characteristics for "alternate" or "equal" equipment differ from equipment specified it shall be the responsibility of the equipment manufacturer to pay all costs associated with the revisions to the electrical contract. Only manufacturers listed will be accepted for their product listing. All other manufacturers shall be quoted as substitution stating conditions and credit amount.
- .4 If pipe or item, of size or weight indicated, is unobtainable, supply next larger size or heavier weight without additional charge.

1.8 EXAMINATION

- .1 Site Reviews
 - .1 Examine premises to understand conditions which may affect performance of work of this Division before submitting proposals for this work.
 - .2 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.
- .2 Drawings
 - .1 Plumbing and HVAC Drawings show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
 - .2 Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing, HVAC, and Fire Protection Drawings.

- .3 Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories, which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.
- .3 Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

1.9 SEQUENCING SCHEDULING AND COORDINATION

- .1 It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of Contract Documents. Anything not clear or in conflict will be explained by making application to Consultant. Should conditions arise where certain changes would be advisable, secure Consultant's approval of these changes before proceeding with work.
- .2 Coordinate work of various trades in installing interrelated work. Before installation of HVAC items, make proper provision to avoid interferences in a manner approved by Consultant. Each Contractor shall refer to all sections of the specification for their responsibilities with other trades. Changes required in work specified in HVAC Division caused by neglect to do so shall be made at no cost to Owner.
- .3 Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, starters, motors, control components, and to clear openings of doors and access panels.
- .4 Furnish and install inserts and supports required by HVAC Division unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by HVAC Division.
- .5 Be responsible for required excavation, backfilling, cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of Consultant. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.
 - .1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.
 - .2 Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

- .3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.
- .6 Adjust locations of pipes, ducts, equipment, fixtures, etc., to accommodate work from interferences anticipated and encountered. Determine exact route and location of each pipe and duct prior to fabrication.
 - .1 Make offsets, transitions, and changes in direction of pipes, ducts, and electrical raceways as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
 - .2 Furnish and install traps, air vents, sanitary vents, pull boxes, etc., as required to effect these offsets, transitions, and changes in direction.
- .7 Slots and openings through floors, walls, ceilings, and roofs shall be provided by this contractor but performed by a trade specializing in this type of work. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.10 REQUEST FOR INFORMATION (RFI) PROCEDURES

- .1 RFIs shall be submitted to the consultant minimum two (2) weeks prior to answer being required. Failure to submit an RFI in a timely manner will forfeit delay claims and schedule extension requests by the contractor.
- .2 All RFIs will be submitted with the following information:
 - .1 RFI number
 - .2 Name of project
 - .3 Date of initiation
 - .4 Date response required by (minimum two (2) weeks)
 - .5 Subject
 - .6 Submitter's name
 - .7 Drawing/specification reference
 - .8 Photograph of the issue (if applicable)
 - .9 Description of the issue
 - .10 Contractor's proposed resolution

1.11 CONTRACT BREAKDOWN

- .1 Provide breakdown of Contract exclusive of HST to acceptance of consultants prior to first draw submission.
- .2 Provide labour and material cost for each item.
- .3 Breakdown shall indicate total contract amount.

- .4 Contract breakdown shall be as follows as a minimum.
 - .1 Mobilization and shop drawings (max. \$2,000.00)
 - .2 Demolition
 - .3 NFPA Hood
 - .4 Make-up air unit
 - .5 Exhaust fans
 - .6 Unit Ventilator
 - .7 Heating piping
 - .8 Piping insulation
 - .9 Ductwork
 - .10 Duct insulation
 - .11 Grilles and diffusers
 - .12 Fire stopping
 - .13 HVAC system commissioning
 - .14 Building automation systems
 - .15 Testing, adjusting, and balancing
 - .16 Refrigeration piping
 - .17 HVAC contractor closeout requirements (min. of 3% for the first \$500,000.00, 1% from \$500,000.00 to \$5,000,000.00, and 0.5% beyond. Shall not be less than \$5,000.00.)
- .5 Progress claims, when submitted are to be itemized against each item of the contract breakdown, this shall be done in table form showing contract amount, work complete to date, previous draw, amount this draw and balance.
- .6 **Mobilization amount may only be drawn when all required shop drawings have been reviewed by the consultant.**

1.12 COMMISSIONING CONTRACT BREAKDOWN

- .1 This contractor shall work with the HVAC system commissioning contractor as specified elsewhere. The following commissioning breakdown shall be indicated on the contract breakdown draw.

1.13 SHOP DRAWINGS AND PRODUCT DATA

- .1 Furnish complete catalog data for manufactured items of equipment to be used in the Work to Consultant for review within 14 days after award of Contract.
- .2 Upon receipt of reviewed shop drawing, product is to be ordered immediately.
- .3 Provide a complete list of shop drawings to be submitted prior to first submission.

- .4 Before submitting to the Consultant, review all shop drawings to verify that the products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers, and similar data and that it has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The Contractor's review of each shop drawings shall be indicated by stamp, date and signature of a qualified and responsible person possessing by the appropriate authorization.
- .5 If material or equipment is not as specified or submittal is not complete, it will be rejected by Consultant.
- .6 Additional shop drawings required by the contractor for maintenance manuals, site copies etc., shall be photocopies of the "reviewed" shop drawings. All costs to provide additional copies of shop drawings shall be borne by the contractor.
- .7 **Submit all shop drawings for the project as a package. Partial submittals will not be accepted.**
- .8 Catalog data or shop drawings for equipment, which are noted as being reviewed by Consultant or their Engineer shall not supersede Contract Documents.
- .9 Review comments of Consultant shall not relieve this Division from responsibility for deviations from Contract Documents unless Consultant's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.
- .10 Check work described by catalog data with Contract Documents for deviations and errors.
- .11 Shop drawings and product data shall show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances. e.g., access door swing spaces.
- .12 Shop drawings and product data shall be accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify as to current model production.
 - .5 Certification of compliance to applicable codes.
- .13 State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. List on catalog covers page numbers of submitted items. Underline applicable data.

- .14 Shop drawings shall be submitted electronically as per the following directions:
- .1 Electronic Submissions:
- .1 Electronically submitted shop drawings shall be prepared as follows:
- .1 Use latest software to generate PDF files of submission sheets.
- .2 Scanned legible PDF sheets are acceptable. Image files are not acceptable.
- .3 PDF format shall be of sufficient resolution to clearly show the finest detail.
- .4 PDF page size shall be standardized for printing to letter size (8.5"x11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11"x17".
- .5 Submissions shall contain multiple files according to section names as they appear in Specification.
- .6 File names shall include consultant project number and description of shop drawing section submitted.
- .7 Each submission shall contain an index sheet listing the products submitted, indexed in the same order as they appear in the Specification. Include associated PDF file name for each section.
- .8 On the shop drawing use an "electronic mark" to indicate what is being provided.
- .9 **Each file shall bear an electronic representation of the "company stamp" of the contractor. If not stamped the file submission will not be reviewed.**
- .2 Email submissions shall include subject line to clearly identify the consultant's project number and the description of the shop drawings submitted.
- .3 Electronic attachments via email shall not exceed 10MB. For submissions larger than 10MB, multiple email messages shall be used. Denote related email messages by indicating "1 of 2" and "2 of 2" in email subject line for the case of two messages.
- .4 Electronic attachments via web links (URL) shall directly reference PDF files. Provide necessary access credentials within link or as username/password clearly identified within body of email message.
- .5 On site, provide one (1) copy of the "reviewed" shop drawings in a binder as noted above.
- .6 Contractor to print copies of "reviewed" shop drawings and compile into maintenance manuals in accordance with requirements detailed in this section.

1.14 EQUIPMENT NAMEPLATE DATA

- .1 Between the manufactures design published literature, the shop drawing submission literature, and the nameplate data on the equipment, they can all read differently.
- .2 Most of the confusion and differences are coming out of the electrical power installation.
- .3 The contractors installing and connecting the equipment are responsible for the coordination of this data through the construction period.
- .4 The contractors shall share and/or request this information through out the project and monitor/make adjustments, provide recommendations accordingly based on any discrepancies.
- .5 The contractors are responsible for any cost associated with the changing data.
- .6 The final installation must meet the "Nameplate Data" on the equipment on site.

1.15 OPERATION AND MAINTENANCE MANUAL

- .1 Provide operation and maintenance data for incorporation into manual as in submittals' requirements.
- .2 Operation and maintenance manual to be approved by, and final copies deposited with, Consultant before final inspection.
- .3 Submit one (1) copy of Operation and Maintenance Manual to Consultant for review and approval. Submission of individual data will not be accepted unless directed by Consultant. Submission can be done electronically in PDF format or as a hard copy.
 - .1 Electronic submission/PDF file is required to be bookmarked. Any submission received without bookmarking will be immediately returned as unacceptable.
 - .2 Hard copy submission shall be in a three-ring binder (minimum 50 mm (2") ring) and labelled as 'Operation and Maintenance Manual' with project name and location. Dividers are to be used for binder organization.
- .4 Make changes as required and re-submit as directed by Consultant.
- .5 Operation data to include:
 - .1 Control schematics for each system including environmental controls.
 - .2 Description of each system and its controls.
 - .3 Description of operation of each system at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for each system and each component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .6 Valves schedule and flow diagram.
 - .7 Colour coding chart.
 - .8 Spare parts equipment list.
 - .9 Manufacturers standard or extended warranty information.

- .6 Maintenance data shall include:
 - .1 Servicing, maintenance, operation, and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .7 Performance data to include:
 - .1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified elsewhere.
 - .4 Testing, adjusting, and balancing reports as specified in Testing, Adjusting, and Balancing Section.
 - .5 Copy of all substantial performance final certificates.
- .8 Miscellaneous data to include:
 - .1 Letter of contractor's warranty and guarantee.
 - .2 WRDSB Project Asset and Warranty Card for all assets replaced, newly installed, and removed.
 - .3 Index sheet.
 - .4 Tabbed format for each section.
 - .5 Manufacturers approved shop drawings.
 - .6 Spare parts list and source.
 - .7 List of Manufacturers and suppliers address for each piece of equipment.
- .9 Final Submittals:
 - .1 Upon acceptance of Operation and Maintenance Manual by the Consultant, provide the following:
 - .1 Provide two (2) copies of final Operation and Maintenance Manuals, as well as a PDF file of the entire approved manual on a USB stick. Only one (1) USB stick is to be provided containing both the approved manual and as-built drawings.

1.16 AS-BUILT DRAWINGS

- .1 Site records:
 - .1 Contractor shall provide two (2) sets of reproducible HVAC drawings. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include changes to existing HVAC systems, control systems, and low voltage control wiring.
 - .2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.
 - .3 Use different colour waterproof ink for each service.

- .4 Make available for reference purposes and inspection at all times.
- .2 As-built drawings submittal for TAB and review:
 - .1 Prior to start of Testing, Adjusting, and Balancing (TAB), finalize production of as-built drawings.
 - .2 Identify **each drawing** in lower right-hand corner in letters at least 3 mm (1/8") high as follows: - "AS-BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW HVAC SYSTEMS AS INSTALLED" (Company Name) (Signature of Contractor) (date).
 - .3 TAB to be performed using as-built drawings.
 - .4 Submit copy to Consultant for review and approval. When returned, make corrections as directed.
- .3 As-built drawings final submittal:
 - .1 Once approved, submit completed, reproducible paper as-built drawings as well as a scanned PDF file copy on USB stick with Operation and Maintenance Manuals.

1.17 WARRANTIES

- .1 In addition to guarantee specified in General Conditions, guarantee heating, cooling, and plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
- .2 Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record "start-up" date of each piece of equipment on certificate. Include certificates as part of Operation and Maintenance Manual.
- .3 Contractor shall rectify any installation deficiencies in the boiler or pressurized other systems identified by a TSSA Inspector for a period of three (3) years from ready for takeover.
- .4 Warranty period shall start from date of ready for takeover. Warranty period shall start from date of ready for takeover. Warranty start date based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .5 Warranty Duration:
 - .1 Two (2) year warranty period applies unless otherwise noted.
- .6 Warranty Coverage:
 - .1 Applies to parts and labour.

1.18 READY FOR TAKEOVER

- .1 Complete the following to the satisfaction of the consultant prior to request for ready for takeover.
 - .1 As-built Drawings
 - .2 Maintenance Manuals
 - .3 System Start up
 - .4 TAB Reports
 - .5 HVAC System Commissioning
 - .6 Instructions to Owners

1.19 REVISION TO CONTRACT

- .1 Provide the following:
 - .1 Itemized list of material with associated costs.
 - .2 Labour rate and itemized list of labour for each item.
 - .3 Copy of manufacturers/supplier's invoice if requested.

1.20 DELIVERY, STORAGE, AND HANDLING

- .1 Follow Manufacturer's directions in delivery, storage, and protection of equipment and materials. Contractor to include all costs associated with delivery storage and handling in tender price.
- .2 Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or environmental damaging conditions but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.
- .3 Remove any damaged materials from the site.

1.21 TSSA INSPECTION

- .1 Prior to final completion of the project, this contractor shall make application, arrange, and pay for a TSSA inspection of all piping systems and equipment installations, including, but not limited to medical gasses, refrigeration, fuel piping, compressed air, heating plant, cooling plant, and associated equipment installed under the contract.
- .2 Provide a copy of the TSSA report in the maintenance manuals for each system.

1.22 ENERGY EFFICIENCY

- .1 The HVAC systems of this building must achieve the energy efficiency levels by conforming to ANSI/ASHRAE/IESNA 90.1 "Energy Standard for Buildings Except Low-Rise Residential Buildings" and Chapter 2 of Division 3 of SB-10 prescriptive method from the Ontario Building Code.
- .2 All equipment, products, and installations must conform to the Codes and Standards.

END OF SECTION

Part 1 General

1.1 OCCUPANCY REQUIREMENTS

- .1 The contractor shall provide the following documentation to the consultant's satisfaction prior to receiving occupancy. Failure to provide the proper documentation will result in the occupancy not being granted. List of required documentation:
 - .1 Final Certificates (required prior to consultant's release of conformance letter).
 - .1 Mandatory TSSA Gas Pressure Test (CSA B149.1)
 - .2 NFPA-96 Kitchen Hood Fire Suppression System Test
 - .3 TSSA Certificate of Authorization for split refrigeration systems
***exceed 3 tons
 - .4 Contractor letter verifying all refrigeration leak detection systems and their interlocks to downstream devices have been installed and tested.

Part 2 Not Used

Part 3 Not Used

END OF SECTION

Part 1 General

1.1 TESTS

- .1 Give 48 hours' written notice of date for tests.
- .2 Insulate or conceal work only after testing and approval by Consultant.
- .3 Conduct tests in presence of Consultant.
- .4 Bear costs including retesting and making good.
- .5 Piping:
 - .1 General: Maintain test pressure without loss for 4 h unless otherwise specified.
 - .2 Hydraulically test steam and hydronic piping systems at 1-1/2 times system operating pressure or minimum 860 kPa, whichever is greater.
 - .3 Test natural gas systems to CSA-B149.1-00, TSSA requirements and requirements of authorities having jurisdiction.
- .6 Equipment: Test as specified in relevant sections.
- .7 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.

1.2 SYSTEM START UP

- .1 Provide adjusting testing and start up of all equipment prior to testing and balancing (TAB) specified elsewhere.
- .2 Provide Consultant with written notice verifying all equipment operation and installation is complete.
- .3 Start up shall be in presence of the following: Owner or Representative, Contractor, Building Automation Systems (BAS) Contractor, and Manufacturer's Representative. Each person shall witness and sign off each piece of equipment. Consultant's attendance will be determined by Consultant.
- .4 Simulate system start up and shut down and verify operation of each piece of equipment.
- .5 Arrange with all parties and provide 72 hours' notice for start up procedure.
- .6 Arrange with building automation systems contractor to sequence all components and ensure system operation.

1.3 COMMISSIONING

- .1 Co-ordinate and direct each step of the commissioning process and recommend acceptance or non-acceptance to the Owner/Owner's Representative.

- .2 Prepare, in writing, documentation of any deficiencies discovered during the commissioning process. Submit to Consultant and Owner/Owner's Representative.
- .3 The Commissioning Process is detailed in *ASHRAE Guideline 1-1996 HVAC Commissioning Process*. The commissioning plan may be modified to reflect the actual construction schedule and design.
- .4 Provide a pre-functional test of all HVAC system and sub-system elements, including control devices, shall be checked for the following:
 - .1 Verify that each element has been properly installed, properly identified, and that all connections (including electrical) have been made correctly.
 - .2 Verify that each element has been checked for proper lubrication, drive rotation, belt tension, control sequence, flow direction, or other conditions which may cause damage or reduce system performance.
 - .3 Verify that tests, meter readings, and specific HVAC/electrical performance characteristics agree with those required by equipment or system manufacturer.
 - .4 Controls calibration to be completed in accordance with the specification.
 - .5 The TAB shall be done in accordance with the specifications.
- .5 A functional performance testing shall be done during two separate periods – one during the cooling season and one during the heating season. The first (cooling) testing period shall occur as soon after completion of installation as practical. The heating testing period shall occur as soon as weather conditions make it practical to test warm-up, zone heating and economizer functions. These tests ensure that all equipment and systems operate in accordance with design intent. The tests are dynamic tests and test the systems through all possible modes of operation.
- .6 Reports:
 - .1 The Contractor shall be responsible for recording, documenting, and maintaining detailed inspection and testing data on the test documentation reports. The data record shall be comprehensive and concise.
 - .2 All data must be recorded as soon as possible during the course of the inspection and testing.
 - .3 All documentation shall have the date, time, and names of persons participating in the inspection and testing.
 - .4 All test instruments shall be documented for valid calibration.
 - .5 The recording work sheets, inspection check lists, and Performance Testing plans must all be approved by the Engineer and the Owner's Representative prior to the start of the testing.
 - .6 Include all commissioning documentation in the maintenance manuals.

- .7 HVAC System Execution:
- .1 Operate equipment and systems shall be tested in the presence of the Owner's Representative and the Consultant to demonstrate compliance with specified requirements. To minimize the time of Commissioning Team members, testing shall be done in four seasonal single blocks of time insofar as possible.
 - .2 Notify the consultant, in writing, fourteen (14) days prior to tests scheduled under requirements of this Section.
 - .3 Testing shall be conducted under specified design operating conditions as recommended or approved by the Consultant.
 - .4 All elements of systems shall be tested to demonstrate that total systems satisfy all requirements of these Specifications. Testing shall be accomplished on hierarchical basis. Test each piece of equipment for proper operation, followed by each sub-system, followed by entire system, followed by any inter-ties of other major systems.
 - .5 All special testing materials and equipment shall be provided by the appropriate contractor.
 - .6 Provide three copies of all test reports and records to the Consultant.
- .8 The verification testing procedures shall address all operating characteristics of all HVAC equipment and systems, including:
- | | |
|---------------------------------|------------------|
| Equipment Checklist | System Checklist |
| Unit Ventilator | Unit Ventilator |
| Rooftop Heating/Cooling Unit(s) | Chiller(s) |
| Exhaust Fans | Pumps |
| Controllers/Valves/Dampers | |
| Relays/Sensors/Transducers | |

1.4 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTION

- .1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, troubleshooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .2 HVAC Contractor to schedule and coordinate the demonstration all on the same day, starting at a pre-approved time and continuing consequently until complete.
- .3 Where specified elsewhere in HVAC Division, qualified manufacturers' representatives who are knowledgeable about the project to provide demonstrations and instructions.
- .4 Use operation and maintenance manual, as-built drawings, audio visual aids, etc. as part of instruction materials.
- .5 Instruction duration time requirements as specified in appropriate sections.
- .6 Where deemed necessary, Consultants may record these demonstrations on video tape for future reference.

1.5 TRIAL USAGE

- .1 Consultant or Owner may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Trial usage to apply to following equipment and systems:
 - .1 HVAC
 - .2 Exhaust air
 - .3 Hydronic water systems
 - .4 Boilers and pumps
 - .5 Control systems

1.6 DEFICIENCIES

- .1 During the course of construction, the Consultants will monitor construction and provide written reports of work progress, discussions, and instruction to correct work.
- .2 Instruction to correct work shall be done within the work period before the next review.
- .3 The Contractor shall not conceal any work until inspected.
- .4 The Contractor shall expedite 100% complete rough-in work and have inspected prior to concealing services and equipment especially above ceiling.
- .5 Upon completion of the project, the Consultant will do a final review. Upon receiving the final inspection report, the Contractor must correct and sign back the inspection report indicating the deficiencies are completed. A re-inspection will only be done once Consultant receives this in writing.

1.7 EQUIPMENT INSTALLATIONS

- .1 Unions or flanges: Provide for ease of maintenance and disassembly.
- .2 Space for servicing, disassembly and removal of equipment and components: Provide as recommended by manufacturer or as indicated.
- .3 Equipment drains: Pipe to floor drains.
- .4 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.

1.8 ANCHOR BOLTS AND TEMPLATES

- .1 Supply anchor bolts and templates for installation by other divisions.

1.9 PROTECTION OF OPENINGS

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

1.10 ELECTRICAL

- .1 Electrical work to conform to Electrical Division including the following:
 - .1 Supplier and installer responsibility and related HVAC responsibility is indicated in Equipment Schedule on HVAC and/or electrical drawings,
 - .2 Power wiring and conduit is specified in Electrical Division except for conduit, wiring and connections below 50 V which are related to control systems specified in HVAC Division. Follow Electrical Division for quality of materials and workmanship.
 - .3 Electrically operated equipment shall be C.S.A. approved label. Special Inspection Label of Provincial Authority having jurisdiction will be accepted in lieu of C.S.A. approval. Each motor shall have an approved starter. Starter will be supplied and installed by Electrical Division unless otherwise indicated.

1.11 CONTROL WIRING

- .1 Furnish and install all components, devices, and control wiring for all HVAC equipment, HVAC systems, lighting, and other electrical loads to make all equipment operable to satisfaction of Owner and Consultant and to manufacturer's requirements and recommendations.
- .2 All electrical wiring, HVAC wiring and installations shall comply with local and national electrical and HVAC codes.
- .3 Supply and install wiring as required for all devices and systems. Install wiring in EMT conduit and otherwise comply with all requirements of the Electrical Division. Approved plenum wire may be used for sensor and network communication wiring where it complies with appropriate building codes and regulatory authorities.
- .4 All wiring concealed in walls and chases, and all exposed wiring shall be run in conduit.
- .5 Provide recessed conduit and backer boxes where controls are wall mounted. Surface mounted boxes and conduit are acceptable in service rooms.
- .6 Free-run plenum rated cable shall be run in cable hangers where provided by electrical division or tied neatly to pipe and duct hangers in the ceiling. Avoid wiring that droops. Follow building lines and do not run wiring "as the crow flies".

1.12 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to equipment unless specified or indicated otherwise. Coordinate with block coursing (if applicable).
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install equipment at following heights unless indicated otherwise.
 - .1 Thermostats (Operable, Barrier Free) 1200 mm (47.2")
 - .2 Thermostats (Non Barrier Free) 1500 mm (59")

- .4 Also follow direction of architectural drawings and where discrepancies occur clarify prior to rough-in.

1.13 MOTORS

- .1 Provide high efficiency motors for HVAC equipment as specified.
- .2 If delivery of specified motor will delay delivery or installation of any equipment, install motor approved by Consultant for temporary use. Final acceptance of equipment will not occur until specified motor is installed.
- .3 Motors under 373 W, (1/2 hp): speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, voltage as indicated.
- .4 Motors 373 W, (1/2 hp) and larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40°C (72°F), 3 phase, voltage as indicated.

1.14 BELT DRIVES

- .1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.
- .2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.
- .3 For motors under 7.5 kW 10 hp: Standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.
- .4 For motors 7.5 kW 10 hp and over: Sheave with split tapered bushing and keyway having fixed pitch unless specifically required for item concerned. Provide sheave of correct size to suit balancing.
- .5 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.
- .6 Motor slide rail adjustment plates to allow for centre line adjustment.
- .7 Provide sheave changes as required for final air balancing.

1.15 SLEEVES

- .1 Pipe sleeves: at points where pipes pass through masonry, concrete or fire rated assemblies and as indicated. Grout sleeves in place.
- .2 Schedule 40 steel pipe.
- .3 Sleeves with annular fin continuously welded at midpoint:
 - .1 Through foundation walls.
 - .2 Where sleeve extends above finished floor.
 - .3 Through fire rated walls and floors.
- .4 Sizes: minimum 6 mm (1/4") clearance all around, between sleeve and uninsulated pipe or between sleeve and insulation.

- .5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors.
- .6 Fill voids around pipes:
 - .1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.
 - .2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.
 - .3 Ensure no contact between copper tube or pipe and ferrous sleeve.
 - .4 Fill future-use sleeves with lime plaster or other easily removable filler.
 - .5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+Amdt-Mar-78.
- .7 Provide minimum 20 gauge duct sleeves where ducts pass through masonry concrete or fire rated assemblies. Maintain minimum 25 mm clearance all around or to the requirements of the authority having jurisdiction. Seal at wall as indicated.

1.16 FIRE STOPPING

- .1 This contractor shall work with all other contractors on the project in providing one common method of fire stopping all penetrations made in fire rated assemblies.
- .2 Approved fire stopping and smoke seal material in all fire separations and fire ratings within annular space between pipes, ducts, insulation and adjacent fire separation and/or fire rating.
- .3 Do not use cementitious or rigid seals around penetrations for pipe or ductwork where penetrating through walls, floors, ceilings, etc.
- .4 Insulated pipes and ducts: ensure integrity of insulation and vapour barrier at fire separation.
- .5 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases. Ensure continuity and integrity of fire separation.
- .6 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.
- .7 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation. Provide "fire wrap" blanket around services penetrating fire walls. Extent of blanket must correspond to ULC recommendations.
- .8 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.
- .9 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

- .10 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes. Exposed surfaces are to be acceptable to consultant prior to application of finish.
- .11 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.
- .12 Install material and components in accordance with ULC certification, manufacturers instructions and local authority.
- .13 Submit product literature and installation material on fire stopping in shop drawing and product data manual. Maintain copies of these on site for viewing by installers and consultant.
- .14 Manufacturer of product shall provide certification of installation. Submit letter to the consultant.
- .15 Acceptable Alternate Manufacturers to approval of local authority:
 - .1 Minnesota Mining and Manufacturing
 - .2 Fryesleeve Industries Inc.
 - .3 General Electric Pensil Firestop Systems
 - .4 International Protective Coatings Corp.
 - .5 Rectorseal Corporation (Metacaulk)
 - .6 Proset Systems
 - .7 3M
 - .8 AD Systems
 - .9 Hilti
- .16 Ensure firestop manufacturer representative performs onsite inspections and certifies installation. Submit inspection reports/certification at time of substantial completion.

1.17 ESCUTCHEONS

- .1 On pipes and ductwork passing through walls, partitions, floors and ceilings in exposed finished areas and on water and drain pipes inside millwork and cabinets.
- .2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.
- .3 Outside diameter to cover opening or sleeve.
- .4 Inside diameter to fit around finished pipe.

1.18 PAINTING

- .1 Refer to Section Interior Painting and specified elsewhere.
- .2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

- .3 Apply two coats of paint to exposed piping service in service room, base colour as specified in HVAC Identification Section.
- .4 Prime and touch up marred finished paintwork to match original.
- .5 Restore to new condition, or replace equipment at discretion of consultant, finishes which have been damaged too extensively to be merely primed and touched up.

1.19 SPARE PARTS

- .1 Furnish spare parts in accordance with general requirements and as follows:
 - .1 One set of packing seals for each pump.
 - .2 One casing joint gasket for each size pump.
 - .3 One head gasket set for each heat exchanger.
 - .4 One set of belts for each type or each size of machinery.
 - .5 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.
- .2 Provide list of equipment in maintenance manuals indicating corresponding spare parts required. List of spare parts to be signed off by receiving personnel.

1.20 SPECIAL TOOLS

- .1 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Maintenance Materials Special Tools and Spare Parts.

1.21 ACCESS DOORS

- .1 Provide access doors to concealed HVAC equipment for operating, inspecting, adjusting and servicing.
- .2 Flush mounted 600 x 600 mm (24" x 24") for body entry and 300 x 300 mm (12" x 12") for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.
- .3 Material:
 - .1 Special areas such as tiled or marble surfaces: Use stainless steel with brushed satin or polished finish as directed by Consultant.
 - .2 Remaining areas: Use prime coated steel.
 - .3 Fire rated areas: Provide ULC listed access doors.
 - .4 Washrooms or high moisture area ceilings: Aluminum with mill finish suitable for painting.
- .4 Installation:
 - .1 Locate so that concealed items are accessible.
 - .2 Locate so that hand or body entry (as applicable) is achieved.

- .5 Acceptable Manufacturers:
 - .1 Le Hage
 - .2 Zurn
 - .3 Acudor
 - .4 Nailor Industries Inc.

1.22 DIELECTRIC COUPLINGS

- .1 General:
 - .1 To be compatible with and to suit pressure rating of piping system.
 - .2 Where pipes of dissimilar metals are joined.
- .2 Pipes NPS 50 mm (2") and under: Isolating unions.
- .3 Pipes NPS 65 mm (2 1/2") and over: Isolating flanges.

1.23 DRAIN VALVES

- .1 Locate at low points and at section isolating valves unless otherwise specified.
- .2 Minimum NPS 20 mm (3/4") unless otherwise specified: bronze, with hose end male thread and complete with cap and chain.
- .3 Drain valves on potable water systems shall be complete with vacuum breaker.

1.24 REPAIRS, CUTTING, AND RESTORATION

- .1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.
- .2 Each Section of this Division shall bear expense of cutting, patching, and repairing to install their work and/or replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
- .3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.
- .4 All patching, painting and making good of the existing walls, floors, ceilings, partitions and roof will be at the expense of this Contractor, but performed by the Contractor specializing in the type of work involved unless otherwise noted.

1.25 EXISTING SYSTEMS

- .1 Connections into existing systems to be made at time approved by Consultant. Request written approval of time when connections can be made.
- .2 Be responsible for damage to existing plant by this work.

1.26 CLEANING

- .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units prior to turn over to owner.
- .2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition including replacement of all filters in all air and piping systems.

1.27 DISCONNECTION AND REMOVAL

- .1 Disconnect and/or remove equipment, piping, ductwork, etc. as indicated.
- .2 Cap and conceal all redundant and obsolete connections.
- .3 Provide a list of equipment to be removed to the owner, for his acceptance of same. Remove all equipment from site, which the owner does not retain.
- .4 Store equipment to be retained by owner on site where directed by consultant.

1.28 OWNER SUPPLIED EQUIPMENT

- .1 Connect to equipment supplied by the owner and make operable.

1.29 DEMOLITION

- .1 The general requirements are indicated on the drawings and on the outline specification in Division 1.
- .2 The general execution of the demolition is to be carried out in a clean and efficient manner.
- .3 Demolition of existing ceiling, walls etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.
- .4 All openings or holes created by removal of existing HVAC systems which are not being reused are to be patched with the same material surrounding surfaces.
- .5 All new holes and openings to facilitate HVAC systems are to be patched to match surrounding surfaces.
- .6 Protect all existing furnishings, materials, and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.
- .7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.
- .8 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

- .9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, invert elevations, etc., immediately after moving on site. Should for any reason the information obtained necessitate changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.

1.1 TSSA INSPECTION

- .1 Prior to final completion of the project, this contractor shall make application, arrange, and pay for a TSSA inspection of all piping systems and equipment installations, including, but not limited to medical gasses, refrigeration, fuel piping, compressed air, heating plant, cooling plant, and associated equipment installed under the contract.
- .2 Provide a copy of the TSSA report in the maintenance manuals for each system.

1.2 INTEGRATED LIFE SAFETY SYSTEMS TESTING

- .1 HVAC systems in this building, including but not limited to smoke control dampers, smoke control fans, high speed low velocity ceiling fans, makeup air units, and heat tracing for fire protection systems may be subject to Integrated Life Safety Systems testing.
- .2 The HVAC Contractor shall co-ordinate with the Integrated Life Safety Systems Testing Agent as follows:
- .1 Confirm which HVAC systems are to be included as part of the testing process.
 - .2 Verify in writing to the Integrated Life Safety Systems Testing Agent that HVAC commissioning of the affected systems/devices is complete prior to the scheduled testing date(s).
 - .3 Participate in the Integrated Life Safety Systems Testing to confirm proper operation of all associated systems.
 - .4 This contractor shall work with the Integrated Life Safety Systems Testing Agent to reset all systems back to normal operating mode after the testing is complete.
- .3 Include all costs associated with Integrated Life Safety System Testing in the tender value.
- .4 Refer to Division 1/Division 26 Integrated Life Safety Systems Testing specifications for additional information/requirements.

1.3 REFRIGERANT CONTAINING EQUIPMENT

- .1 A2L refrigerants are classified as mildly flammable. CSA B52-2023 has specific safety clauses related to the use of refrigerants with this classification within buildings.
- .2 This Contractor shall be responsible to ensure that the installation requirements of CSA B52-2023 are met.

- .3 Throughout this specification various pieces of equipment have been specified with refrigerant leak detection systems. Field wiring of the alarm status of this system to various downstream system components is required under Annex P of the standard and is the responsibility of this Contractor. These devices include the following:
- .1 Open all zone dampers connected to the affected system.
 - .2 Disable electric reheat coils within the affected system.
 - .3 Activate field installed safety shut off valves on the affected refrigeration systems.
 - .4 De energize any potential sources of ignition with the ductwork system of the affected system.
 - .5 Energize fans within the ductwork system.
 - .6 Activate any designated refrigeration leak ventilation systems.

1.4 FREEZE PROTECTION

- .1 Do not run lines in outside walls, or locations where freezing may occur. Piping next to outside walls shall be in furred spaces with insulation between the piping and the outside wall. Insulation of piping shall not be considered freeze protection.

1.5 SCAFFOLDING, RIGGING, AND HOISTING

- .1 Provide all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished; remove same from premises when no longer required. Conform to OSHA requirements and standards.

1.6 COOPERATION WITH OTHER TRADES

- .1 Give full cooperation to other trades and furnish in writing to other trades, with copies to the engineer, any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.
- .2 Where plumbing work will be installed in close proximity to, or will interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment. Prepare composite working drawings and sections at a suitable scale, not less than ¼ inches = 1-foot – 0-inches, clearly showing how the HVAC work is to be installed in relation to the work of other trades. If work is installed before coordinating with other trades, or if it causes any interference with work of other trades, make the necessary changes in the work to correct the conditions and bear all costs.
- .3 Furnish to other trades necessary templates, patterns, setting drawings, and shop details for the proper installation of work and for coordinating adjacent work.

1.7 WATERPROOFING SEAL MATERIALS

- .1 Modular, compressed seal assemblies consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and pipe sleeve or wall opening, assembled with stainless steel bolts and pressure plates and designed so when bolts are tightened the links expand to seal the opening watertight. Select seal assemblies to suit pipe size and sleeve size or wall opening size.
- .2 Standard of quality assurance manufacturers are:
 - .1 Thunderline Corp. (Power Plant Supply Co.) "Link Seal" Model S-316
 - .2 The Metraflex Co. "MetraSeal" type ES
 - .3 Or approved equivalent.

1.8 SLEEVE, CUT, AND FORMED OPENING LOCATION DRAWINGS

- .1 Prepare and submit for review, drawings indicating size and location of required sleeves, recesses, and formed openings in poured or precast concrete work.
- .2 Such drawings are to be completely and accurately dimensioned and relate sleeve, recesses, and formed openings to suitable grid lines and elevation datum, and are to take into account structural items such as grade beams, column caps, and column drop slabs.
- .3 Begin to prepare such drawings immediately upon notification of acceptance of bid and award of Contract.

1.9 SUSTAINABLE CONSTRUCTION

- .1 Construction Waste Management:
 - .1 Recycle all waste materials to avoid land fill sites where possible.
 - .2 All metal contents shall be recycled.
 - .3 All cardboard and paper shall be recycled.
 - .4 All plastic packaging shall be recycled.
 - .5 All wood shall be directed to the appropriate recycled wood section at the landfill site.
- .2 This Contractor is responsible for their own waste management system and cost associated with the disposal. This can be their own on site system, daily removal, back to shop, or a communal system shared with other contractors on site.
- .3 In all cases the cost to remove materials on site are the cost of this Contractor.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

- .1 Conform to the General Provisions of General Requirements Section.
- .2 This project is one of a retrofit nature in part, and which will require some demolition.
- .3 Allow for all remedial work in areas indicated on the drawings and as generally defined in the relevant sections of the specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- .1 Electrical Division.

1.3 SCOPE OF WORK

- .1 The scope of work is essentially the selected disconnection and/or removal of services and/or equipment, piping, ductwork, etc. as indicated or required to complete the work.

Part 2 Products

2.1 GENERAL

- .1 This Division is to liaise with the Owners or Consultant for equipment being removed that may be suitable for reuse to that specified or handed over to the Owner.
- .2 This Division is to take full responsibility for any special tools or equipment required to disassemble or remove material from building.

Part 3 Execution

3.1 GENERAL

- .1 The general requirements are indicated on the drawings and on the outline specification in Division 1.
- .2 The general execution of the demolition is to be carried out in a clean and efficient manner.
- .3 Demolition of existing ceilings, walls, etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.
- .4 All openings or holes created by removal of existing HVAC systems which are not being reused are to be patched with the same material surrounding surfaces.
- .5 All new holes and openings to facilitate HVAC systems are to be patched to match surrounding surfaces.

- .6 Protect all existing furnishings, materials, and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.
- .7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.
- .8 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.
- .9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, invert elevations, etc., immediately after moving on site. Should for any reason the information obtained necessitate changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.
- .10 Disconnect and/or remove equipment, piping, ductwork, etc. as indicated.
- .11 Cap and conceal all redundant and obsolete connections.
- .12 Provide a list of equipment to be removed to the Owner, for his acceptance of same. Remove all equipment from site which the Owner does not retain.
- .13 Maintain equipment to be retained by Owner on site where directed by Consultant.
- .14 Demolition of all parts of the work must be completed within the confines of the work area and in such a way as the dust produced and risk to injury of will not adversely affect the building users.
- .15 Demolished areas of the existing building will remain in their current use in some cases. Demolition in these areas must be kept to the minimum required to complete the work.
- .16 Demolition shall take place within areas isolated from all other areas with appropriate hoarding, scaffolding, netting, fencing or other means of security between building users and the work.
- .17 Co-ordinate making safe electrical devices, capping plumbing and removal of fixtures prior to commencement of demolition.
- .18 All piping and equipment to be removed and/or abandoned shall be drained prior to capping and/or abandoning. Disposal of all liquids shall be to the approval of authority of having jurisdiction and/or provincial regulations.

3.2 EXISTING SYSTEM DRAINAGE

- .1 Drain all existing piping systems including all related equipment as required to facilitate system renovations.
- .2 Disposal of existing system shall be to the requirements of the local and/or provincial regulations.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)
 - .1 ANSI/ASME B31.1, Power Piping, (SI Edition).
- .3 American Society for Testing and Materials (ASTM)
 - .1 ASTM A 125, Specification for Steel Springs, Helical, Heat-Treated.
 - .2 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM A 563, Specification for Carbon and Alloy Steel Nuts.
- .4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
 - .1 MSS SP-58, Pipe Hangers and Supports - Materials, Design, Manufacture Selection, Application, and Installation.

1.2 DESIGN REQUIREMENTS

- .1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
- .2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP-58.
- .3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
- .4 Design hangers and supports to support systems under all conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
- .5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment to be in accordance with MSS SP-58.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with general requirements.
- .2 Submit shop drawings and product data for following items:
 - .1 All bases, hangers and supports.
 - .2 Connections to equipment and structure.
 - .3 Structural assemblies.

1.4 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 GENERAL

- .1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS-SP-58.
- .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.2 PIPE HANGERS

- .1 Finishes:
 - .1 Pipe hangers and supports: to ANSI & ULC requirements
 - .2 Ensure steel hangers in contact with copper piping are copper plated.
- .2 Upper attachment structural: Suspension from upper flange of I-Beam or joist.
 - .1 Cold piping NPS 50 mm (2") maximum: Ductile iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.
 - .1 Rod: 10 mm (3/8") UL listed
 - .2 Cold piping NPS 65 mm (2 1/2") or greater, all hot piping: Malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed & FM approved.
- .3 Upper attachment structural: Suspension from upper flange of I-Beam.
 - .1 Cold piping NPS 50 mm (2") maximum: Ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed.
 - .2 Cold piping NPS 65 mm (2 1/2") or greater, all hot piping: Malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nuts.
- .4 Upper attachment to concrete.
 - .1 Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm (1/4") minimum greater than rod diameter.
 - .2 Concrete inserts: wedge shaped body with knockout protector plate ULC listed.
Note: Rapidex and Siporex are not considered concrete. Should one of these systems be encountered, piping/ductwork and/or equipment shall be supported from adjacent walls or from supplemental steel provided by this contractor attached to the adjacent walls/structure.

- .5 Shop and field-fabricated assemblies.
 - .1 Trapeze hanger assemblies: ASME B31.1.
 - .2 Steel brackets: ASME B31.1.
- .6 Hanger rods: threaded rod material to MSS SP-58.
 - .1 Ensure that hanger rods are subject to tensile loading only.
 - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
- .7 Pipe attachments: material to MSS SP-58.
 - .1 Attachments for steel piping: carbon steel.
 - .2 Attachments for copper piping: copper plated black steel.
 - .3 Use insulation shields for all piping.
 - .4 Oversize pipe hangers and supports to accommodate thermal insulation. Provide 1.5 mm (16 gauge) saddles.
- .8 Adjustable clevis: material to MSS SP-58 UL listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
 - .1 Ensure "U" has hole in bottom for rivetting to insulation shields.

2.3 INSULATION PROTECTION SHIELDS

- .1 Insulated cold piping:
 - .1 64 kg/m² (13.12 lbs/ft²) density insulation plus insulation protection shield to: MSS SP-69, galvanized sheet carbon steel. Length designed for maximum 3 m (10') span.
- .2 Insulated hot piping:
 - .1 Curved plate 300 mm (12") long, with edges turned up, welded-in centre plate for pipe sizes NPS 300 mm (12") and over, carbon steel to comply with MSS SP-58.

2.4 EQUIPMENT SUPPORTS

- .1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of miscellaneous metals, specified herein. Submit calculations with shop drawings.

2.5 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

- .1 Provide templates to ensure accurate location of anchor bolts.

2.6 OTHER EQUIPMENT SUPPORTS

- .1 From structural grade steel meeting requirements of structural steel section specified herein.
- .2 Submit structural calculations with shop drawings.

2.7 MANUFACTURER

- .1 Acceptable Manufacturers:
 - .1 Grinnell
 - .2 Anvil
 - .3 Myatt
 - .4 Taylor

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with:
 - .1 Manufacturer's instructions and recommendations.
- .2 Vibration Control Devices:
 - .1 Install on piping systems at pumps, boilers, chillers, cooling towers, elsewhere as indicated.
- .3 Clamps on riser piping:
 - .1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.
 - .2 Bolt-tightening torques to be to industry standards.
 - .3 Steel pipes: Install below coupling or shear lugs welded to pipe.
 - .4 Cast iron pipes: Install below joint.
- .4 Clevis plates:
 - .1 Attach to concrete with 4 minimum concrete inserts at each corner.
- .5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

3.2 HANGER SPACING

- .1 Plumbing piping: most stringent requirements of Canadian Plumbing Code, Provincial Code, or authority having jurisdiction.
- .2 Fire protection: to applicable fire code.
- .3 Gas and fuel oil piping: up to NPS 15 mm (1/2"): every 1.8 m (6').
- .4 Copper piping: up to NPS 15 mm (1/2"): every 1.5 m (5').

- .5 Within 300 mm (12") of each elbow and:

Maximum Pipe Size: NPS	Spacing Steel	Maximum Spacing Copper
up to 32 mm (1 1/4")	2.1 m (7')	1.8 m (6')
40 mm (1 1/2")	2.7 m (9')	2.4 m (8')
50 mm (2")	3.0 m (10')	2.7 m (9')
65 mm (2 1/2")	3.6 m (12')	3.0 m (10')
80 mm (3")	3.6 m (12')	3.0 m (10')
90 mm (3 1/2")	3.9 m (13')	3.3 m (11')
100 mm (4")	4.2 m (14')	3.6 m (12')
125 mm (5")	4.8 m (16')	
150 mm (6")	5.1 m (17')	
200 mm (8")	5.7 m (19')	
250 mm (10")	6.6 m (22')	
300 mm (12")	6.9 m (23')	

- .6 Pipework greater than NPS 300 mm (12"): to MSS SP-69.

3.3 HANGER INSTALLATION

- .1 Install hanger so that rod is vertical under operating conditions.
- .2 Adjust hangers to equalize load.
- .3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.
- .4 Do "NOT" support piping, ductwork and equipment from roof deck, on bottom chord of floor and/or roof joist and/or from OWSJ bridging. Provide structural member between joist.

3.4 HORIZONTAL MOVEMENT

- .1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4mm (5/32") from vertical.
- .2 Where horizontal pipe movement is less than 15 mm (1/2"), offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.5 FINAL ADJUSTMENT

- .1 Adjust hangers and supports:
 - .1 Ensure that rod is vertical under operating conditions.
 - .2 Equalize loads.

- .2 Adjustable clevis:
 - .1 Tighten hanger load nut securely to ensure proper hanger performance.
 - .2 Tighten upper nut after adjustment.
- .3 C-clamps:
 - .1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
- .4 Beam clamps:
 - .1 Hammer jaw firmly against underside of beam.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)
 - .1 ANSI/ASME B31.1, Power Piping, (SI Edition).
- .3 American Society for Testing and Materials (ASTM)
 - .1 ASTM A 125, Specification for Steel Springs, Helical, Heat-Treated.
 - .2 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM A 563, Specification for Carbon and Alloy Steel Nuts.
- .4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
 - .1 MSS SP-58, Pipe Hangers and Supports - Materials, Design, Manufacture Selection, Application, and Installation.
- .5 CSA B272-93 – Prefabricated Self-Sealing Roof Vent Flashings
- .6 CRCA (Canadian Roofing Contractor's Association)
- .7 SPRI (Single Ply Roofing Institute)
- .8 CUFCA (Canadian Urethane Foam Contractor's Association) and CGSB-51-GP-46MP, Manual for "Installers of Spray Polyurethane Foam Thermal Insulation"
- .9 CSA G40.21-M1987, M350W, and M300W (Structural Quality Steels)
- .10 CSA W47.1-1983 (Certificate of Companies for Fusion Welding of Structural Steel)
- .11 CSA W59-M1989 (Welded Steel Construction – Metal Arc Welding)
- .12 CSA G164-M1981 (Hot Dip Galvanizing of Irregularly Shaped Articles)

1.2 RELATED SECTIONS

- .1 Section 03300 – Cast-in-place Concrete
- .2 Section 05210 – Steel Joists
- .3 Section 05300 – Metal Deck
- .4 Section 06100 – Rough Carpentry
- .5 Section 07200 – Thermal Protection
- .6 Section 07500 – Membrane Roofing
- .7 Section 07900 – Joint Sealers

1.3 DESIGN REQUIREMENTS

- .1 Construct support systems to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
- .2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP-58.
- .3 Design supports to support systems under all conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
- .4 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment to be in accordance with MSS SP-58.

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with general requirements.
- .2 Submit shop drawings and product data for following items:
 - .1 All bases, hangers and supports.
 - .2 Connections to equipment and structure.
 - .3 Structural assemblies.
- .3 Manufacturer's installation instruction.

1.5 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements.

1.6 QUALITY ASSURANCE

- .1 Roof accessories manufactures to have minimum five (5) years documented experience in the design and fabrication of roofing specialties and accessories.

1.7 SPECIAL WARRANTY

- .1 Warrant products installed under this section of work to be free of leaks, condensation, and defects in materials and/or manufacture for a period of twenty (20) years when installed in accordance with the manufacturer's written instructions.

Part 2 Products

2.1 PIPE/SUPPORT

- .1 Pipe/Support:
 - .1 Adjustable height 6061-T6, hollow aluminum with mill finish, urethane insulated supports, 2" (51 mm) diameter.

- .2 Stack Jack Flashing:
 - .1 Height to suit application.
 - .2 Fully urethane insulated.
 - .3 Aluminum construction.
 - .4 Complete with EPDM triple pressure grommet seal and EPDM base seal and other accessories as required to suit roof type.
- .3 Provide appropriate stainless steel mounting hardware to suit supported pipe/equipment.
- .4 Provide appropriate system support as specified in this section to suit application.
 - .1 Single Plain Pipe: Type 304 stainless steel pipe roller assembly to suite actual O.D pipe.
 - .2 Double Plain Pipe: Type 304 stainless steel pipe roller assemblies sized to suit actual O.D pipe.
 - .3 Single Insulated Pipe: Type 304 stainless steel pipe cradle assembly sized to suit actual O.D of insulated pipe.
 - .4 Double insulated Pipe: Type 304 stainless steel pipe cradle assemblies sized to suit actual O.D of insulated pipe.
- .5 Acceptable Manufacturers:
 - .1 Thaler MERS 600 series.
 - .2 Acceptable equals if submitted and approved during tender period.

2.2 DUCT SUPPORT

- .1 Duct support:
 - .1 Adjustable height 6061-T6, hollow aluminum with mill finish, urethane insulated supports, 2" (51 mm) diameter.
- .2 Stack Jack Flashing:
 - .1 Height to suit application.
 - .2 Fully urethane insulated.
 - .3 Aluminum construction.
 - .4 Complete with EPDM triple pressure grommet seal and EPDM base seal and other accessories as required to suit roof type.
- .3 Provide appropriate stainless steel mounting hardware to suit application.
- .4 Cross-bar carrier assembly of length to suit application with EPDM end caps.
- .5 Acceptable Manufacturers:
 - .1 Thaler MERS-800 series.
 - .2 Acceptable equals if submitted and approved during tender period.

2.3 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

- .1 Provide templates to ensure accurate location of anchor bolts.

2.4 ROOF CURB MOUNTED EQUIPMENT

- .1 Install as per manufacturer's instructions on roof curbs provided by manufacturer as indicated.
- .2 Provide all necessary continuous pressure treated wood blocking and 24 gauge metal liner on all exposed wood as required to install roof curb level.

2.5 MANUFACTURED ROOF SUPPORTS

- .1 Single piece injection moulded polypropylene support.
- .2 Type 3-20 psi extruded polystyrene UV protected base glued to the support.
- .3 Minimum base dimension of 300 x 225 (12" x 9") and be 140 mm (5.5") high.
- .4 Pull test of 1.4 KN (315 lbs) using two #14-10 screws on pipe strap.
- .5 Acceptable Manufacturers:
 - .1 Quick Block
 - .2 Erico

2.6 ALUMINUM ROOF SUPPORTS

- .1 450 mm high aluminum pipe support.
- .2 Adjustable leg assembly, base plate, roller assembly.
- .3 Acceptable Manufacturers:
 - .1 Thaler Mers-600A Series.

2.7 PIPING THROUGH ROOF

- .1 Provide Thaler MEF-9 or equal gas piping flashing where pipe and/or relief vent penetrates roof.

2.8 ROOF MOUNTED DUCT SUPPORT

- .1 Provide zero penetration duct support on roof where indicated.
- .2 Base shall be made of high density polypropylene with UV protection.
- .3 Frames shall be galvanized. All fastenings, rods, nuts, washers, etc. shall be stainless steel.
- .4 Provide shop drawings as specified. Install to manufacturers recommendations.
- .5 Acceptable Manufacturers:
 - .1 Portable pipe hanger
 - .2 Bigfoot systems

- .3 Miro rooftop support
- .4 Trikon Systems
- .5 Walravin BIS Yeti
- .6 Ecofoot

2.9 ROOF MOUNTED PIPE SUPPORT

- .1 Provide zero penetration pipe support on roof where indicated.
- .2 Base shall be made of high density polypropylene with UV protection. Maximum loading shall be 50 lb/sq.ft.
- .3 Frames shall be galvanized. All fastenings, rods, nuts, washers, hangers, etc. shall be stainless steel.
- .4 Provide shop drawings as specified. Install to manufacturers recommendations.
- .5 Acceptable Manufacturers:
 - .1 Portable pipe hanger
 - .2 Bigfoot systems
 - .3 Miro rooftop supports
 - .4 Walravin BIS Yeti
 - .5 Ecofoot

Part 3 Execution

3.1 INSTALLATION

- .1 Roof support install in accordance with:
 - .1 Manufacturer's instructions and recommendations.
 - .2 Provide protection against deterioration due to contact of dissimilar metals.
- .2 Flashing Installation:
 - .1 Install roof support flashing in accordance with manufacturer's printed instructions.
- .3 Vibration Control Devices:
 - .1 Install as indicated and at all roof mounted equipment that is not internally isolated.
- .4 Clevis plates:
 - .1 Attach to concrete with 4 minimum concrete inserts at each corner.
- .5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

3.2 PIPE SUPPORT SPACING

- .1 Within 300 mm (12") of each elbow and:

Maximum Pipe Size: NPS	Spacing Steel	Maximum Spacing Copper
up to 32 mm (1 1/4")	2.1 m (7')	1.8 m (6')
40 mm (1 1/2")	2.7 m (9')	2.4 m (8')
50 mm (2")	3.0 m (10')	2.7 m (9')
65 mm (2 1/2")	3.6 m (12')	3.0 m (10')
80 mm (3")	3.6 m (12')	3.0 m (10')
90 mm (3 1/2")	3.9 m (13')	3.3 m (11')
100 mm (4")	4.2 m (14')	3.6 m (12')
125 mm (5")	4.8 m (16')	
150 mm (6")	5.1 m (17')	
200 mm (8")	5.7 m (19')	
250 mm (10")	6.6 m (22')	
300 mm (12")	6.9 m (23')	

- .2 Pipework greater than NPS 300 mm (12"): to MSS SP-69.
.3 Gas and fuel oil piping: every 1.8 m (6').

3.3 EXAMINATION

- .1 Report to the contractor in writing, defects of work prepared by other trades and other unsatisfactory site conditions. Verify site dimensions. Commencement of work will imply acceptance of prepared work.

3.4 ADJUSTING

- .1 Verify that all manufactured units have been installed in accordance with specifications and details and will function as intended. Adjust any items where necessary to ensure proper operation.

3.5 CLEANING

- .1 Clean manufactured units using materials and methods approved by manufacturer. Do not use cleaning techniques which could impair performance of the roofing system.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ASHRAE Handbook (2013) – Noise and Vibration Control chapter.

1.2 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with general requirements.
- .2 Provide separate shop drawings for each isolated system complete with performance and product data.
- .3 Provide detailed engineered shop drawings, outlining the manufacturer's recommended product for each piece of mechanical equipment. Submission shall be specific to the reviewed and returned shop drawings for equipment on the project.

1.3 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 GENERAL

- .1 Size and shape of bases type and performance of vibration isolation to be as indicated.
- .2 To be of the same manufacturer for all isolation.
- .3 Acceptable materials:
 - .1 Kinetics Noise Control
 - .2 Korfund
 - .3 Mason Industries

2.2 BASE TYPES

- .1 Curb-Mounted Spring Rail:
 - .1 Full-perimeter rail type isolator, spring components shall be **1"/25 mm deflection**, free-standing, un-housed, laterally stable steel springs. Springs shall have a lateral stiffness greater than 1.0 times the rated vertical stiffness and shall be designed for 50% overload to solid.
- .2 Vibration Restrained Curb-Mounted Spring Rail:
 - .1 All rooftop air-handling units shall be supported by vibration isolation curbs. The vibration isolation curbs shall be complete assemblies designed to resiliently support the equipment at the specified elevation and shall constitute a fully enclosed air- and weather-tight system.

- .3 Spring Isolation Roof Curb:
 - .1 Curb type isolator with integral spring isolators, designed to provide a complete roof curb installation. All rooftop air handling units shall be supported by vibration isolation curbs. The vibration isolation curbs shall be complete assemblies designed to resiliently support equipment at the specified elevation and shall constitute a fully enclosed air- and weather-tight system. The isolation curb shall consist of an upper support rail with supply and return duct supports on which the equipment and duct openings rest and a lower support curb which is attached to the roof structure, separated by free-standing, un-housed, laterally stable steel springs.
 - .2 Minimum 3" static deflection from spring isolators.

2.3 ISOLATOR TYPES

- .1 Provide Isolator Type as indicated in Table under section 2.4 of this specification.
- .2 Type 1 (Neoprene and Fiberglass Isolation Pads)
 - .1 Type A:
 - .1 Isolation pads shall be single ribbed or crossed, double ribbed elastomer-in-shear pads, in combination with steel shims when required, having minimum static deflections as tabulated. All pads shall be true elastomer-in-shear using alternately higher and lower ribs to provide effective vibration isolation, and shall be molded using 2500 PSI (176 kg/cm²) tensile strength, oil resistant compounds with no color additives. Pads shall be 45 to 65 durometer and designed to permit 60 or 120 PSI (4.2 or 8.4 kg/cm²) loading at maximum rated deflections. When two isolation pads are laminated, they shall be separated by, and bonded to, a galvanized steel shim plate.

2.4 ROOF CURB ACOUSTIC LINING

- .1 Design Basis: Kinetics RT-7
- .2 Factory laminated acoustic panel. Panels to be sectional and modular, designed for easy and accurate field assembly.
- .3 Panels to be minimum 7 – ¼" thick and comprised of alternating fiberglass absorption media and acoustically dampened sheet rock. Integrate additional layers as required to meet required STC rating.
- .4 Provide on all HVAC equipment over 4,000 cfm capacity.
- .5 Required STC Rating: 60.

				Equipment Location												
				Slab on Grade			Up to 20 ft (6 m) Floor Span			20 to 30 ft (6-9 m) Floor Span			30 to 40 ft (9-12 m) Floor Span			
Equipment Type	Equipment Category	Horsepower and Other	RPM	Base Type	Isolator Type	Min. Defl., in. (mm)	Base Type	Isolator Type	Min. Defl., in. (mm)	Base Type	Isolator Type	Min. Defl., in. (mm)	Base Type	Isolator Type	Min. Defl., in. (mm)	Reference Notes
Condensing Units	All	All	All	A	1	0.25	A	4	0.75	A	4	1.50	A/D	4	1.50	
Base Types:				Isolator Type:												
A. No base, isolators attached directly to equipment (Note 28)				1. Pad, rubber, or glass fiber												
B. Structural steel rails or base (Notes 29 and 30)				2. Rubber floor isolator or hanger												
C. Concrete inertia base (Note 31)				3. Spring floor isolator or hanger												
				4. Restrained spring isolator												
				5. Thrust restraint												
				6. Air spring												

- .2 Notes accompanying table:
- .1 Cooling Towers: These are normally isolated with restrained spring isolators (type 4) directly under the tower or lower dunnage. High deflection isolators proposed for use directly under the motor-fan assembly must be used with extreme caution ensure stability and safety under all weather conditions. See Note 5.
 - .2 For large equipment capable of generating substantial vibratory forces and structure borne noise, increase isolator deflection, if necessary, so isolator stiffness is less than one-tenth the stiffness of the supporting structure, as defined by the deflection due to load at the equipment support.
 - .3 Pumps: Concrete inertia bases (type C) are preferred for all flexible-coupled pumps and are desirable for most close-coupled pumps, although steel bases (type B) can be used. Close-coupled pumps should not be installed directly on individual isolators (type A) because the impeller usually overhangs the motor support base, causing the rear mounting to be in tension. The primary requirements for type C bases are strength and shape to accommodate base elbow supports. Mass is not usually a factor, except for pumps over 55 kW, where extra mass helps limit excess movement due to starting torque and forces. Concrete bases (type C) should be designed for a thickness of one-tenth the longest dimension with minimum thickness as follows: (1) for up to 20 kW, 150 mm; (2) for 30 to 55 kW, 200 mm; and (3) for 75 kW and up, 300 mm. Pumps over 55 kW and multistage pumps may exhibit excessive motion at start-up ("heaving"); supplemental re-straining devices can be installed if necessary. Pumps over 90 kW may generate high starting forces; a vibration specialist should be consulted.
 - .4 Certain designs cannot be installed directly on individual isolators (type A), and the equipment manufacturer should be consulted on the need for supplemental support (base type).
 - .5 Wind load conditions must be considered. Provide restrained spring isolators (type 4), supplemental bracing, snubbers, or limit stops.
 - .6 Compressors: Base-mounted compressors through 5 HP and horizontal tank-type air compressors through 10 HP can be installed directly on spring isolators (type 3) with structural bases (type B) if required, and compressors 15 to 100 HP on spring isolators (type 3) with inertia bases (type C) with a mass 1 to 2 times the compressor mass.
 - .7 Fans and Air-Handling Equipment:
 - .1 For fans operating under 300 rpm, select isolator deflection so the isolator natural frequency is 40% or less than the fan speed.
 - .2 Flexible duct connectors must be installed at the intake and discharge of all fans and air-handling equipment to reduce vibration transmission
 - .3 Inertia bases (type C) are required for all class 2 and 3 fans and air-handling equipment.

- .8 To avoid isolator resonance problems, select isolator deflection so that resonance frequency is 40% or less of the lowest normal operating speed of equipment. Equipment such as variable-frequency drives, and high-speed equipment, such as screw chillers and vane axial fans, contain very-high-frequency vibration. To reduce high-frequency vibration transmission, add a 25 mm thick pad (type 1) to the base plate of spring isolators (type 3).
- .9 To limit undesirable movement, thrust restraints (type 5) are required for all ceiling-suspended and floor-mounted units operating at 1500 Pa or more total static pressure.

Part 3 Execution

3.1 INSTALLATION

- .1 Install vibration isolation equipment in accordance with manufacturers instructions and adjust mountings to level equipment.
- .2 Provide Roof Curb acoustic lining on all HVAC equipment above 4,000 cfm / 10 tonnes capacity.
- .3 Ensure piping, ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduit and ducting passage through walls and floors do not transmit vibrations.
- .4 Unless indicated otherwise, support piping connected to isolated equipment with spring mounts or spring hangers with 25 mm (1") minimum static deflection as follows:
 - .1 Up to NPS 100 mm (4"): first 3 points of support. NPS 125 mm (5") to NPS 200 mm (8"): first 4 points of support. NPS 250 mm (10") and Over: first 6 points of support.
 - .2 First point of support shall have a static deflection of twice deflection of isolated equipment, but not more than 50 mm (2").
- .5 Where isolation is bolted to floor use vibration isolation rubber washers.
- .6 Block and shim level bases so that ductwork and piping connections can be made to a rigid system at the operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.
- .7 Rooftop Units and Central Air Handling Units
 - .1 Packaged rooftop units shall be provided with standard curb mounted spring rails.
 - .2 Central air handling units (10,000 cfm or greater) shall be provided with spring isolation roof curbs.
- .8 Spring isolators shall not be used in series to ensure no harmonics issues. This contractor shall review internally isolated equipment against method of spring isolation and ensure no overlap.

3.2 SITE VISIT

- .1 Manufacturer to visit site and provide written certification that installation is in accordance with manufacturer's instructions and submit report to Consultant.
- .2 Provide Consultant with notice 24 h in advance of visit.
- .3 Make adjustments and corrections in accordance with written report.

3.3 TESTING

- .1 Experienced and competent sound and vibration testing professional engineer to take vibration measurement for HVAC systems after start up and TAB of systems to Testing Adjusting and Balancing Section.
- .2 Vibration measurements shall be taken for equipment-listed below:
- .3 Provide Consultant with notice 48 h in advance of commencement of tests.
- .4 Establish adequacy of equipment isolation and acceptability of noise levels in occupied areas and where appropriate, remedial recommendations including sound curves.
- .5 Submit complete report of test results including sound curves.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.
 - .2 CAN/CGSB-24.3, Identification of Piping Systems.
- .3 Canadian Standards Association (CSA).
 - .1 Natural Gas and Propane Installation Code CSA B149.1.
- .4 National Fire Protection Association
 - .1 NFPA 13, Installation of Sprinkler Systems.
 - .2 NFPA 14, Standpipe and Systems.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with General Requirements.
- .2 Product data to include paint colour chips, all other products specified in this section.

1.3 PRODUCT LITERATURE

- .1 Submit product literature in accordance with General Requirements.
- .2 Product literature to include nameplates, labels, tags, lists of proposed legends.

Part 2 Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

- .1 Metal or plastic lamicoid nameplate mechanically fastened to each piece of equipment by manufacturer.
- .2 Lettering and numbers to be raised or recessed.
- .3 Information to include, as appropriate:
 - .1 Equipment: Manufacturer's name, model, size, serial number, capacity.
 - .2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

- .1 Colours:
 - .1 Hazardous: red letters, white background.

- .2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).

.2 Construction:

- .1 3 mm (1/8") thick laminated plastic, matte finish, with square corners, letters accurately aligned, and machine engraved into core.

.3 Sizes:

- .1 Conform to following table:

Size	No. of Sizes mm (")	Height of Line mm (")	Letters mm (")
1	10 x 50 (3/8" x 2")	1 (3/64")	3 (1/8")
2	15 x 75 (1/2" x 3")	1 (3/64")	6 (1/4")
3	15 x 75 (1/2" x 3")	2 (5/64")	3 (1/8")
4	20 x 100 (3/4" x 4")	1 (3/64")	10 (3/8")
5	20 x 100 (3/4" x 4")	2 (6/64")	6 (1/4")
6	20 x 200 (3/4" x 8")	1 (3/64")	10 (3/8")
7	25 x 125 (1" x 5")	1 (3/64")	15 (1/2")
8	25 x 125 (1" x 5")	2 (5/64")	10 (3/8")
9	32 x 200 (1¼" x 8")	1 (3/64")	20 (3/4")

- .2 Use maximum of 25 letters/numbers per line.

.4 Locations:

- .1 Terminal cabinets, control panels: Use size #5.
.2 Equipment in Mechanical Rooms: Use size #9.
.3 Roof top equipment: use size #9.
.4 Equipment above ceiling: use size #1 riveted to ceiling suspension system.

2.3 FIRE DAMPER/FIRE STOP FLAP NAMEPLATES/FIRE SMOKE DAMPER

.1 Colours:

- .1 Black letters, yellow background.

.2 Construction:

- .1 Self adhesive 50 mm x 25 mm, matte finish, with round corners.

.3 Locations:

- .1 Install on adjacent ceiling grid. Where fire stop flap is installed in gypsum ceiling install on diffuser/grille frame. Where fire damper is installed above gypsum ceiling install on adjacent wall.

2.4 EXISTING IDENTIFICATION SYSTEMS

- .1 Apply existing identification system to new work.
- .2 Where existing identification system does not cover for new work, use identification system specified this section.
- .3 Before starting work, obtain written approval of identification system from Consultant.
- .4 Upon completion of this project all references to room names and numbering shall be to the Owner's requirements which may or may 'NOT' be the numbering system used on the drawings. Each contractor shall verify the proper numbering scheme to be used prior to project completion.
- .5 All equipment shall be identified in sequence from the existing equipment and "NOT" duplicate numbering of equipment.

2.5 PIPING SYSTEMS GOVERNED BY CODE

- .1 Identification:
 - .1 Natural and propane gas: To CSA B149.1-00 and authority having jurisdiction and as indicated elsewhere.
 - .2 Sprinklers: To NFPA 13.
 - .3 Standpipe and hose systems: To NFPA 14.

2.6 IDENTIFICATION OF PIPING SYSTEMS

- .1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.
- .2 Legend:
 - .1 Block capitals to sizes and colours listed in CAN/CGSB-24.3.
- .3 Arrows showing direction of flow:
 - .1 Outside diameter of pipe or insulation less than 75 mm (3"): 100 mm (4") long x 50 mm (2") high.
 - .2 Outside diameter of pipe or insulation 75 mm (3") and greater: 150 mm (6") long x 50 mm (2") high.
 - .3 Use double-headed arrows where flow is reversible.
- .4 Extent of background colour marking:
 - .1 To full circumference of pipe or insulation.
 - .2 Length to accommodate pictogram, full length of legend and arrows.
- .5 Materials for background colour marking, legend, arrows:
 - .1 Pipes and tubing 20 mm (3/4") and smaller: Waterproof and heat-resistant pressure sensitive plastic marker tags.

- .2 All other pipes: Pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150°C (300°F) and intermittent temperature of 200°C (395°F).
- .6 Colours and Legends:
- .1 Where not listed, obtain direction from Consultant.
- .2 Colours for legends, arrows: To following table:
- | | | |
|--------------------|---------|---------|
| Background colour: | Legend: | Arrows: |
| Yellow | White | Black |
| Green | White | Black |
| Red | White | Black |
- .7 Pictograms:
- .1 Where required, to Workplace Hazardous Materials Information System (WHMIS) regulations.
- .8 Background colour marking and legends for piping systems:

CONTENTS	BACKGROUND COLOUR	
	MARKING	LEGEND
Condenser water supply	Green	COND. WTR. SUPPLY
Condenser water return	Green	COND. WTR. RETURN
Chilled water supply	Green	CH. WTR. SUPPLY
Chilled water return	Green	CH. WTR. RETURN
Hot water heating supply	Yellow	HEATING SUPPLY
Hot water heating return	Yellow	HEATING RETURN
High temp HW Htg. Supply	Yellow	HTHW HTG. SUPPLY++
High temp HW Htg. Return	Yellow	HTHW HTG. RETURN++
Make-up water	Yellow	MAKE-UP WTR
Boiler feed water	Yellow	BLR. FEED WTR
Steam [] kPa (psi)	Yellow	[] kPa (psi) STEAM
Steam condensate (gravity)	Yellow	ST.COND.RET (GRAVITY)
Steam condensate (pumped)	Yellow	ST.COND.RET (PUMPED)
Safety valve vent	Yellow	STEAM VENT
Intermittent blow-off	Yellow	INT. BLOW-OFF
Continuous blow-off	Yellow	CONT. BLOW-OFF
Glycol heating water supply	Yellow	GLYCOL HEATING WATER SUPPLY
Glycol heating water return	Yellow	GLYCOL HEATING WATER RETURN
Condensate	Green	CONDENSATE

Refrigeration suction	Yellow	REF. SUCTION
Refrigeration liquid	Yellow	REF. LIQUID
Refrigeration hot gas	Yellow	REF. HOT GAS
No.[] fuel oil suction	Yellow	#[] FUEL OIL
No.[] fuel oil return	Yellow	#[] FUEL OIL
Engine exhaust	Yellow	ENGINE EXHAUST
Lubricating oil	Yellow	LUB. OIL
Hydraulic oil	Yellow	HYDRAULIC OIL
Gasoline	Yellow	GASOLINE
Natural gas	Yellow	NATURAL GAS
Propane		to Codes
Gas regulator vents		to Codes
Conduit for low voltage		
Control wiring	White	CONTROL WIRING__VOLTS

2.7 IDENTIFICATION DUCTWORK SYSTEMS

- .1 50 mm (2") high stencilled letters and directional arrows 150 mm (6") long x 50 mm (2") high.
- .2 Colours: Black, or co-ordinated with base colour to ensure strong contrast.

2.8 VALVES, CONTROLLERS

- .1 Brass tags with 15 mm (1/2") stamped identification data filled with black paint.
- .2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.
- .3 Provide adhesive coloured tab (max. size 15 mm) indication on ceiling to locate valves/equipment above. Same applies to grid. Colour to be approved by consultant.

2.9 CONTROLS COMPONENTS IDENTIFICATION

- .1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.
- .2 Inscriptions to include function and (where appropriate) fail-safe position.
- .3 Provide equipment identification and/or indication on ceiling to locate devices/equipment above ceiling. Install identification on grid. Colours to be approved by consultant.

2.10 LANGUAGE

- .1 Identification to be in English.

Part 3 Execution

3.1 TIMING

- .1 Provide identification only after all painting specified has been completed.

3.2 INSTALLATION

- .1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.
- .2 Provide ULC and/or CSA registration plates as required by respective agency.

3.3 NAMEPLATES

- .1 Locations:
 - .1 In conspicuous location to facilitate easy reading and identification from operating floor.
- .2 Standoffs:
 - .1 Provide for nameplates on hot and/or insulated surfaces.
- .3 Protection
 - .1 Do not paint, insulate or cover in any way.

3.4 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

- .1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels not more than 1.7 m (5'-8") intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
- .2 Adjacent to each change in direction.
- .3 At least once in each small room through which piping or ductwork passes.
- .4 On both sides of visual obstruction or where run is difficult to follow.
- .5 On both sides of separations such as walls, floors, partitions.
- .6 Where system is installed in pipe chases, ceiling spaces, galleries, other confined spaces, at entry and exit points, and at each access opening.
- .7 At beginning and end points of each run and at each piece of equipment in run.
- .8 At point immediately upstream of major manually operated or automatically controlled valves, dampers, etc. Where this is not possible, place identification as close as possible, preferably on upstream side.
- .9 Identification to be easily and accurately readable from usual operating areas and from access points.
 - .1 Position of identification to be approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 VALVES, CONTROLLERS

- .1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.
- .2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Consultant. Provide one copy (reduced in size if required) in each operating and maintenance manual.
- .3 Number valves in each system consecutively. Where existing numbering system is installed start new numbering system at 100.

END OF SECTION

Part 1 General

1.1 GENERAL

- .1 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do all other work as specified in this section including all air handling systems and equipment, all plumbing systems and equipment and all temperature controls system, building automation systems and equipment.
- .2 This contractor must co-ordinate their work with that of the TAB contractor.

1.2 QUALIFICATIONS OF TAB AGENCIES

- .1 Names of all personnel it is proposed to perform TAB to be submitted to and approved by Consultant within 30 days of start of work.
- .2 Provide documentation confirming qualifications, successful experience.
- .3 Only the following NEBB (National Environmental Balancing Bureau) TAB contractors may quote:

GROUP A – STANDARD NEBB

- .1 Air Audit Inc.
 110 Turnbull Court, Unit 11
 Cambridge, ON N1T 1K6
 (519) 740-0871
- .2 Air Velocities Control Ltd.
 206 Lawlor Avenue
 Toronto, ON M4E 3M1
 (905) 279-4433
- .3 Flowset Balancing Ltd.
 431 Willis Drive .
 Oakville, ON L6L 4V6
 (416) 410-9793
- .4 Clark Balancing Ltd.
 8094 Esquesing Line
 Milton, ON L9T 2X9
 (905) 693-1518

GROUP B – AUXILIARY NEBB CERTIFIED TRIALING – SMALL PROJECTS ONLY

- .5 Dynamic Flow Balancing Ltd.
 1200 Speers Road, Unit 36
 Oakville, ON L6L 2X4
 (905) 338-0808

GROUP C – AUXILIARY/OTHER

- .6 Red Leaf Technical Inc.
 5249 Ament Line,
 Linwood, ON N0B 2A0
 (519) 504-1617

GROUP D – CLIENT SPECIFIC (SIMCOE BOARD)

- .7 Airwaso Canada Inc. (WRDSB)
 3365 Paulpeel Avenue
 London, ON N6L 0A4
 (519) 652-4040

1.3 PURPOSE OF TAB

- .1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average (95% design) and low (75% of design) loads using actual or simulated loads. TAB contractor to perform equipment evaluation upon start up and once during each season in the first year of operation.
- .2 Adjust and regulate equipment and systems so as to meet specified performance requirements and to achieve specified interaction with all other related systems under all normal and emergency loads and operating conditions. Confirm all equipment interlocks and functions of associated systems.
- .3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges and temperatures. Refer to BAS for system operating functions.

1.4 EXCEPTIONS

- .1 TAB of systems and equipment regulated by codes, standards to be to satisfaction of authority having jurisdiction.

1.5 CO-ORDINATION

- .1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule so as to ensure completion before acceptance of project.
- .2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems. Co-ordinate with other trades to ensure all systems are interlocked as indicated elsewhere prior to TAB.

1.6 PRE-TAB REVIEW

- .1 Review contract documents before project construction is started and confirm in writing to Consultant adequacy of provisions for TAB and all other aspects of design and installation pertinent to success of TAB.
- .2 Review specified standards and report to Consultant in writing all proposed procedures which vary from standard.
- .3 During construction, co-ordinate location and installation of all TAB devices, equipment, accessories, measurement ports and fittings.
- .4 During construction indicate all tolerances of piping, ductwork etc conforms to specifications.

1.7 START-UP

- .1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.
- .2 Follow special start-up procedures specified elsewhere in the Mechanical Division.

1.8 OPERATION OF SYSTEMS DURING TAB

- .1 Operate systems for length of time required for TAB and as required by Consultant for verification of TAB reports.

1.9 START OF TAB

- .1 Notify Consultant in writing 3 days prior to start of TAB.
- .2 Start TAB only when building is essentially completed, including:
 - .1 Installation of ceilings, doors, windows, other construction affecting TAB.
 - .2 Application of weather-stripping, sealing, caulking.
 - .3 All pressure, leakage, other tests specified elsewhere in the Mechanical Division.
 - .4 All provisions for TAB installed and operational.
 - .5 Start-up, verification for proper, normal and safe operation of all mechanical and associated electrical and control systems affecting TAB including but not limited to:
 - .1 Proper thermal overload protection in place for electrical equipment.
 - .2 Air systems:
 - .1 Filters in place, clean.
 - .2 Duct systems clean.
 - .3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
 - .4 Correct fan rotation.
 - .5 Fire, smoke, volume control dampers installed and open.
 - .6 Coil fins combed, clean.

- .7 Access doors, installed, closed.
- .8 All outlets installed, volume control dampers open.
- .3 Liquid systems:
 - .1 Flushed, filled, vented.
 - .2 Correct pump rotation.
 - .3 Strainers in place, baskets clean.
 - .4 Isolating and balancing valves installed, open.
 - .5 Calibrated balancing valves installed, at factory settings.
 - .6 Chemical treatment systems complete, operational.
 - .7 Control valves are properly piped.
 - .8 Coils and radiation are properly piped.
 - .9 BAS in operation.

1.10 APPLICATION TOLERANCES

- .1 Do TAB to following tolerances of design values:
 - .1 HVAC systems: plus 10%, minus 5%.
 - .2 Hydronic systems: plus or minus 10%.

1.11 ACCURACY TOLERANCES

- .1 Measured values to be accurate to within plus or minus 2% of actual values.

1.12 INSTRUMENTS

- .1 Prior to TAB, submit to Consultant list of instruments to be used together with serial numbers.
- .2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.
- .3 Calibrate within 3 months of TAB. Provide certificate of calibration to Consultant.

1.13 SUBMITTALS

- .1 Submit, prior to commencement of TAB:
 - .1 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.14 PRELIMINARY TAB REPORT

- .1 Submit for checking and approval of Consultant, prior to submission of formal TAB report, sample of rough TAB sheets. Include:
 - .1 Details of instruments used.
 - .2 Details of TAB procedures employed.
 - .3 Calculations procedures.
 - .4 Summaries.

1.15 TAB REPORT

- .1 Format to be in accordance with NEBB, AABC, or SMACNA.
- .2 The following additional information shall be provided for all air systems:
 - .1 Minimum damper position (MAD/Economizer) and the corresponding BAS signal and the voltage to the actuator to meet the full ASHRAE occupied ventilation requirements.
 - .2 Minimum damper position (MAD/Economizer) and the corresponding BAS signal and the voltage to the actuator to meet the full ASHRAE unoccupied ventilation requirements.
 - .3 Static pressure reading for each HVAC/AHU unit with VAV/VVT boxes open to 80% of design airflow and bypass damper closed to 0%. Provide reading at normal MAD/economizer damper position, dampers fully closed and dampers fully open.
- .3 TAB report to show all results in SI or imperial units as indicated on plans and to include:
 - .1 Project as-built drawings.
 - .2 System schematics.

1.16 VERIFICATION

- .1 All reported results subject to verification by Consultant.
- .2 Provide manpower and instrumentation to verify up to 30% of all reported results.
- .3 Number and location of verified results to be at discretion of Consultant.
- .4 Bear costs to repeat TAB as required to satisfaction of Consultant.

1.17 SETTINGS

- .1 After TAB is completed to satisfaction of Consultant, replace drive guards, close all access doors, lock all devices in set positions, ensure sensors are at required settings. Replace all ceiling tile etc.
- .2 Permanently mark all settings to allow restoration at any time during life of facility. Markings not to be eradicated or covered in any way.

1.18 COMPLETION OF TAB

- .1 TAB to be considered complete only when final TAB Report received and approved by Consultant.

1.19 AIR SYSTEMS

- .1 Standard: TAB to be to most stringent of TAB standards of NEBB, AABC, SMACNA, ASHRAE.
- .2 Do TAB of all systems, equipment, components, controls specified in the Mechanical Division including but not limited to following:
 - .1 Air handling systems and equipment
 - .2 Duct testing to SMACNA standards.
- .3 Qualifications: personnel performing TAB to be current member in good standing of NEBB.
- .4 Quality assurance: Perform TAB under direction of qualified supervisor.
- .5 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.
- .6 Locations of equipment measurements: To include, but not be limited to, following as appropriate:
 - .1 Inlet and outlet of each damper, filter, coil, humidifier, fan, and other equipment causing changes in conditions.
 - .2 At each controller, controlled device.
- .7 Locations of systems measurements to include, but not be limited to, following as appropriate: Each main duct, main branch, sub-branch, grille, register or diffuser.

1.20 HYDRONIC SYSTEMS

- .1 Definitions: for purposes of this section, to include low pressure hot water heating, chilled water, condenser water, glycol systems.
- .2 Standard: TAB to be the most stringent of TAB standards of NEBB, AABC, SMACNA, ASHRAE.
- .3 Do TAB of all systems, equipment, components, controls specified in Mechanical Division including but not limited to hydronic equipment testing.
- .4 Qualifications: personnel performing TAB to be current member in good standing of NEBB.
- .5 Quality assurance: perform TAB under direction of qualified supervisor.
- .6 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: Flow rate, static pressure, pressure drop (or loss), temperature, specific gravity, density, RPM, electrical power voltage, noise, vibration.

- .7 Locations of equipment measurement: To include, but not be limited to, following as appropriate:
 - .1 Inlet and outlet of each heat exchanger (primary and secondary sides), boiler, chiller, coil, humidifier, cooling tower, condenser, pump, PRV, control valve, other equipment causing changes in conditions.
 - .2 At each controller, controlled device.
- .8 Locations of systems measurements to include, but not be limited to, following as appropriate: Supply and return of each primary and secondary loop (main, main branch, branch, sub-branch of all hydronic systems, inlet connection of make-up water.

1.21 DUCT LEAKAGE TESTING

- .1 Co-ordinate leakage testing with the sheet metal contractor. TAB contractor will be responsible for all duct testing.
- .2 Duct to be tested in accordance with SMACNA HVAC Duct Leakage Test Manual and as indicated.

1.22 OTHER PLUMBING SYSTEMS

- .1 This contractor shall test, adjust, and record the domestic water (in 1.24 change read "plumbing") system after the plumbing contractor has completed their work.
 - .1 Pressure booster systems: test for capacity and pressures under all conditions and at all times.
- .2 This contractor shall test, adjust, and record the domestic water (in 1.24 change read "plumbing") system after the plumbing contractor has completed their work.
 - .1 Recirculating Systems: pump flows and pressures
 - .2 Pumped sanitary and storm water systems: test for proper operation at all possible flow rates.

1.23 OTHER TAB REQUIREMENTS

- .1 General requirements applicable to all work specified this paragraph:
 - .1 Qualifications of TAB personnel: as for air systems specified this section.
- .2 Quality assurance: as for air systems specified this section.
- .3 **Smoke management systems:**
 - .1 **Test for proper operation of all smoke and fire dampers installed as component parts of air systems specified.**

END OF SECTION

Part 1 General

1.1 GENERAL

- .1 The Mechanical Contractor shall provide the labour and material to conduct the closeout process as outlined in this specification section.
- .2 The mechanical contractor shall perform the closeout requirements specified in conjunction with the independent commissioning consultant (CC) retained by the owner.

Part 2 Products

2.1 GENERAL

- .1 The mechanical contractor and manufacturers shall provide all instrumentation and equipment necessary to conduct the tests specified. The Mechanical Contractor shall advise the Mechanical Consultant of instrumentation to be used and the dates the instruments were calibrated.

Part 3 Execution

3.1 THE CONTRACT CLOSE OUT PROCESS

- .1 The mechanical contractor close out process shall consist of:
 - Shop Drawings and As-built Drawings
 - Installation inspection and equipment verification
 - Plumbing and drainage system testing
 - Testing of piping systems
 - Independent contractor balancing of water systems
 - Testing of air systems
 - Independent contractor balancing of air systems
 - Testing of equipment and systems
 - BAS Commissioning
 - Verification of refrigeration leak detection systems
 - Commissioning Consultant performance testing
 - Commissioning meetings
 - Operating and maintenance manuals
 - Training
 - Systems Demonstration and turnover
 - Testing forms
 - Warranties
 - Contractor to provide list of equipment maintenance including schedule of maintenance parts, quantities, and model fixtures, etc.

3.2 SHOP DRAWINGS AND AS-BUILT DRAWINGS

- .1 Conform to General Requirements Section for shop drawings and as-built drawings requirements.

3.3 INSTALLATION INSPECTION AND EQUIPMENT VERIFICATION

- .1 The Mechanical Contractor shall co-ordinate with the Consultant who will inspect the mechanical installation.
- .2 The Mechanical Contractor shall complete the equipment verification forms for each piece of equipment. The forms shall be included in the operating and maintenance manual. The equipment data shall include:
- Manufacturers name, address and telephone number
 - Distributors name, address and telephone number
 - Make, model number and serial number
 - Pumps - RPM, impeller sizes, rated flow
 - Fans - belt type and size, shive type and size
 - Electrical - volts, amps, fuse size, overload size
 - Any other special characteristics.

3.4 THE CONTRACTOR'S TESTING OF PIPING SYSTEMS

- .1 Test all piping systems in accordance with all applicable plumbing codes and General Requirements section.
- .2 All tests for the systems shall be performed in the presence of the Consultant or Commissioning Consultant. Complete the testing forms and forward to the Consultant.

3.5 THE INDEPENDENT CONTRACTORS TESTING AND BALANCING OF WATER SYSTEMS

- .1 Conform with the specification section, Testing, Adjusting and Balancing.
- .2 The Independent Contractor shall be hired by The Mechanical Contractor and shall report to the Commissioning Consultant.

3.6 THE CONTRACTORS TESTING OF AIR SYSTEMS

- .1 Conform with the specification section, Testing, Adjusting and Balancing.
- .2 All tests shall be performed in the presence of the Mechanical Consultant or the Commissioning Consultant. Complete the testing forms and forward to the Consultant.

3.7 THE INDEPENDENT CONTRACTORS TESTING AND BALANCING OF AIR SYSTEMS

- .1 Conform with specification section, Testing, Adjusting and Balancing.
- .2 The Independent Contractor shall be hired by The Mechanical Contractor and shall report to the Commissioning Consultant.

3.8 TESTING OF EQUIPMENT AND SYSTEMS

.1 General:

- .1 The Mechanical Contractor shall hire the services of the manufacturers technicians to test the equipment and associated systems. The technician shall record the results of the tests on the testing forms. The tests shall be witnessed by the Consultant or Owners representative. When the tests have been completed satisfactorily the technician and witnessing authority shall sign the forms. A copy of the forms shall be forwarded to the Consultant. The original shall be inserted into the operating and maintenance manual.
- .2 Should equipment or systems fail a test, the test shall be repeated after repairs or adjustments have been made. The additional tests shall be witnessed.
- .3 Tests which have not been witnessed shall not be accepted and shall be repeated.
- .4 The equipment and systems to be tested shall include:
 - Heat Pumps
 - Condensing Units
 - Boilers and Pumps
 - Air Handling Units
 - Cooling Tower
 - Life Safety and Fire Protection Systems
 - Water Treatment Systems
 - Building Automation Systems (BAS)

.2 BAS Testing:

- .1 The BAS Contractor shall test the system as described in General Requirements and/or Controls Sections.
- .2 Co-ordinate with the Consultant and submit completed test forms monthly.
- .3 Demonstrate to the Owner and Consultant the operation of the BAS when all tests have been completed.

.3 Verification of Refrigeration Leak Detection System Operation:

- .1 The commissioning process shall include the verification of the refrigeration leak detection system.
- .2 All interlocks between leak detection systems installed and system components, as well as interlocks between field installed detection systems and associated safety system components shall be tested and verified to operate as per the requirements of CSA B52. Specifically, the following shall occur for each independent system on registration of a refrigerant leak:
 - .1 Open all zone dampers in the affected system.
 - .2 Disable all electric reheat coils within the affected system.
 - .3 Activate field installed safety shut off valves within the affected refrigeration system.

- .4 Energize all fans within the affected ductwork system.
- .5 Activate all refrigerant leak system specific ventilation systems.
- .6 De-energize any other potential sources of ignition within the affected system.

3.9 CLOSEOUT SCHEDULE

- .1 The Mechanical Contractor shall include the schedule for all tests and equipment start-up tests in the construction schedule.
- .2 All testing forms and reports associated with the mechanical systems shall be directed to the Consultant with copies to the Owner and Consultant.
- .3 The forms and reports to be issued shall include:
 - Shop drawings, issued and accepted
 - Equipment verification forms
 - Testing forms
 - Reports resulting from tests
 - Testing schedule
 - Equipment Start-up Forms

3.10 OPERATION AND MAINTENANCE MANUAL

- .1 Conform to General Requirements section for the Operating and Maintenance Manual requirements.

3.11 OPERATOR TRAINING

- .1 Conform to General Requirements section for requirements for Instruction to Operating Staff.
- .2 The training shall be conducted in a classroom and at the equipment or system.
- .3 Training will begin when the operating and maintenance manuals have been delivered to The Owner and approved by the Consultant.
- .4 Each training session shall be structured to cover:
 - The operating and maintenance manual
 - Operating procedures
 - Maintenance procedures
 - Trouble-shooting procedures
 - Spare parts required
 - Submit a course outline to the Mechanical Consultant before training commences.
 - Provide course documentation for up to eight people.
- .5 The training sessions shall be scheduled and co-ordinated by the Mechanical Contractor.

- .6 Training shall be provided for the following systems:

<u>System</u>	<u>Minimum Training Times</u>
Condensing Units	2 hours
Life Safety & Fire Protection Systems	2 hours
Water Treatment Systems	2 hours

- .7 The minimum training for the BAS shall be 16 hours. The training shall include:

- A walk through of the installation for the Building Owner to review the installation and equipment
- Operation of the central computer
- Operation of portable terminals
- Control sequences
- Report set-up and generation
- Managing the system
- Maintenance requirements

Refer to Controls specification section for further information.

- .8 The training requirement for the mechanical system shall include a walk-through of the building by the Mechanical Contractor. During the walk through the Mechanical Contractor shall:

- Identify equipment
- Identify starters associated with equipment
- Identify valves and balancing dampers
- Identify access doors
- Review general maintenance of equipment
- Review drain points in pipework systems
- Identify maintenance items

- .9 When each training session has been completed The Owner shall sign the associated form to verify completion.

3.12 MECHANICAL SYSTEM DEMONSTRATION AND TURNOVER

- .1 Refer to General Requirements section, Mechanical Project Completion.

- .2 The system demonstration and turnover to The Owner shall occur when:

- The installation is complete
- The acceptance test conducted by the Mechanical Consultant has been completed successfully
- The Commissioning Consultant system performance testing has been completed successfully
- Training has been completed
- Operating and Maintenance Manuals have been accepted
- Shop-drawings have been updated
- As-built drawings have been completed

- .3 The systems demonstration shall be conducted by the Mechanical Contractor and the manufacturers. The demonstration shall cover a demonstration of equipment installation and operation.

3.13 TESTING FORMS

- .1 The Mechanical Contractor and manufacturers shall provide forms for testing. The forms must be approved by the Consultant and The Owner before they are used.

3.14 WARRANTIES

- .1 Equipment and system warranties shall not begin until the system demonstration and turnover has been conducted successfully and accepted by The Owner.
- .2 The Mechanical Contractor shall fill out the warranty form listing the equipment and systems and the start and finishing dates for warranty.
- .3 Refer to the general conditions specification section for the requirements during the warranty period.

3.15 CLOSEOUT PROCESS ALLOCATION

- .1 The mechanical contractor closeout process shall be as follows:
 - .1 3% for the first \$500,000 of contract value.
 - .2 1% of the contract value for value between \$500,000 to \$5,000,000.
 - .3 0.5% of contract value for the value in excess of \$5,000,000.
 - .4 Minimum Allocation for Close Out Documents is \$5,000.
- .2 The Mechanical Contractor shall submit all test and verification forms. The Consultant will use these forms to calculate percentage complete.
- .3 The monies shall not be paid out until the performance testing, O & M manuals, systems demonstration, and training including all required paperwork have been completed to the satisfaction of the consultant. Refer to General Requirements section for contract breakdown.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 51-GP-52Ma-[89], Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
- .3 Underwriters Laboratories of Canada (ULC).
 - .1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
- .4 American Society for Testing and Materials (ASTM).
 - .1 ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Mean of the Guarded Hot-Plate Apparatus.
 - .2 ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - .3 ASTM C 449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - .4 ASTM C1729 Standard Specification for Aluminum Jacketing for Insulation.
 - .5 ASTM C1290 Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
 - .6 ASTM C1393 Standard Specification for Perpendicularly Oriented Mineral Fiber Roll and Sheet Thermal Insulation for Pipes And Tanks.
 - .7 ASTM C553, Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - .8 ASTM C612, Mineral Fiber Block and Board Thermal Insulation.
- .5 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).
 - .1 ASHRAE Standard 90.1.
- .6 Manufacturer's Trade Associations.
 - .1 Thermal Insulation Association of Canada (TIAC)
 - .2 North American Commercial and Industrial Insulation Standards.

1.2 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with general requirements.
- .2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for duct jointing recommendations.

- .3 Submit completed detail plates from the North American Commercial and Industrial Insulation Standards manual, applicable to installation types required by this specification section.

1.3 INSTALLATION INSTRUCTIONS

- .1 Submit manufacturer's installation instructions in accordance with general requirements.
- .2 Installation instructions to include procedures to be used, installation standards to be achieved.

1.4 QUALIFICATIONS

- .1 Installer to have successfully completed apprenticeship program.
- .2 Installer to be specialist in performing work of this section and have at least 3 years successful experience in this size and type of project, qualified to standards of TIAC.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.
- .2 Protect from weather and construction traffic.
- .3 Protect against damage from any source.
- .4 Store at temperatures and conditions required by manufacturer.

1.6 DEFINITIONS

- .1 For purposes of this section:
 - .1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.
 - .2 "EXPOSED" - will mean "not concealed" as defined herein.
 - .3 "ASJ+" – All Service Jacket – vapor retarder laminate of aluminium foil inner layer, reinforced with fiberglass scrim, bonded to a bleached kraft paper, with outer poly film leaving no paper exposed.
 - .4 "ASJ" – All Service Jacket (no outer film) – vapor retarder laminate of aluminium foil inner layer, reinforced with fiberglass scrim, bonded to a bleached kraft paper outer layer.
 - .5 "FSK" – Foil Scrim Kraft – vapor retarder laminate of aluminium foil outer layer, reinforced with fiberglass scrim, bonded to a natural kraft paper inner layer.
- .2 Insulation systems - insulation material, fasteners, jackets, and other accessories.

1.7 QUALITY ASSURANCE

- .1 Products shall not contain formaldehyde, asbestos, lead, mercury or mercury compounds or PBDE fire retardants.

Part 2 Products

2.1 LIMITATION ON MATERIALS

- .1 Products shall not contain formaldehyde, asbestos, lead, mercury or mercury compounds or PBDE fire retardants.

2.2 FIRE AND SMOKE RATING

- .1 In accordance with CAN/ULC S102:
 - .1 Maximum flame spread rating: 25.
 - .2 Maximum smoke developed rating: 50.

2.3 INSULATION

- .1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C (75°F) mean temperature when tested in accordance with ASTM C177 or ASTM C518.
- .3 Type C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket meeting the requirement of ASTM C1136 Type II and IV (FSK):
 - .1 Jacket: to ASTM C1136 Type II and IV (FSK)
 - .2 Maximum "k" value: .033 W/M•°C (.23 BTU•IN/HR•FT²•°F)
- .4 Manufacturers:
 - .1 All materials must be supplied by the same manufacturer.
 - .2 Acceptable Manufacturers:
 - .1 Johns Manville
 - .2 Knauf
 - .3 Manson

2.4 JACKETS

- .1 Aluminum:
 - .1 To ASTM C1729 with moisture barrier as scheduled in PART 3 of this section.
 - .2 Thickness: 0.5 mm (0.020") sheet.
 - .3 Finish: Smooth.
 - .4 Jacket banding and mechanical seals: 15 mm (1/2") wide, 0.5 mm (0.020") thick stainless steel.
 - .5 Provide exterior silicone sealant on all joints.
 - .6 **Self-adhesive aluminum jackets are not permitted.**

2.5 ACCESSORIES

- .1 Vapour retarder lap adhesive:
 - .1 Water based, fire retardant type, compatible with insulation.
- .2 Indoor Vapour Retarder Finish:
 - .1 Compatible with insulation.
- .3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C 449.
- .4 ULC Listed Canvas Jacket:
 - .1 220 g/m² (6oz/yd²) cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.
- .5 Tape: self-adhesive, aluminum, reinforced, 75 mm (3") wide minimum.
- .6 Contact adhesive: quick-setting Childers CP-82 or equal.
- .7 Canvas adhesive: washable.
- .8 Tie wire: 1.5 mm (16 gauge) stainless steel.
- .9 Facing: 25 mm (1") stainless steel hexagonal wire mesh stitched on one face of insulation
- .10 Fasteners: weld pins, length to suit insulation, with 40 mm (1½") diameter clips.

Part 3 Execution

3.1 PRE-INSTALLATION REQUIREMENTS

- .1 Pressure testing of ductwork systems to be complete, witnessed, and certified.
- .2 Surfaces to be clean, dry, free from foreign material.

3.2 INSTALLATION

- .1 Install in accordance with North American Commercial and Industrial Insulation Standards.
- .2 Apply materials in accordance with manufacturers instructions and this specification.
- .3 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
 - .1 Hangers, supports to be outside vapour retarder jacket.
- .4 Supports, Hangers in accordance with general requirements.
 - .1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.
- .5 Fasteners: At 300 mm (12") oc. in horizontal and vertical directions, minimum two rows each side.

- .6 Provide rigid insulation for exposed ductwork.
- .7 **Use two layers with staggered joints when required nominal thickness exceeds 75 mm (3").**

3.3 DUCTWORK INSULATION SCHEDULE

- .1 Insulation types and thicknesses conform to following table:

Application	Type	Thickness
Rectangular supply air ducts	C-1	25 mm (1")
Round supply air ducts	C-2	25 mm (1")
Outdoor air ducts (exterior ductwork)	C-1	80 mm (3")
Outdoor air intake ductwork and plenums	C-1	50 mm (2")
Exhaust plenums dampers and louvres	C-1	25 mm (1")
Interior acoustically lined ducts	None	
Last 1.5m of exhaust duct	C-1	25 mm (1")
Exterior ductwork	C-1	80 mm (3")

- .2 Exposed round ducts 600 mm (24") and larger, smaller sizes where subject to abuse:

- .1 Use TIAC code C-1 insulation, scored to suit diameter of duct.
- .2 **C-6 insulation is also acceptable. Same thickness, schedule, and facing to be used as C-1 material.**

- .3 Finishes: Conform to following table:

Application	Rectangular	Round
Indoor, concealed	None	None
Outdoor, exposed to precipitation	Aluminum	Aluminum

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketing Sheet, for Insulating Pipes, Vessels, and Round Ducts.
- .3 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .4 American Society for Testing and Materials (ASTM)
 - .1 ASTM C547, Type I and IV Standard Specification for Mineral Fiber Pipe Insulation.
 - .2 ASTM C177, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 - .3 ASTM C518, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus to recognize the correct thermal insulation performance testing for blanket.
 - .4 ASTM C1393, Standard Specification for Perpendicularly Oriented Mineral Fiber Roll and Sheet Thermal Insulation for Pipes and Tanks
 - .5 ASTM C1695, Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service.
 - .6 ASTM C 335, Test Method for Steady State Heat Transfer Properties of Pipe Insulation.
 - .7 ASTM C 921, Practice for Determining the Properties Jacketing Materials for Thermal Insulation.
 - .8 ASTM C1729 Standard Specification for Aluminium Jacketing for Insulation.
 - .9 ASTM C553, Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - .10 CGSB 51-GP-52Ma, Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
- .5 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).
 - .1 ASHRAE Standard 90.1.
- .6 Manufacturer's Trade Associations
 - .1 Thermal Insulation Association of Canada (TIAC)
 - .2 North American Commercial and Industrial Insulation Standards

1.2 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with general requirements.
- .2 Submit properly completed detail plates from the North American Commercial and Industrial Insulation Standards manual, applicable to installation types required by this specific section.
- .3 Submit for approval manufacturer's catalogue literature related to installation, fabrication for pipe, fittings, valves, and jointing recommendations.

1.3 INSTALLATION INSTRUCTIONS

- .1 Submit manufacturer's installation instructions in accordance with general requirements.
- .2 Installation instructions to include procedures to be used, installation standards to be achieved.

1.4 QUALIFICATIONS

- .1 Installer to have successfully completed apprenticeship program.
- .2 Installer to be specialist in performing work of this section and have at least 3 years successful experience in this size and type of project, qualified to standards of TIAC.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .2 Protect from weather, construction traffic.
- .3 Protect against damage from any source.
- .4 Store at temperatures and conditions required by manufacturer.

1.6 DEFINITIONS

- .1 For purposes of this section:
 - .1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
 - .2 "EXPOSED" - will mean "not concealed" as defined herein.
 - .3 "ASJ+" – All Service Jacket – vapor retarder laminate of aluminium foil inner layer, reinforced with fiberglass scrim, bonded to a bleached kraft paper, with outer poly film leaving no paper exposed.
 - .4 "ASJ" – All Service Jacket (no outer film) – vapor retarder laminate of aluminium foil inner layer, reinforced with fiberglass scrim, bonded to a bleached kraft paper outer layer.
 - .5 "FSK" – Foil Scrim Kraft – vapor retarder laminate of aluminum foil outer layer, reinforced with fiberglass scrim, bonded to a natural kraft paper inner liner.

- .6 "PSK" – Poly Scrim Kraft – vapor retarder laminate of polypropylene outer layer, reinforced with fiberglass scrim, bonded to a natural kraft paper inner layer.
- .7 "PVC" – Poly Vinyl Chloride – polymer used to manufacture a non-metallic final protective finish jacket over insulation systems.

1.7 QUALITY ASSURANCE

- .1 Products shall not contain formaldehyde, asbestos, lead, mercury or mercury compounds or PBDE fire retardants.
- .2 Products shall be Certified UL GREENGUARD Gold or Indoor Advantage Gold and formaldehyde free.
- .3 Recycled content: Mineral fiber products will contain a minimum of 50% recycled glass content certified and UL validated and are to be constructed using bio-based thermosetting binder.

Part 2 Products

2.1 MATERIAL LIMITATIONS

- .1 Products shall not contain formaldehyde, asbestos, lead, mercury or mercury compounds or PBDE fire retardants.

2.2 FIRE AND SMOKE RATING

- .1 In accordance with CAN/ULC-S102:
 - .1 Maximum flame spread rating: 25.
 - .2 Maximum smoke developed rating: 50.

2.3 INSULATION

- .1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C (75°F) mean temperature when tested in accordance with ASTM C335, ASTM C177 or ASTM C518.
- .3 Type A-1: Rigid moulded or wound mineral fibre with factory applied vapour retarder jacket.
 - .1 Mineral fibre: to ASTM C547 Type I and IV.
 - .2 Jacket: to ASTM C1136, Type I, II, III, IV, X.
 - .3 Maximum "k" factor: to ASTM C547.

- .4 Type A-3: Tubular flexible elastomeric closed cell foam:
 - .1 Insulation to ASTM C534 Type I.
 - .2 Maximum "k" factor: to ASTM C534.
 - .3 To be certified by manufacturer to be free of potential stress corrosion cracking corrodents.
- .5 Materials:
 - .1 All materials must be supplied by the same manufacturer.
 - .2 Acceptable Manufacturers:
 - .1 Knauf
 - .2 Manson
 - .3 Owens Corning

2.4 INSULATION SECUREMENT

- .1 Tape: Self-adhesive, aluminum, reinforced, 50 mm (2") wide minimum.
- .2 Contact adhesive: Quick setting.
- .3 Canvas adhesive: Washable.
- .4 Tie wire: 1.5mm (16 gauge) diameter stainless steel.
- .5 Bands: Stainless steel, 20 mm (3/4") wide, 0.5 mm (0.020") thick.

2.5 CEMENT

- .1 Thermal insulating and finishing cement:
 - .1 Air drying on mineral wool, to ASTM C 449M.
 - .2 Hydraulic setting on mineral wool, to ASTM C165

2.6 VAPOUR RETARDER LAP ADHESIVE

- .1 Water based, fire retardant type, compatible with insulation.

2.7 INDOOR VAPOUR RETARDER FINISH

- .1 Compatible with insulation.

2.8 OUTDOOR VAPOUR RETARDER FINISH

- .1 Compatible with insulation.
- .2 Reinforcing fabric: Open weave fibreglass fabric, with maximum weave of 10 x 10 squares per inch.

2.9 JACKETS

- .1 Aluminum:
 - .1 To ASTM C1729.
 - .2 Thickness: 0.50 mm (0.020") sheet.
 - .3 Finish: Smooth.
 - .4 Joining: Longitudinal and circumferential slip joints with 50 mm (2") laps.
 - .5 Fittings: 0.50 mm (0.020") thick die-shaped fitting covers with factory-attached protective liner.
 - .6 Metal jacket banding and mechanical seals: stainless steel, 20 mm (3/4") wide, 0.50 mm (0.020") thick at 300 mm (12") spacing.

2.10 CAULKING FOR JACKETS

- .1 Caulking: Silicone clear caulking.

Part 3 Execution

3.1 PRE-INSTALLATION REQUIREMENT

- .1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed, and certified.
- .2 Surfaces to be clean, dry, free from foreign material.

3.2 INSTALLATION

- .1 Install in accordance with North American Commercial and Industrial Insulation Standards.
- .2 Provide continuous insulation for complete systems including all valves, air separators, fittings, and other equipment.
- .3 Apply materials in accordance with manufacturers' instructions and this specification.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
 - .1 Hangers, supports to be outside vapour retarder jacket.
- .5 Supports, Hangers:
 - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.
- .6 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm (3").

- .7 Below ambient/chilled water installation:
- .1 All pipes, fittings, valves, strainers, flanges, unions, and other pipe system components and specialties must be properly insulated with correctly completed vapor retarded applied.
 - .2 All insulation material must have properly installed and sealed vapor retarding jacket, including circumferential and longitudinal seams.
 - .3 All penetrations, tears, and punctures must be repaired and sealed with a vapor retarding material with a .02 or lower perm rating.
 - .4 Vapor stops must be installed at 18' intervals, at all pipe insulation termination points, including fittings, flanges, and other changes in direction or other types of piping specialties.
 - .5 All fitting insulation must be of the same type, thickness, and density of the pipe insulation, be premoulded insulation covers or fabricated from the same material as the pipe insulation. Full thickness must be factory-applied, vapor-retarder facing is unacceptable.
 - .6 A complete vapor retarder must be installed on insulation over fittings before applying final finish. Vapor retarder must extend onto and be sealed to the vapor retarder or pipe insulation.
 - .7 Additional fitting covers, PVC or metal, must have a vapor retarder seal applied to all longitudinal and circumferential seams in addition to the vapor retarder applied to the fitting insulation.
 - .8 Additional field applied jackets must not use staples, screws, tacks or rivets for attachment, to avoid puncturing vapor retarder underneath.
 - .9 Insulating support inserts are to be high compressive strength insulation with a rigid shield. No calcium silicate is to be used for insulation on below-ambient operation piping.

3.3 REMOVABLE, PREFABRICATED, INSULATION AND ENCLOSURES

- .1 Application: At expansion joints, valves, primary flow measuring elements, flanges, and unions at equipment.
- .2 Flexible removable insulation covers are not acceptable for below-ambient (cold) operation piping systems. Rigid removable insulation jackets that are vapor retarder exterior material that can be vapor sealed at the seams, are acceptable on below-ambient (cold) operation piping systems.
- .3 Insulation:
 - .1 Insulation, fastenings, and finishes: same as system.
 - .2 Jacket: As per adjacent insulation.

3.4 PIPING INSULATION SCHEDULES

- .1 Includes valves, valve bonnets, strainers, flanges, air separators, and fittings unless otherwise specified.

- .2 Install insulator and jackets to applicable TIAC codes.
- .3 Insulate ends of capped piping with type and thickness indicated for capped service.
- .4 Thickness of insulation to be as listed in following table.
 - .1 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Type	Pipe sizes through (NPS) and insulation thickness mm (")				
		to 25 (1")	32 (1¼") 40 (1½")	50 (2") 80 (3")	105 (4") 150 (6")	200 (8") & over
Condensate	A-1	40 (1½")	40 (1½")	50 (2")	50 (2")	50 (2")
Hot Water Heating	A-1	40 (1½")	50 (2")	50 (2")	50 (2")	50 (2")
Chilled Water Piping	A-3	25 (1")	25 (1")	25 (1")	25 (1")	25 (1")
Refrigerant piping	A-3	25 (1")	25 (1")	25 (1")	25 (1")	25 (1")
Cooling Coil cond. Drain	A-1	25 (1")	25(1")	25 (1")	25 (1")	25 (1")

- .5 Finishes: Conform to the following table:

Application	Piping	Valves & Fittings
Concealed indoors	N/A	PVC
Exterior refrigerant piping	Aluminum	Aluminum

- .6 Connection: To appropriate TIAC code.
- .7 Finish attachments: SS bands, @ 150 mm (6") oc. seals: closed.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ANSI/ASME B16.5, Pipe Flanges and Flanged Fittings: NPS ½ through NPS 24 Metric/Inch.
- .3 ANSI B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
- .4 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
- .5 ANSI B18.2.1, Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series).
- .6 ASTM A47/A47M, Specification for Ferritic Malleable Iron Castings.
- .7 ASTM A53/A53M, and A106, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded ERW and Seamless.
- .8 ASTM B32, Specification for Solder Metal.
- .9 ASTM B75M, Specification for Seamless Copper Tube [Metric].
- .10 CSA B149.1, Natural Gas and Propane Installation Code.
- .11 CSA W47.1, Certification of Companies for Fusion Welding of Steel.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings product data in accordance with general requirements.
- .2 Indicate on manufacturers catalogue literature.

1.3 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 PIPE

- .1 Steel pipe: to ASTM A106, Schedule 40, seamless as follows:
 - .1 NPS 15 mm to 50 mm (1/2" to 2"), screwed.
 - .2 NPS 65 mm (2 1/2") and over, plain end.
- .2 Buried pipe: CGA approved polypropylene complete with tracer wire and marker.
- .3 Copper tube: to ASTM B75M.

2.2 JOINTING MATERIAL

- .1 Screwed fittings: pulverized lead paste.
- .2 Welded fittings: to CSA W47.1.
- .3 Flange gaskets: nonmetallic flat.
- .4 Soldered: to ASTM B32, tin antimony 95/5.
- .5 Screwed brass fittings: Teflon Tape.

2.3 FITTINGS

- .1 Steel pipe fittings, screwed, flanged or welded:
 - .1 Malleable iron: screwed, banded, Class 150.
 - .2 Steel pipe flanges and flanged fittings: to ANSI/ASME B16.5.
 - .3 Welding: butt-welding fittings.
 - .4 Unions: malleable iron, brass to iron, ground seat, to ASTM A47/A47M.
 - .5 Bolts and nuts: to ANSI B18.2.1.
 - .6 Nipples: schedule 40, to ASTM A53/A53M/A106.
- .2 Copper pipe fittings, screwed, flanged or soldered:
 - .1 Cast copper fittings: to ANSI B16.18.
- .3 Brass fittings: To ASTM B16.

2.4 BALL VALVES

- .1 NPS 50 mm (2") and under:
 - .1 Body and cap: cast high tensile bronze to ASTM B62.
 - .2 Pressure rating: Class 125, 860 kPa (125 psi) steam, WP = 1.4 MPa (203 psi) WOG.
 - .3 Connections: Screwed ends to ANSI B1.20.1 and with hex. shoulders.
 - .4 Stem: tamperproof ball drive.
 - .5 Stem packing nut: external to body.
 - .6 Ball and seat: replaceable stainless steel solid ball and teflon seats.
 - .7 Stem seal: TFE with external packing nut.
 - .8 Operator: removable lever handle.

2.5 LUBRICATED PLUG VALVES

- .1 All sizes
 - .1 Provincial Code approved, lubricated plug type.
 - .2 Body: cast iron to ASTM A 126 Class B semi-steel.
 - .1 Rating: Class 125 psig.

- .3 Plug: tapered, with regular pattern port – 90 from full open to fully closed.
- .4 Ends: 50 mm (2") and smaller with hexagon shoulders, ends screwed to ANSI B1.20.1. Flanged to ANSI B16.1.
- .5 Lubrication system, nickel-plated.
- .6 Lubricant: to suit type, temperature and pressure of contained fluid.
- .7 Feeding system: lubricant forced into lubrication grooves between seating surfaces of plug and body to form positive seal, leakproof operation, and corrosion preventing film.
- .8 Lubricant screw for lubrication.
- .9 O-rings between body and plug.
- .10 Operator: removable manual lever handle.
- .11 Acceptable Manufacturers:
 - .1 Newman Hattersley
 - .2 Crane
 - .3 Jenkins
 - .4 Milwaukee
 - .5 Toya

2.6 MANUFACTURED ROOF SUPPORTS

- .1 Single piece injection moulded polypropylene support.
- .2 Type 3-20 psi extruded polystyrene UV protected base glued to the support.
- .3 Minimum base dimension of 300 x 225 (12" x 9") and be 140 mm (5.5") high.
- .4 Pull test of 1.4 KN (315 lbs) using two #14-10 screws on pipe strap.
- .5 Acceptable Manufacturers:
 - .1 Quick Block
 - .2 Erico

2.7 PIPING THROUGH ROOF

- .1 Provide Thaler MEF-9 or equal gas piping flashing where pipe and/or relief vent penetrates roof.

Part 3 Execution

3.1 PIPING

- .1 Install in accordance with applicable Provincial/Territorial Codes.
- .2 Install in accordance with CAN/CSA B149.
- .3 Assemble piping using fittings manufactured to ANSI standards.

- .4 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.
- .5 Slope piping down in direction of flow to low points.
- .6 Install drip points:
 - .1 At low points in piping system.
 - .2 At each connection to equipment.
- .7 Use eccentric reducers at pipe size change installed to provide positive drainage.
- .8 Provide clearance for access and for maintenance.
- .9 Ream pipes, clean scale and dirt, inside and out.
- .10 Install piping to minimize pipe dismantling for equipment removal.
- .11 Install regulator vents to code. Terminate in open air with Gooseneck fitting complete with stainless steel screen.
- .12 Paint gas piping with two (2) coats yellow paint. Banding of gas will not be accepted.

3.2 PIPING ON ROOF

- .1 Support piping as follows or as per seismic requirements (1.8 M (6' - 0") O.C.) whichever is more stringent:
 - ≤ 40 mm (1½") 2.4 M (8' - 0") O.C.
 - ≥ 50 mm (2") 3.0 M (10' - 0") O.C.
- .2 Provide support at each elbow and fitting.
- .3 Provide support at each regular and/or isolating valve.
- .4 Provide support within 600 mm (24") of each piece of equipment.

3.3 VALVES

- .1 Install valves with stems upright or horizontal unless otherwise approved by Consultant.
- .2 Install valves at branch take-offs to isolate each piece of equipment, and as indicated.
- .3 Provide lubricated plug type when gas line is exterior of building or 65 mm (2½") and larger.
- .4 Provide ball valve when gas line is interior of building and 50 mm (2") or smaller.

3.4 FIELD QUALITY CONTROL

- .1 Test system in accordance with CAN/CSA B149. Requirements of authorities having jurisdiction.
- .2 Provide copy of TSSA tag to the consultant.

3.5 PURGING

- .1 Purge after pressure test in accordance with CAN/CSA B149.

3.6 GAS FIRED EQUIPMENT START-UP

- .1 Start-up of all new and existing gas fired equipment shall be by this contractor to the requirements of the equipment manufacturer.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ANSI/ASME B16.22, Wrought Copper Alloy and Copper Alloy Solder - Joint Pressure Fittings: Classes 150, 300, 600, 900, 1500, and 2500.
- .3 ANSI/ASME B16.24, Cast Copper Pipe Flanges and Flanged Fittings.
- .4 ANSI/ASME B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
- .5 ANSI/ASME B31.5, Refrigeration Piping and Heating Transfer Components.
- .6 ASTM A307, Specification for Carbon Steel Bolts and Studs, 413.5 mPa (60,000 psi) Tensile Strength.
- .7 ASTM B280, Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
- .8 CSA B52, Mechanical Refrigeration Code.
- .9 EPS 1/RA/2, Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

Part 2 Products

2.1 TUBING

- .1 Processed for refrigeration installations, deoxidized, dehydrated and sealed.
 - .1 Hard copper: to ASTM B280, Type ACR-B.
 - .2 Soft copper: to ASTM B280, Type ACR
 - .3 Refer to Part 3 for allowed applications.

2.2 FITTINGS

- .1 Service: design pressure 2070 kPa (300 psi) and temperature 121°C (250°F).
- .2 Brazed:
 - .1 Fittings: wrought copper to ANSI/ASME B16.22.
 - .2 Joints: silver solder, 45% Ag-15% Cu or copper-phosphorous, 95% Cu-5%P and non-corrosive flux.
- .3 Flanged:
 - .1 Bronze or brass, to ANSI/ASME B16.24, Class 150 and Class 300.
 - .2 Gaskets: suitable for service.
 - .3 Bolts, nuts and washers: to ASTM A307, heavy series.

- .4 Flared:
 - .1 Bronze or brass, for refrigeration, to ANSI/ASME 16.26.

2.3 PIPE SLEEVES

- .1 Hard copper or steel, sized to provide 6 mm (1/4") clearance all around between sleeve and uninsulated pipe or between sleeve and insulation.

2.4 VALVES

- .1 22 mm (7/8") and under: Class 500, 3.5 MPa (500 psi), globe or angle non-directional type, diaphragm, packless type, with forged brass body and bonnet, moisture proof seal for below freezing applications, brazed connections.
- .2 Over 22 mm (7/8"): Class 375, 2.5 MPa (375 psi), globe or angle type, diaphragm, packless type, back-seating, cap seal, with cast bronze body and bonnet, moisture proof seal for below freezing applications, brazed connections.

2.5 FILTER-DRIER

- .1 On lines 20 mm (3/4") outside diameter and larger, filter-drier shall be replaceable core type with Schraeder type valve.
- .2 On lines smaller than 20 mm (3/4") outside diameter, filter-drier shall be sealed type using flared copper fittings.
- .3 Size shall be full line size.
- .4 Acceptable Manufacturers:
 - .1 Mueller
 - .2 Parker
 - .3 Sporlan
 - .4 Virginia

2.6 SIGHT GLASS

- .1 Combination moisture and liquid indicator with protection cap.
- .2 Sight glass shall be full line size.
- .3 Sight glass connections shall be solid copper or brass, no copper-coated steel sight glasses allowed.
- .4 Acceptable Manufacturers:
 - .1 Mueller
 - .2 Henry
 - .3 Parker
 - .4 Superior

2.7 SUCTION LINE TRAP

- .1 Manufactured standard one-piece traps.

2.8 EXPANSION VALVES

- .1 For pressure type distributors, externally equalized with stainless steel diaphragm, and same refrigerant in thermostatic elements as in system.
- .2 Size valves to provide full rated capacity of cooling coil served. Co-ordinate selection with evaporator coil and condensing unit.
- .3 Acceptable Manufacturers:
 - .1 Henry
 - .2 Mueller
 - .3 Parker
 - .4 Sporlan

2.9 FLEXIBLE CONNECTORS

- .1 Designed for refrigerant service with bronze seamless corrugated hose and bronze braiding.
- .2 Approved Manufacturers:
 - .1 Anaconda "Vibration Eliminators" by Anamet
 - .2 Vibration Absorber Model VAF by Packless Industries
 - .3 Vibration Absorbers by Superior Valve Co
 - .4 Style "BF" Spring-flex freon connectors by Vibration Mountings.

2.10 ROOF FLASHING

- .1 Thaler or equal spun aluminum complete with insulation, cap, and rubber gasket.

2.11 PREFABRICATED PIPE ENTRY DOGHOUSE

- .1 Dog House and cover shall be fabricated from 2mm thick aluminum with UV protected powder coated finish is also acceptable.
- .2 Cover shall be gasketed to ensure air and water tightness.
- .3 Mount in curb shall be full insulated and supplied with Doghouse.
- .4 Curb shall be 610 mm (24") high with 89 mm (3.5") wide flange pre-punched for securement to roof deck.
- .5 Curb shall be insulated with 50 mm (2") thick glass fibre insulation.

- .6 Pipe entry openings shall be provided by the pipe entry chase manufacturer and be specifically made for the application. Minimum acceptable standard:
 - .1 Sigrist Exit Seal
 - .2 Vault Exit Seal
- .7 Cover shall be removable and be fastened to the curb/body with vandal resistant fasteners. Hardware shall be zinc plated or stainless steel.
- .8 Size: To suite required penetrations.
- .9 Acceptable Manufacturers:
 - .1 Sigrist Alta Pipe Chase Housing
 - .2 Vault Roof Penetration Housing
 - .3 Other Acceptable Manufacturers if approved by Consultant prior to tender close.

2.12 PIPING SUPPORT ASSEMBLY

- .1 All channel members shall be fabricated from structural grade steel conforming to one of the following ASTM specifications: A1011/A1011M, A653/A653M.
- .2 All fittings shall be fabricated from steel conforming to one of the following ASTM specifications: A575, A36/A36M or A635/A635M.
- .3 Electro galvanized crush clamps with shoulder bolt and molded thermoplastic cushion, size to suit pipe.
- .4 Acceptable Manufacturers:
 - .1 Unistrut
 - .2 Or equal

Part 3 Execution

3.1 GENERAL

- .1 Install in accordance with CSA B52, EPS 1/RA/2 and ANSI/ASME B31.5.
- .2 Connect to equipment with isolating valves and unions.
- .3 Provide space for servicing, disassemble, and removal of equipment and components all as recommended by manufacturer.
- .4 Protect all openings in piping against entry of foreign material.
- .5 Provide all necessary equipment including thermal expansion valve, sight glass, solenoid valve, filter dryer, etc., for a complete installed system. Pipe system as per manufacturer's recommendation and requirements.
- .6 Provide number of refrigerant circuits and appropriate corresponding piping as per manufacturer's recommendations and requirements.

3.2 BRAZING PROCEDURES

- .1 Bleed inert gas into pipe during brazing.
- .2 Remove valve internal parts, solenoid valve coils, sight glass.
- .3 Do not apply heat near expansion valve and bulb.

3.3 PIPING INSTALLATION

- .1 General:
 - .1 Hard drawn copper tubing: do not bend. Minimize use of fittings.
 - .2 Soft drawn copper: install in a neat manner without excessive bends or twists. Minimize use of fittings.
 - .3 Fittings, joints and other connections to equipment shall be minimized in all inaccessible areas, including but not limited to areas above drywall ceilings, shafts etc.
 - .4 Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.
 - .5 Provide trap at base of risers greater than 2.4m (8') high and at each 7.6m (25'-0") thereafter.
 - .6 Provide inverted deep trap at top of each riser.
 - .7 Provide double risers for compressors having capacity modulation.
 - .1 Large riser: install traps as specified above.
 - .2 Small riser: size for 5.1 m/s (1000 ft/min) at minimum load. Connect upstream of traps on large riser.

3.4 PRESSURE AND LEAK TESTING

- .1 Close valves on factory charged equipment and other equipment not designed for test pressures.
- .2 Leak test to CSA B52 before evacuation to 2 MPa (290 psi) and 1 MPa (145 psi) on high and low sides respectively.
- .3 Test Procedure: Build pressure up to 35 kPa (5 psi) with refrigerant gas on high and low sides. Supplement with nitrogen to required test pressure. Test for leaks with electronic or halide detector. Repair leaks and repeat tests.
- .4 Testing shall be completed to the standards of CSA B52, section 5.10 so that the exemption contained in Annex N (N.1.2) allowing areas (such as those above fully enclosed drywall ceilings) to have joints and connections installed within them is met.

3.5 DEHYDRATION AND CHARGING

- .1 Close service valves on factory charged equipment.
- .2 Ambient temperatures to be at least 13°C (55°F) for at least 12 h before and during dehydration.

- .3 Use copper lines of largest practical size to reduce evacuation time.
- .4 Use 2-stage vacuum pump with gas ballast on 2nd stage capable of pulling 5 Pa (0.02" WC) absolute and filled with dehydrated oil.
- .5 Measure system pressure with vacuum gauge. Take readings with valve between vacuum pump and system closed.
- .6 Triple evacuate all system components containing gases other than correct refrigerant or having lost holding charge as follows:
 - .1 Twice to 14 Pa (0.056" WC) absolute and hold for 4 h.
 - .2 Break vacuum with refrigerant to 14 kPa (0.056" WC).
 - .3 Final to 5 Pa (0.02" WC) absolute and hold for at least 12 h.
 - .4 Isolate pump from system, record vacuum and time readings until stabilization of vacuum.
 - .5 Submit all test results to Consultant.
- .7 Charging:
 - .1 Charge system through filter-drier and charging valve on high side. Low side charging not permitted.
 - .2 With compressors off, charge only amount necessary for proper operation of system. If system pressures equalize before system is fully charged, close charging valve and start up. With unit operating, add remainder of charge to system.
 - .3 Re-purge charging line if refrigerant container is changed during charging process.
- .8 Checks:
 - .1 Make all checks and measurements as per manufacturer's operation and maintenance instructions.
 - .2 Record and report all measurements to Consultant.

3.6 INSTRUCTIONS

- .1 Post instructions in frame with glass cover in accordance with Operation and Maintenance Manual Section and CSA B52.

3.7 PREFABRICATED PIPE CHASE

- .1 Install on prefabricated, insulated roof curb.
- .2 Install pipe chase and pipe entry to manufacturers installation instructions.
- .3 Provide field installed insulation on roof deck to match roof insulation thickness.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Plumbing Specialties and Accessories.
- .2 Hydronic Systems – Steel.

1.2 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 American Society of Mechanical Engineers (ASME).
- .3 ANSI/ASME Boiler and Pressure Vessel Code, Section VI.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with general requirements.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit operation and maintenance data for incorporation into manual specified in general requirements
- .2 Include following:
 - .1 Log sheets as recommended by manufacturer.
 - .2 Test reports.

Part 2 Products

2.1 MANUFACTURER

- .1 Equipment, chemicals, service by one supplier.
- .2 Acceptable Manufacturers:
 - .1 **Aquarian Chemicals (905-825-3711) No alternates.**

2.2 WATER TREATMENT FOR HYDRONIC SYSTEMS

- .1 Hot water heating system: Reuse existing.

2.3 TEST EQUIPMENT

- .1 Provide one set of test equipment for each system to verify performance.
- .2 Complete with carrying case, reagents for chemicals, all specialized or supplementary equipment.

2.4 CLEANING CHEMICALS

- .1 Provide as required to make system clean.
- .2 Cleaner chemical: compatible and of the same manufacturer of the water treatment supplier.

2.5 RECORD MANAGEMENT

- .1 Provide cards and card holder mounted on wall adjacent to each pot feeder.

Part 3 Execution

3.1 INSTALLATION

- .1 Install HVAC water treatment systems in accordance with ASME Boiler Code Section VII, and requirements and standards of authorities having jurisdiction, except where specified otherwise.
- .2 Ensure adequate clearances to permit performance of servicing and maintenance of equipment.

3.2 CHEMICAL FEED PIPING

- .1 Install crosses at all changes in direction. Install plugs in all unused connections.

3.3 WATER TREATMENT SERVICES

- .1 After entire new and existing system is cleaned as specified elsewhere, provide monthly water treatment monitoring and consulting services for period of one year after system start-up. Provide written report to consultant after each visit. Service to include:
 - .1 Initial water analysis and treatment recommendations.
 - .2 System start-up assistance.
 - .3 On site system testing and recording of treated hydronic system.
 - .4 Operating staff training.
 - .5 Visit plant every 7 days during first month of operation and as required until system stabilizes and advise consultant in writing on treatment system performance.
 - .6 Provide monthly visits with reports after system has stabilized to the satisfaction of the owner.
 - .7 Provide necessary monthly recording charts and log sheets for one year operation.
 - .8 Provide necessary laboratory and technical assistance.
 - .9 Instructions and advice to operating staff to be clear, concise and in writing.

3.4 START-UP

- .1 Start up water treatment systems in accordance with manufacturer's instructions.

3.5 SYSTEM COMMISSIONING AND TRAINING

- .1 Commissioning and training shall be provided by installing water treatment sub-contractor and water treatment supplier.
- .2 Timing:
 - .1 After start-up deficiencies rectified.
 - .2 After start-up and before TAB of connected systems.
- .3 Pre-commissioning Inspections:
 - .1 Verify:
 - .1 Presence of test equipment, reagents, chemicals, details of specific tests to be performed, operating instructions.
 - .2 Suitability of log book.
 - .3 Currency and accuracy of initial water analysis.
 - .4 Required quality of treated water.
- .4 Commissioning procedures - applicable to all Water Treatment Systems:
 - .1 Establish, adjust as necessary and record all automatic controls and chemical feed rates.
 - .2 Monitor performance continuously during commissioning of all connected systems and until acceptance of project.
 - .3 Establish test intervals, regeneration intervals.
 - .4 Record on approved report forms all commissioning procedures, test procedures, dates, times, quantities of chemicals added, raw water analysis, treated water analysis, test results, instrument readings, adjustments made, results obtained.
 - .5 Establish, monitor and adjust automatic controls and chemical feed rates as necessary.
 - .6 Visit project at monthly intervals after commissioning is satisfactorily completed to verify that performance remains as set during commissioning (more often as required until system stabilizes at required level of performance).
 - .7 Advise Engineer in writing on all matters regarding installed water treatment systems.

3.6 CLEANING OF MECHANICAL SYSTEM

- .1 Coordinate cleaning of mechanical systems with mechanical contractor.
- .2 Provide copy of recommended cleaning procedures and chemicals for approval by Consultant.

- .3 Procedure:
 - .1 Flushing and cleaning should only take place after successful piping pressure testing.
 - .2 Terminal device (reheat coils, heat pumps, perimeter radiation, heat exchangers etc.), air handling unit coils and their associated control and balancing valves should be bypassed during the preliminary flushing and cleaning process.
 - .3 Instruments such as flow meters; flow metering valves and orifice plates should only be installed after flushing and cleaning.
- .4 Timing:
 - .1 The overall construction schedule identifies piping flushing and cleaning with realistic time allotments.
 - .2 The mechanical contractor is required to provide a detailed report outlining the processes and procedures for flushing and cleaning per piping system at least 4 to 6 weeks in advance of work.
 - .3 As a minimum, at least one piping flushing and cleaning procedure shall be witnessed, by the consultant and/or commissioning agent.
- .5 The mechanical contractor shall to utilize a qualified water treatment specialist to supervise the flushing and cleaning process and provide the certified water analysis report certifying that the piping systems are clean.
- .6 Coordinate flushing and cleaning of mechanical systems with HVAC water treatment contractor.
- .7 Flush and clean new piping system in presence of Owner
- .8 Flush after pressure test for a minimum of 4 hrs.
- .9 Fill system with solution of water and non-foaming, phosphate-free detergent 3% solution by weight. Circulate for minimum of 8 hrs.
- .10 Thoroughly flush all new mechanical systems and equipment with approved cleaning chemicals designed to remove deposition from construction such as pipe dope, oils, loose mill scale and other extraneous materials. Chemicals to inhibit corrosion of various system materials and be safe to handle and use.
- .11 During circulation of cleaning solution, periodically examine and clean filters and screens and monitor changes in pressure drop across equipment.
- .12 Refill system with clean water. Circulate for at least 2 hours. Clean out strainer screens/baskets regularly. Then drain.
- .13 Drainage to include drain valves, dirt pockets, strainers, every low point in system.
- .14 Drain and flush systems until alkalinity of rinse water is equal to make-up water. Refill with clean water treated to prevent scale and corrosion during system operation.
- .15 Reinstall strainer screens/baskets only after obtaining Owner's approval and approval from HVAC water treatment contractor and board chemical treatment technician.

- .16 Repeat system drain and flush as often as necessary to have a clean system.
- .17 Disposal of cleaning solutions to be approved by authority having jurisdiction.
- .18 Isolate new piping system from existing system as required for system cleaning.

3.7 WARRANTY

- .1 Warranty Start Date:
 - .1 Warranty period starts as of the date of Ready for Takeover.
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .2 Warranty Duration:
 - .1 Two (2) year warranty period applies.
- .3 Warranty Coverage:
 - .1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.
- .3 SMACNA HVAC Duct Leakage Test Manual.
- .4 ASTM A480/A480M, Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
- .5 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process. (Metric).
- .6 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.
- .7 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.
- .8 **ANSI/NFPA 96, Ventilation Control and Fire Protection of Commercial Cooking Operations.**
- .9 **CSA B228.1, Pipe Ducts and Fittings for Residential Type Air Conditioning Systems.**

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section general requirements.
- .2 Indicate following:
 - .1 Sealants
 - .2 Tape
 - .3 Proprietary Joints
 - .4 Fittings

1.3 CERTIFICATION OF RATINGS

- .1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 DUCTWORK

.1 Galvanized Steel:

- .1 Galvanized steel with Z90 designation zinc coating lock forming quality: to ASTM A653/A653M.
- .2 Thickness:

Size Type	Class A Gauge	Class B Gauge	Class C Gauge
Square and Rectangular			
Up to 600 mm (24")	22	24	24
625 mm to 1000 mm (25" to 40")	20	22	24
1025 mm to 1800 mm (41" to 72")	18	20	22
1825 mm to 2400 mm (73" to 96")	16	18	20
2450 mm and over (97")	16	16	16
Round and Oval			
Up to 300 mm (12")	24	24	24
325 mm to 600 mm (13" to 24")	22	24	24
625 mm to 900 mm (25" to 36")	20	22	24
925 mm to 1200 mm (37" to 48")	18	20	22
1225 mm (49") and over	18	18	20
Residential Suite Ductwork:			
Square and Rectangular			
Up to 300 mm (12") *	26	26	26
Round and Oval Snap Lock *			
Up to 200mm (8") *	30	30	30

*Following SMACNA for low pressure ductwork.

- .3 All ductwork between HVAC unit connections and 3.0 m (10'-0") downstream or to silencers shall be 1.4 mm (18 gauge).

- .2 Aluminum
 - .1 To ASHRAE and SMACNA. Aluminum type: 3003-H-14.
 - .2 Thickness, fabrication and reinforcement: to ASHRAE and SMACNA or as indicated.
 - .3 Joints: to ASHRAE and SMACNA.
 - .1 Acceptable Manufacturers:
 - .1 Ductmate Canada Ltd.
 - .4 Foil tape all transverse and longitudinal joints.
- .3 Black Steel
 - .1 To ASTM A6653/A653M.
 - .2 Thickness: 1.2 mm (18 gauge)
 - .3 Fabrication: ducts and fittings to ASHRAE and SMACNA.
 - .4 Reinforcement: as indicated.
 - .5 Joints: continuous weld.

2.2 DUCT CONSTRUCTION

- .1 Round and oval:
 - .1 Ducts: factory fabricated, spiral wound, with matching fittings and specials to SMACNA.
 - .2 Transverse joints up to 900 mm (36"): slip type with tape and sealants.
 - .3 Transverse joints over 900 mm (36"): Ductmate or Exanno Nexus Duct System.
- .2 Square and rectangular:
 - .1 Ducts: to SMACNA.
 - .2 Transverse joints, longest side:
up to and including 750 mm (30"): SMACNA proprietary duct joints.
- .3 Ducts with sides over 750 mm (30") to 1200 mm (48"), transverse duct joint system by Ductmate/25, Nexus, or WDCI (Lite) (SMACNA "E" or "G" Type connection). Weld all corners.
 - .1 Acceptable Manufacturers:
 - .1 Ductmate Canada Ltd.
 - .2 Nexus, Exanno Corp.
 - .3 WDCI

- .4 Ducts 1200 mm (48") and larger, Ductmate/35, Nexus, or WDCI (heavy) (SMACNA "J" Type connection). Weld all corners.

- .1 Acceptable Manufacturers:

- .1 Ductmate Canada Ltd.
 - .2 Nexus, Exanno Corp.
 - .3 WDCI.

2.3 FITTINGS

- .1 Fabrication: to SMACNA.
- .2 Radiused elbows:
 - .1 Rectangular: standard radius and or short radius with single thickness turning vanes Centreline radius: 1.5 times width of duct.
 - .2 Round:
 - .1 In exposed areas one-piece smooth radius, 1.5 times diameter.
 - .2 In concealed areas 3-piece adjustable, 1.5 times diameter.
- .3 Mitred elbows, rectangular:
 - .1 To 400 mm (16"): with double thickness turning vanes.
 - .2 Over 400 mm (16"): with double thickness turning vanes.
- .4 Branches:
 - .1 Rectangular main and branch: with 45° entry on branch.
 - .2 Round main and branch: enter main duct at 45° with conical connection.
 - .3 Provide volume control damper in branch duct near connection to main duct.
 - .4 Main duct branches: with splitter damper.
- .5 Diffuser connection to main:
 - .1 90° round spin in collars with balancing damper and locking quadrant.
- .6 Transitions:
 - .1 Diverging: 20° maximum included angle.
 - .2 Converging: 30° maximum included angle.
- .7 Offsets:
 - .1 Full short radiused elbows.
- .8 Obstruction deflectors: maintain full cross-sectional area.

2.4 SEAL CLASSIFICATION

- .1 Classification as follows:

Maximum Pressure Pa (" w.c.)	SMACNA Seal Class	Acceptable Leakage Classification (Rectangular)	Acceptable Leakage Classification (Round)
2500 (10")	A	4	2
1500 (6")	A	4	2
1000 (4")	A	4	2
750 (3")	A	8	4
500 (2")	B	16	8
250 (1")	B	16	8
125 (0.5")	C	16	8

- .2 Seal classification:

- .1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.
- .2 Class B: longitudinal seams, transverse joints and connections made airtight with sealant.
- .3 Class C: transverse joints and connections made air tight with gaskets, or sealant or combination thereof. Longitudinal seams sealed with foil tape or sealant.

2.5 SEALANT

- .1 Sealant: oil resistant, polymer type flame resistant duct sealant. Temperature range of -30°C (-22°F) to plus 93°C (199°F).
- .2 Flame-spread rating not more than 25.
- .3 Smoke developed classification not more than 50.
- .4 Acceptable Manufacturers:
- .1 Duro Dyne S-2
- .2 Foster

2.6 TAPE

- .1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm (2") wide.
- .1 Acceptable Manufacturers:
- .1 Duro Dyne FT-2

2.7 DUCT LEAKAGE

- .1 In accordance with SMACNA HVAC Duct Leakage Test Manual.

2.8 FIRESTOPPING

- .1 40 mm x 40 mm x 3 mm (1½" x 1½" x 16ga) retaining angles all around duct, on both sides of fire separation.
- .2 Firestopping material and installation must not distort duct.
- .3 All ductwork passing through partition walls shall be firestopped.

2.9 KITCHEN EXHAUST SYSTEMS

- .1 Construct in accordance with ANSI/NFPA 96.
- .2 Material: Type 316 stainless steel sheet or carbon steel.
- .3 Clearance: 450 mm (18") to combustible materials or protected to NFPA 96 requirements.
- .4 Fabrication: as indicated.

2.10 HANGERS AND SUPPORTS

- .1 Band hangers: use on round and oval ducts only up to 500 mm (20") diameter, of same material as duct but next sheet metal thickness heavier than duct.
- .2 Trapeze hangers: ducts over 500 mm (20") diameter or longest side, to ASHRAE and SMACNA.
- .3 Hangers: galvanized steel angle with black steel rods to ASHRAE and SMACNA following table:

Duct Size mm (")	Angle Size mm (")	Rod Size mm (")
up to 750 (30)	25 x 25 x 3 (1 x 1 x 1/8)	6 (1/4)
>750 to 1050 (>30 to 42)	40 x 40 x 3 (1½ x 1½ x 1/8)	6 (1/4)
>1050 to 1500 (>42 to 60)	40 x 40 x 3 (1½ x 1½ x 1/8)	10 (3/8)
>1500 to 2100 (>60 x 84)	50 x 50 x 3 (2 x 2 x 1/8)	10 (3/8)
>2100 to 2400 (>84 x 96)	50 x 50 x 5 (2 x 2 x 1/8)	10 (3/8)
>2400 (96) and over	50 x 50 x 6 (2 x 2 x ¼)	10 (3/8)

- .4 Upper hanger attachments:
 - .1 For concrete: manufactured concrete inserts.
 - .1 Acceptable Manufacturers:
 - .1 Myatt fig. 485
 - .2 For steel joist: manufactured joist clamp or steel plate washer.
 - .1 Acceptable Manufacturers:
 - .1 Grinnell fig. 61 or 60
 - .3 For steel beams: manufactured beam clamps:
 - .1 Acceptable Manufacturers:
 - .1 Grinnell Fig. 60

Part 3 Execution

3.1 GENERAL

- .1 The following systems shall conform to these requirements:

System	Pressure	Class	Material
Individual Exhaust	+	A	Galvanized Steel/Aluminum
HVAC Supply and Return	+/-	B	Galvanized steel
Individual Exhaust	-	C	Galvanized steel/Aluminum
Commercial Kitchen Exhaust	+/-	Welded	Black Steel

- .2 Do work in accordance with ASHRAE and SMACNA.
- .3 Do not break continuity of insulation vapour barrier with hangers or rods.
- .4 Support risers in accordance with ASHRAE and SMACNA.
- .5 Install breakaway joints in ductwork on each side of fire separation.
- .6 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.
- .7 Manufacture duct in lengths to accommodate installation of acoustic duct lining.

3.2 HANGERS

- .1 Strap hangers: install in accordance with SMACNA.
- .2 Angle hangers: complete with locking nuts and washers.
- .3 Hanger spacing: in accordance with ASHRAE, SMACNA and as follows:

Duct Size	Spacing
mm (")	mm (")
to 1500 (60")	3000 (120")
over 1500 (60")	2500 (100")
- .4 Do not support ductwork over 250 mm x 250 mm (10" x 10") from roof deck.

3.3 KITCHEN EXHAUST SYSTEMS

- .1 Install to ANSI/NFPA 96 and as indicated.
- .2 Provide smoke test on exhaust ductwork and report to the engineer.
- .3 Provide smoke test on system to the local authorities' requirements.

3.4 SEALING

- .1 Apply sealant to outside of joint to manufacturer's recommendations.
- .2 Bed tape in sealant and recoat with minimum of 1 coat of sealant to manufacturers recommendations.

3.5 LEAKAGE TESTS

- .1 Co-ordinate leakage testing with TAB contractor **and commissioning agent**. TAB contractor will be responsible for all duct testing.
- .2 Duct to be tested in accordance with SMACNA HVAC Duct Leakage Test Manual.
- .3 Leakage tests to be done in sections.
- .4 Trial leakage tests to be performed as instructed to demonstrate workmanship.
- .5 Install no additional ductwork until trial test has been passed.
- .6 Test section to be minimum of 15 m (50'-0") long with not less than 3 branch takeoffs and two 90° elbows. Maximum test length and area to be determined by BAS testing equipment. Allow for twelve (12) tests.
- .7 Complete test before insulation or concealment.
- .8 Provide all necessary end caps and fittings as required for the TAB contractor. Remove same after successful completion of duct test.
- .9 Pressure test ductwork to 1½ times operating pressure (minimum pressure 500 Pa (2" wc) all systems).

3.6 CLEANING

- .1 Keep ducts clear from dust and debris
- .2 Keep duct liner clean from dust, debris, and moisture.
- .3 At completion of project vacuum ducts if dirt or dust is present.
- .4 Where new systems connect into existing systems the existing systems shall be cleaned and vacuumed prior to reconnection. **The extent of the cleaning shall be limited to the area immediately surrounding the new connection point.**
- .5 Ensure all systems are clean prior to start up.

3.7 ROOF MOUNTED DUCT SUPPORT

- .1 Provide zero penetration duct support on roof where indicated.
- .2 Base shall be made of high density polypropylene with UV protection.
- .3 Frames shall be galvanized. All fastenings, rods, nuts, washers, etc. shall be stainless steel.
- .4 Provide shop drawings as specified. Install to manufacturers recommendations.
- .5 Acceptable Manufacturers:
 - .1 Portable pipe hanger
 - .2 Bigfoot systems
 - .3 Trikon Systems

3.8 INSTALLATION REQUIREMENTS

- .1 All ductwork is to be protected from the weather and precipitation. The top and sides of all ductwork are to be completely covered with 6mil poly to the satisfaction of the consultant. Maintain protection of the ductwork until the building is made watertight and hollow cores drained. Tape all joints.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.
- .3 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.
- .4 ANSI/NFPA 96, Ventilation Control and Fire Protection of Commercial Cooking Operations.
- .5 CSA B228.1, Pipes, Ducts and Fittings for Residential Type Air Conditioning.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with general requirements.
- .2 Indicate the following:
 - .1 Flexible connections.
 - .2 Duct access doors.
 - .3 Turning vanes.
 - .4 Instrument test ports.

1.3 CERTIFICATION OF RATINGS

- .1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 GENERAL

- .1 Manufacture in accordance with CSA B228.1.

2.2 FLEXIBLE CONNECTIONS

- .1 Frame: galvanized sheet metal frame with fabric clenched by means of double locked seams.
- .2 Material:
 - .1 Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at -40°C (-40°F) to plus 90°C (194°F), density of 1.3 kg/m.

2.3 ACCESS DOORS IN DUCTS

- .1 Non-insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm (25 gauge) thick complete with sheet metal angle frame.
- .2 Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm (24 gauge) thick complete with sheet metal angle frame and 25 mm (1") thick rigid glass fibre insulation.
- .3 Gaskets: neoprene
- .4 Hardware:
 - .1 Up to 300 mm (12"): 2 sash locks
 - .2 301 mm to 450 mm (13" to 18"): 4 sash locks Complete with safety chain.
 - .3 451 mm to 1000 mm (19" to 40"): piano hinge and minimum 2 sash locks.
 - .4 Doors over 1000 mm (40"): piano hinge and 2 handles operable from both sides.
 - .5 Hold open devices.
- .5 Acceptable Manufacturers:
 - .1 Nailor
 - .2 E. H. Price
 - .3 Titus
- .6 **Provide access doors in kitchen exhaust duct with bolted cover to the requirements of NFPA and authority having jurisdiction.**

2.4 TURNING VANES

- .1 Factory or shop fabricated double thickness, to recommendations of SMACNA and as indicated.
- .2 Acceptable Manufacturers:
 - .1 Duro Dyne
 - .2 Ductmate

2.5 INSTRUMENT TEST PORTS

- .1 1.6 mm (16 gauge) thick steel zinc plated after manufacture.
- .2 Cam lock handles with neoprene expansion plug and handle chain.
- .3 28 mm (1 1/8") minimum inside diameter. Length to suit insulation thickness.
- .4 Neoprene mounting gasket.
- .5 Acceptable Manufacturers:
 - .1 Duro Dyne IP1 or IP2
 - .2 Duct mate

2.6 PREFABRICATED ROOF CURB

- .1 Construction: welded with exposed joints ground flush and smooth.
- .2 Material: 1.3 mm (18 gauge) galvanized steel with raised cant and wood nailer.
- .3 25 mm (1") insulation 3 lb density.
- .4 Acceptable Manufacturers:
 - .1 Greenheck GPR – 600 mm (24") high
 - .2 Penn

2.7 SPIN-IN COLLAR

- .1 Construction: galvanized straight or conical spin-in collar complete with spin-in bead and crimped collar connection.
- .2 Provide balancing damper where indicated.
- .3 Acceptable Manufacturers:
 - .1 Ecco Manufacturing
 - .2 Flex Master

Part 3 Execution

3.1 INSTALLATION

- .1 Flexible connections:
 - .1 Install in following locations:
 - .1 Inlets and outlets to supply air units and fans. (Unless internally isolated)
 - .2 Inlets and outlets of exhaust and return air fans.
 - .3 As indicated.
 - .2 Length of connection: 100 mm (4").
 - .3 Minimum distance between metal parts when system in operation: 75 mm (3").
 - .4 Install in accordance with recommendations of SMACNA.
 - .5 When fan is running:
 - .1 Ducting on each side of flexible connection to be in alignment.
 - .2 Ensure slack material in flexible connection.

- .2 Access doors and viewing panels:
 - .1 Size:
 - .1 600 mm x 600 mm (24" x 24") for person size entry.
 - .2 600 mm x 1000 mm (24" x 40") for servicing entry.
 - .3 300 mm x 300 mm (12" x 12") for viewing.
 - .4 As indicated.
 - .2 Location:
 - .1 At fire and smoke dampers.
 - .2 At control dampers.
 - .3 At devices requiring maintenance.
 - .4 At locations required by code.
 - .5 At inlet and outlet of reheat coils.
 - .6 Elsewhere as indicated.
 - .7 Inlet and outlet of duct mounted coils.
- .3 Instrument test ports.
 - .1 General:
 - .1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
 - .2 Locate to permit easy manipulation of instruments
 - .3 Install insulation port extensions as required.
 - .4 Locations.
 - .1 For traverse readings:
 - .1 At ducted inlets to roof and wall exhausters.
 - .2 At inlets and outlets of other fan systems.
 - .3 At main and sub-main ducts.
 - .4 And as indicated.
 - .2 For temperature readings:
 - .1 At outside air intakes.
 - .2 In mixed air applications in locations as approved by Consultant.
 - .3 At inlet and outlet of coils.
 - .4 Downstream of junctions of two converging air streams of different temperatures.
 - .5 And as indicated.
- .4 Turning vanes:
 - .1 Install in accordance with recommendations of SMACNA and as indicated.
 - .2 Install on supply ducts only.

3.2 WARRANTY

- .1 Warranty Start Date:
 - .1 Warranty period starts as of the date of Ready for Takeover.
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .2 Warranty Duration:
 - .1 Two (2) year warranty period applies.
- .3 Warranty Coverage:
 - .1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with general requirements
- .2 Indicate the following: performance data.

Part 2 Products

2.1 GENERAL

- .1 Manufacture to SMACNA standards.

2.2 SINGLE BLADE DAMPERS

- .1 Of same material as duct, but one sheet metal thickness heavier. V-groove stiffened, minimum 1.6 mm (16 gauge).
- .2 Size and configuration to recommendations of SMACNA, except maximum height 100 mm (4").
- .3 Shaft extension to accommodate insulation thickness and locking quadrant.
- .4 Inside and outside nylon end bearings.
- .5 Channel frame of same material as adjacent duct, complete with angle stop.

2.3 MULTI-BLADED DAMPERS

- .1 Factory manufactured of material compatible with duct.
- .2 Opposed blade: configuration, metal thickness and construction to recommendations of SMACNA.
- .3 Maximum blade height:
 - .1 50 mm (2") up to 375 mm (15") high duct.
 - .2 100 mm (4") max 400 mm (16") high duct and over.
- .4 Bearings: self-lubricating nylon.
- .5 Linkage: shaft extension with locking quadrant.
- .6 Channel frame of same material as adjacent duct, complete with angle stop.
- .7 **Shaft extension to accommodate insulation thickness and locking quadrants.**

.8 Acceptable Manufacturers:

- .1 Duro Dyne
- .2 E.H. Price
- .3 Nailor
- .4 T.A. Morrison
- .5 Tamco
- .6 Ruskin
- .7 Ventex/Alumavent
- .8 United Enertech

2.4 LOCKING QUADRANTS

- .1 6 mm (1/4") dial regulator with square bearing shaft.
 - .1 18 gauge oval frame, cadmium plated, clearly shows damper position.
 - .2 18 gauge formed handle for easy adjustment.
 - .3 Bolt and wing nut lock damper securely.
 - .4 Offset mounting holes avoid interference with damper movement and mechanical fastening to duct.
- .2 9 mm (3/8") and larger: clamp quadrant with square bearing shaft.
 - .1 Accommodates and securely locks square rod, bearing fitting and adaptor pins.
 - .2 Heavily ribbed 16 gauge steel frame, 3 mm (1/8") thick formed steel handle, cadmium-plated.
 - .3 By tightening nut, bearing is securely locked in handle, preventing slippage and rattle.
 - .4 Neoprene and steel washer assembly seals bearing opening to eliminate air-leakage.
 - .5 Screw holes for mechanically fastening to ductwork.
- .3 High pressure system locking quadrant:
 - .1 Airtight, rattle-proof regulator, designed for ZERO leakage at high pressure. Use for applications up to 500°F constant temperature.
 - .2 Handle design for easy recognition of damper position.
 - .3 Heavy-gauge, zinc-plated steel, 2 high temperature rubber seals and washers, end bearing support, and 2 end bearings. Pressure loss and damper rattle in ductwork has been a constant annoyance for as long as HVAC ductwork has been installed. Now, a truly air-tight, rattle-proof regulator is available. The SPEC-SEAL regulator utilizes a special high-temperature rubber seal to eliminate leakage and rattle even at many times the pressure found in high pressure.

- .4 Soft, comfortable grip handle with a highly-visible, plastic cover which indicates the damper position.
- .5 Handle to accommodate 9 mm (3/8") or 12 mm (1/2") to match damper shaft size, square and round bearing shafts.
- .4 Acceptable Manufacturers:
 - .1 Duro Dyne
 - .2 Ductmate
 - .3 Pottorff

Part 3 Execution

3.1 INSTALLATION

- .1 Install where indicated.
- .2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
- .3 For supply, return and exhaust systems, locate balancing dampers in each branch duct.
 - .1 Single blade dampers up to 200 mm (8").
 - .2 Multi-blade dampers over 200 mm (8").
- .4 Runouts to registers and diffusers: install single blade damper located as close as possible to main ducts.
- .5 All dampers to be vibration free.
- .6 Leave all dampers in open position for T.A.B.
- .7 Fasten locking quadrants to ductwork and shaft.
- .8 Place locking quadrants on standoffs where ductwork insulated.
- .9 Lock down quadrant arm in the open position.

3.2 WARRANTY

- .1 Warranty Start Date:
 - .1 Warranty period starts as of the date of Ready for Takeover.
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .2 Warranty Duration:
 - .1 One (1) year warranty period applies.
- .3 Warranty Coverage:
 - .1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.
- .3 CAN/ULC-S112, Standard Method of Fire Test of Fire Damper Assemblies.
- .4 CAN/ULC-S112.1, Standard Method of Fire Test of Ceiling Firestop Flap Assemblies.
- .5 ULC-S505, Fusible Links for Fire Protection Service.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with general requirements.
- .2 Indicate the following:
 - .1 Fire dampers.
 - .2 Operators.
 - .3 Firestop flaps.
 - .4 Fusible links.

1.3 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements.

1.4 MAINTENANCE MATERIALS

- .1 Provide the following:
 - .1 Six (6) fusible links of each type.

1.5 CERTIFICATION OF RATINGS

- .1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 FIRE DAMPERS (STATIC)

- .1 Fire dampers: arrangement as indicated, listed and bear label of ULC, meet requirements of provincial fire authority and authorities having jurisdiction. Fire damper assemblies to be fire tested in accordance with CAN/ULC-S112.

- .2 Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.
- .3 Top hinged: offset single damper, round or square; multi-blade hinged or interlocking type; guillotine type; sized to maintain full duct cross section.
- .4 Fusible link actuated, weighted to close and lock in closed position when released or having negator-spring-closing operator for multi-leaf type or roll door type in horizontal position with vertical air flow.
- .5 40 mm x 40 mm x 3 mm (1½" x 1½" x 16ga) retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.
- .6 Acceptable Manufacturers:
 - .1 Ruskin
 - .2 Nailor
 - .3 E.H. Price
 - .4 T.A. Morrison
 - .5 Tamco
 - .6 Ventex/Alumavent
 - .7 United Enertech
 - .8 Safeair-Dowco (stainless steel)
 - .9 Greenheck
 - .10 Pottorff

2.2 FIRE DAMPERS (DYNAMIC)

- .1 Multi blade or roll type, fire damper suitable for HVAC system velocities up to 2000 fpm (610 m/mm), dual direction air flow, max 4" wg pressure.
- .2 Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.
- .3 Top hinged: offset single damper, round or square; multi-blade hinged or interlocking type; guillotine type; sized to maintain full duct cross section.
- .4 Stainless closure spring to positively close damper upon fusible link release, for horizontal or vertical orientations.
- .5 Linkage concealed in frame.
- .6 40 mm x 40 mm x 3 mm (1½" x 1½" x 16ga) retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.
- .7 Fire damper assemblies and type to meet requirements of provincial fire authority and authority having jurisdiction.

- .8 Acceptable Manufacturers:
 - .1 Ruskin
 - .2 Nailor
 - .3 E.H. Price
 - .4 T.A. Morrison
 - .5 Tamco
 - .6 Greenheck
 - .7 Ventex/Alumavent
 - .8 Pottorff

Part 3 Execution

3.1 INSTALLATION

- .1 Provide where indicated and at all fire rated partitions indicated, on architectural drawing.
- .2 Install in accordance with ANSI/NFPA 90A and in accordance with conditions of ULC listing.
- .3 Maintain integrity of fire separation.
- .4 After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.
- .5 Install access door adjacent to each damper.
- .6 Coordinate with installer of firestopping.
- .7 Static fire dampers: Only on transfer air ducts where ductwork is not connected to a fan/blower.
- .8 Dynamic fire dampers: In all duct work where air is moved by a fan/blower.

3.2 WARRANTY

- .1 Warranty Start Date:
 - .1 Warranty period starts as of the date of Ready for Takeover.
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .2 Warranty Duration:
 - .1 Two (2) year warranty period applies.

**TENDER NO. 26-7875-RFT
GRAND RIVER C.I. RENO
KITCHENER, ON
PROJECT NO. 25-092**

FIRE DAMPERS

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.3 Warranty Coverage:

.1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 CODES AND STANDARDS

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.
- .3 CAN/ULC-S112, Standard Method of Fire Test of Fire Damper Assemblies.
- .4 CAN/ULC-S112.1, Standard Method of Fire Test of Ceiling Firestop Flap Assemblies.
- .5 ULC-S505, Fusible Links for Fire Protection Service.
- .6 CAN/ULC-S524, Installation of Fire Alarm Systems
- .7 CAN/ULC-S1001.11, Integrated Systems Testing of Fire Protection and Life Safety Systems.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with general requirements indicating the following:
 - .1 Damper type
 - .2 Operators
 - .3 Fusible links
 - .4 Smoke detectors
 - .5 Power requirements
 - .6 Size, orientation, construction

1.3 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements.

1.4 MAINTENANCE MATERIALS

- .1 Provide the following:
 - .1 Six (6) fusible links of each type.

1.5 CERTIFICATION OF RATINGS

- .1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 SMOKE DAMPERS

- .1 Provide a complete system, consisting of the damper, damper actuator, smoke detector with duct sample tube, sleeve and all other components necessary for a complete and operable system. **The assembly shall be factory assembled as a single unit.** Field assembly shall be permitted at contractor discretion provided all listings are maintained and the installation follows all manufacturer installation guidelines.
- .2 Damper
 - .1 Damper shall be ULC listed and labelled
 - .2 Both damper and damper actuator to be ULC listed and labelled.
 - .3 Normally closed smoke/seal: folding blade type. Blade edge seals of flexible stainless steel shall provide required constant sealing pressure. Stainless steel negator springs with locking devices shall ensure positive closure for units.
 - .4 Damper shall have Class I leakage rating.
 - .5 Suitable for horizontal or vertical installations.
 - .6 Damper Material: Damper material shall match ductwork it is installed in (i.e., stainless steel in laboratory). Refer to specification section 23 31 13 Metal Ducts.
- .3 Actuator
 - .1 Actuator shall be ULC listed and labelled
 - .2 Motorized actuator: 2-position, spring return, normally open with power on. When power is interrupted damper shall close automatically. Upon return of power, damper shall automatically reset open. Actuators are to be located outside of airstream, unless otherwise specified or shown on drawings.
 - .3 Exterior visualization of damper position.
 - .4 Damper actuator end switches for monitoring damper position by the BAS.
- .4 Factory sleeve.
 - .1 Type and style: matching application.
- .5 Operating Temperature: 0° Celsius to 99° Celsius ambient temperature rating for 300 fpm to 4000 fpm air velocity.
- .6 Smoke Detector:
 - .1 ULC approved photoelectric duct smoke detector.
 - .2 Operates from 300 to 3000 ft/min air velocity (fan system), -4 to 158°F temperature, and 0 to 95% non-condensing humidity.
 - .3 Operates from 100 to 4000 ft/min air velocity, -4 to 158°F temperature and 0 – 95% non-condensing humidity (transfer ducts).
 - .4 Test/reset button with LED display.

- .5 The detector housing shall be ULC listed specifically for use in air handling systems; capable of local testing via magnetic switch and test button; duct mounted smoke detector with sampling tube, housing.
- .6 The detector shall incorporate separate 2.0A 30VDC Alarm and Supervisory contacts. Alarm contacts shall be normally open (N.O.) in which closed contacts will indicate an alarm condition to the fire alarm panel. Supervisory contacts shall be normally closed (N.C.) in which open contacts will indicate a trouble condition to the fire alarm panel.
- .7 Damper assembly to operate at 120V with single point power connection.
- .8 Large damper sizes can be provided in multiple sections. Field assembly is acceptable following manufacturer's installation guidelines.
- .9 Size: as indicated on drawings.
- .10 Detectors and electrical components within the airstream shall be classified for use in a Class I, Zone 2 system (as defined by the Electrical Safety Code).
- .11 Acceptable Manufacturers:
 - .1 E H Price
 - .2 NCA Ltd.
 - .3 Nailor Industries Inc.
 - .4 Ruskin
 - .5 Alumavent
 - .6 United Enertech
 - .7 Safeair-Dowco (stainless steel)
 - .8 Pottorff

2.2 COMBINATION FIRE AND SMOKE DAMPERS

- .1 Provide a complete system, consisting of the damper, damper actuator, smoke detector with duct sampling tube, sleeve and all other components necessary for a complete and operable system. **The assembly shall be factory assembled as a single unit.** Field assembly shall be permitted at contractor discretion provided all listings are maintained and the installation follows all manufacturer installation guidelines.
- .2 Damper
 - .1 Damper shall be ULC listed and labelled
 - .2 Both damper and damper actuator to be ULC listed and labelled.
 - .3 Normally closed smoke/seal: folding blade type. Blade edge seals of flexible stainless steel shall provide required constant sealing pressure. Stainless steel negator springs with locking devices shall ensure positive closure for units.
 - .4 Damper shall have Class I leakage rating.
 - .5 Suitable for horizontal or vertical installations.

- .6 Damper Material: Damper material shall match ductwork it is installed in (i.e., stainless steel in laboratory). Refer to specification section 23 31 13 Metal Ducts.
- .3 Actuator/Link
 - .1 Actuator shall be ULC listed and labelled
 - .2 Motorized actuator: 2-position, spring return, normally open with power on. When power is interrupted damper shall close automatically. Upon return of power, damper shall automatically reset open. Actuators are to be located outside of airstream, unless otherwise specified or shown on drawings.
 - .3 Exterior visualization of damper position.
 - .4 Damper actuator end switches for monitoring damper position by the BAS.
 - .5 Combined actuator: electrical control system actuated from smoke sensor or smoke detection system and from fusible link.
 - .6 Fusible link, or electric re-settable link (ERL).
 - .7 Electric fire sensor capable of remote openable control is to be provided in place of fusible link where specifically indicated in project documents.
 - .8 Where ERL or electric fire sensor is used in place of fusible link, this device shall fail closed upon power failure.
- .4 Factory sleeve.
 - .1 Type and style: matching application.
- .5 Operating Temperature: 0° Celsius to 99° Celsius ambient temperature rating for 300 fpm to 4000 fpm air velocity.
- .6 Smoke Detector:
 - .1 ULC approved photoelectric duct smoke detector;
 - .2 Operates from 300 to 3000 ft/min air velocity (fan systems), -4 to 158°F temperature, and 0 to 95% non-condensing humidity;
 - .3 Operates from 100 to 4000 ft/min air velocity, -4 to 158°F temperature and 0 – 95% non-condensing humidity (transfer ducts)
 - .4 Test/reset button with LED display;
 - .5 The detector housing shall be ULC listed specifically for use in air handling systems; capable of local testing via magnetic switch and test button; duct mounted smoke detector with sampling tube, housing
 - .6 The detector shall incorporate separate 2.0A 30VDC Alarm and Supervisory contacts. Alarm contacts shall be normally open (N.O.) in which closed contacts will indicate an alarm condition to the fire alarm panel. Supervisory contacts shall be normally closed (N.C.) in which open contacts will indicate a trouble condition to the fire alarm panel.
- .7 Damper assembly to operate at 120V with single point power connection.

- .8 Large damper sizes can be provided in multiple sections. Field assembly is acceptable following manufacturer's installation guidelines.
- .9 Fire rating to match wall assembly i.e. 1 hour/1 ½ hour/2 hour/ 3 hour.
- .10 Size: as indicated on drawings.
- .11 Detectors and electrical components within the airstream shall be classified for use in a Class I, Zone 2 system (as defined by the Electrical Safety Code).
- .12 Acceptable Manufacturers:
 - .1 E H Price
 - .2 NCA Ltd.
 - .3 Nailor Industries Inc.
 - .4 Ruskin
 - .5 Alumavent
 - .6 United Enertech
 - .7 Pottorff
 - .8 Safeair-Dowco (stainless steel)
 - .9 Pottorff

2.3 LOCATION OF SMOKE DETECTORS

- .1 Ontario Building Code Section 3.1.8.11 requires the smoke detector to be installed downstream of the damper.
- .2 Ship units to site to suit supply or return/exhaust configuration.
- .3 The contractor shall be responsible to cover all costs of a qualified Electrician/Fire Alarm Technician should field relocation of the damper components be required.

2.4 TRANSFER DUCTS

- .1 In accordance with OBC 3.1.8.11, provide secondary smoke detector at all transfer ductwork. Smoke detector shall be installed on both sides of rated separation.
- .2 This contractor shall be responsible to cover all costs of a qualified Electrician/Fire alarm Technician to field supply, install, and wire the secondary detectors.
- .3 This contractor shall extend transfer ductwork and acoustic lining to facilitate proper installation and clearance requirements.

2.5 NUMBER OF AIR TYPE SMOKE DETECTORS

- .1 Where air velocities are greater than 1.5 m/s (300 feet per second), one air duct type detector shall be installed for every 1.5 meters square (16 square feet) of cross-sectional duct area.

- .2 Where air velocities are less than 1.5 m/s (300 feet per second), one duct type smoke detector shall be installed for every 0.5 meters square (5.3 square feet) or cross-sectional duct area.

2.6 PRESSURE RELIEF DOORS

- .1 Frames shall be Z-shape, 12 gage (2.8) galvanized steel.
- .2 Door shall be 12 gage (2.8) galvanized steel, hinged on one side.
- .3 Seal shall be around the door perimeter allowing no more than 7 cfm/ft² at 1.0 inch w.g..
- .4 Door shall include stainless steel springs to close door upon pressure relief and system shutdown.
- .5 All release mechanisms, springs and parts shall be completely out of airstream.
- .6 Pressure relief settings available from 2" (0.5 kPa) to 10" (2.49 kPa) increments of 1" w.g. (0.25 kPa). Supplier shall examine plans to provide appropriate pressure relief based on associated air handling system.
- .7 Pressure relief mechanism shall be factory calibrated in an AMCA Registered Laboratory.
- .8 Pressure Relief Doors shall be provided as indicated in the execution section.

Part 3 Execution

3.1 INSTALLATION

- .1 Provide smoke dampers where indicated and at all duct penetrations through smoke barrier partitions indicated on architectural drawings.
- .2 Provide combination fire and smoke dampers where indicated and at all duct penetrations through fire rated smoke barrier partitions indicated on architectural drawings. To provide separated fire dampers and smoke dampers, obtain approval from the consultant for the alternate arrangement.
- .3 Provide pressure relief doors (both positive and negative as applicable) as follows:
 - .1 For all systems with a combination fire smoke or smoke damper in the duct main of the system when:
 - .1 The system operates at static pressure of 1.0 inches w.g. or higher; and
 - .2 More than 50% of the system airflow passes through the combination fire/smoke or smoke damper.
 - .2 Where/as indicated on the plans.
- .4 Install in accordance with ANSI/NFPA 90A, in accordance with conditions of ULC listing and manufacturer's recommendation.
- .5 Maintain integrity of smoke separation and fire rating.

- .6 After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.
- .7 Install access door adjacent to each damper and smoke detector.
- .8 Front grille access for through wall dampers that terminate in a grille is acceptable.
- .9 Provide proper firestopping and duct seal to fire barrier wall.
- .10 Confirm proper operation and test sheets.
- .11 Should contractor provide separated devices mount smoke detector downstream of damper and within 1.5 m (5 ft) of damper.
- .12 Ensure access doors/panels, fusible links, damper actuators and sensors are easily observed and accessible.

3.2 LOCATION OF SMOKE DETECTORS

- .1 Ontario Building Code Section 3.1.8.11 requires the smoke detector to be installed downstream of the damper.
- .2 Ship units to site to suit supply or return/exhaust configuration.
- .3 The contractor shall be responsible to cover all costs of a qualified Electrician/Fire Alarm Technician should field relocation of the damper components be required.

3.3 TRANSFER DUCTS

- .1 In accordance with OBC 3.1.8.11, provide secondary smoke detector at all transfer ductwork. Smoke detector shall be installed on both sides of rated separation.
- .2 This contractor shall be responsible to cover all costs of a qualified Electrician/Fire alarm Technician to field supply, install, and wire the secondary detectors.
- .3 This contractor shall extend transfer ductwork and acoustic lining to facilitate proper installation and clearance requirements.

3.4 PROTECTION

- .1 Contractor is to ensure all fire smoke dampers detectors are protected from dust, dirt, humidity, and water at all times during construction. This applies to detectors installed, stored on site or stored in storage containers. Contractor shall seal all open-ended ductwork on site at all times. Failure to properly protect dampers, ductwork and detectors will result in the Contractor cleaning all dampers and ductwork. Any detectors that are damaged or dirty shall be replaced at the contractor's expense.

3.5 WIRING

- .1 All fire alarm wiring shall be 1 hour rated and in conduit or as per electrical fire alarm wiring requirement.

3.6 DAMPER POSITION MONITORING

- .1 In all cases the BAS contractor shall monitor the damper actuator end switches i.e. “closed position and open position”.**

3.7 CLEANING

- .1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools, and equipment.**

3.8 INTEGRATED LIFE SAFETY SYSTEMS TESTING

- .1 Prior to the building Integrated Life Safety Systems Testing the mechanical contractor shall commission/verify the operation of all installed smoke dampers.**
- .2 Participate in the Integrated Life Safety Systems Testing to confirm proper operation of all operating smoke dampers and associated Life Safety Systems (i.e. fire alarm).**
- .3 This contractor shall work with the Integrated Life Safety Contractor and reset all systems back into proper operation.**
- .4 Include all costs associated with participation Integrated Life Safety System Testing in the tender value.**

3.9 WARRANTY

- .1 Warranty Start Date:**
 - .1 Warranty period starts as of the date of Ready for Takeover.**
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.**
- .2 Warranty Duration:**
 - .1 Two (2) year warranty period applies.**
- .3 Warranty Coverage:**
 - .1 Applies to parts and labour.**

END OF SECTION

Part 1 General

1.1 GENERAL

- .1 This section applies to operating dampers not specified in Controls Section.

1.2 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.3 PRODUCT DATA

- .1 Submit product data in accordance with general requirements.
- .2 Indicate the following:
 - .1 Performance data.

1.4 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements.

1.5 CERTIFICATION OF RATINGS

- .1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency.

Part 2 Products

2.1 MOTORIZED DAMPERS

- .1 Opposed blade type.
- .2 Extruded aluminum, interlocking blades, complete with extruded vinyl seals, spring stainless steel side seals, extruded aluminum frame.
- .3 Pressure fit self-lubricated bronze bearings.
- .4 Linkage: plated steel tie rods, brass pivots and plated steel brackets, complete with plated steel control rod.
- .5 Operator: Refer to BAS Section.

- .6 Performance:
 - .1 Leakage: in closed position to be less than 2% of rated air flow at 250 Pa (1" w.c.) differential across damper.
 - .2 Pressure drop: at full open position to be less than 10 Pa (0.04" w.c.) differential across damper.
- .7 Insulated aluminum dampers:
 - .1 Frames: insulated with extruded polystyrene foam with R factor of 5.0.
 - .2 Blades: constructed from aluminum extrusions with internal hollows insulated with polyurethane or polystyrene foam, R factor of 5.0.
 - .3 Use on services to the exterior.
 - .4 Acceptable Manufacturers:
 - .1 Honeywell
 - .2 Johnson
 - .3 T. A. Morrison
 - .4 E.H. Price
 - .5 Tamco
 - .6 Ruskin
 - .7 Nailor
 - .8 Henderson Industrial
 - .9 Ventex/Alumavent
 - .10 Pottorff

2.2 BACK DRAFT DAMPERS

- .1 Automatic gravity operated, multi leaf, aluminum construction with nylon bearings, centre pivoted or counterweighted, as indicated.
- .2 Acceptable Manufacturers:
 - .1 T.A. Morrison
 - .2 Tamco Series 7000
 - .3 Ruskin
 - .4 Nailor
 - .5 E.H. Price
 - .6 Henderson Industrial
 - .7 Ventex/Alumavent
 - .8 Pottorff

2.3 STANDALONE GENERATOR DAMPER CONTROL THERMOSTAT

- .1 Thermostat to be microprocessor-based proportional and integral devices with analog 0 to 10 Vdc output.
- .2 Acceptable Manufacturers:
 - .1 Viconics T920 D-C
 - .2 Belimo
 - .3 Pottorff

Part 3 Execution

3.1 INSTALLATION

- .1 Install where indicated.
- .2 Install in accordance with recommendations of SMACNA and manufacturer's instructions.
- .3 Seal multiple damper modules with silicon sealant.
- .4 Install access door adjacent to each damper. See Duct Accessories Section.
- .5 Insulated dampers on all outside air intake and exhaust damper.
- .6 Non-insulated dampers on all interior motorized dampers not exposed to outside air.

3.2 WARRANTY

- .1 Warranty Start Date:
 - .1 Warranty period starts as of the date of Ready for Takeover.
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .2 Warranty Duration:
 - .1 Two (2) year warranty period applies.
 - .2 Disk type dampers gasket: Ten (10) years warranty.
- .3 Warranty Coverage:
 - .1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 CAN/ULC-S110, Standard Methods of Test for Air Ducts.
- .3 UL 181, Factory Made Air Ducts and Air Connectors.
- .4 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.
- .5 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.
- .6 SMACNA HVAC Duct Construction Standards - Metal and Flexible.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with general requirements.
- .2 Indicate the following:
 - .1 Thermal properties.
 - .2 Friction loss.
 - .3 Acoustical loss.
 - .4 Leakage.
 - .5 Fire rating.

1.3 CERTIFICATION OF RATINGS

- .1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 GENERAL

- .1 Factory fabricated to CAN/ULC S110.
- .2 Pressure drop coefficients listed below are based on relative sheet metal duct pressure drop coefficient of 1.00.
- .3 Flame spread rating not to exceed 25. Smoke developed rating not to exceed 50.

2.2 METALLIC – UNINSULATED

- .1 Spiral wound flexible aluminum, Class 1 duct material.

- .2 Performance:
 - .1 Factory tested to 2.5 kPa (10" w.c.) without leakage.
 - .2 Maximum relative pressure drop coefficient: 3.
 - .3 Operating pressure: 300 mm (12").
- .3 Acceptable Manufacturers:
 - .1 Flexmaster T/L
 - .2 Ductmate

2.3 METALLIC –INSULATED

- .1 Spiral wound flexible aluminum with factory applied, 25 mm (1") thick flexible glass fibre thermal insulation with vapour barrier and vinyl jacket, Class 1 duct material.
- .2 Performance:
 - .1 Factory tested to 2.5 kPa (10" w.c.) without leakage.
 - .2 Maximum relative pressure drop coefficient: 3.
 - .3 Operating pressure: 300 mm (12").
- .3 Acceptable Manufacturers:
 - .1 Flexmaster T/L – VT
 - .2 Ductmate

Part 3 Execution

3.1 DUCT INSTALLATION

- .1 Install in accordance with: SMACNA.
- .2 Maximum length of flexible duct: 1.8 m (6' 0").
- .3 Minimum length of acoustical ductwork; 1.5 m (5' 0") with minimum of 1 bend.
- .4 Provide support at centre of flexible duct with 25 mm (1") wide galvanized hanger.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.
- .3 ASTM C1071 Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).
- .4 ASTM C916 Standard Specification for Adhesive for Duct Thermal Insulation.
- .5 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.
- .6 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with general requirements.

Part 2 Products

2.1 RECTANGULAR/SQUARE DUCT LINER

- .1 General:
 - .1 Acoustical duct liner to be fibreglass duct liner meeting or exceeding requirements of ASTM C1071, Type I, Flexible or Type II, Rigid, and NFPA 90A/90B.
 - .2 Bonded with formaldehyde free bio-based binder
 - .3 Mat faced airstream surface
 - .4 Factory applied edge coating
 - .5 Shall not contain formaldehyde, PBDE's, asbestos, mercury, mercury compounds, lead, contain 50% or greater recycled glass content.
 - .6 Thermal conductivity, ASTM C177/C518/C1114 .24BTU (sf•hr•°F) @ 75°F mean temp).
 - .7 Noise Reduction Coefficient (NRC) 1.5 PCF 1" = .70, 1 ½ " = .80, 2" =.95
ASTM C423, Type A mounting.
 - .8 Noise Reduction Coefficient (NRC) 2.0 PCF 1/2" = .50, 1" = .70, 1 ½ " = .85
ASTM C423, Type A mounting
 - .9 Corrosiveness/corrosion, ASTM C665/C1617. Does not accelerate/pass.
 - .10 Mold and mildew growth/fungi resistance, ASTM C1338, ASTM G21/G22, UL2824. Pass/resistant to mold.
 - .11 Maximum service temperature, ASTM C411, 250°F (121°C).

- .12 Maximum rate air velocity, ASTM C1071, 6,000 ft./min. (30.5 m/sec.)
- .13 Water vapor sorption, ASTM C1104, less than 3%.
- .14 Surface burning characteristics, ASTM E84, UL 273, CAN/ULC S102, 20/50 flame spread/smoke development.
- .15 Acceptable Manufacturers:
 - .1 Knauf Atmosphere Duct Liner
 - .2 Manson
 - .3 Johns Manville
 - .4 Owen Corning
- .2 Rigid:
 - .1 Use on flat surfaces.
 - .2 25 mm (1") thick, to CGSB 51-GP-10M, fibrous glass rigid board duct liner.
 - .3 Density: 96 kg/m³ (6 lb/ft³).

2.2 ADHESIVE

- .1 Meet requirements of ASTM C916.
- .2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50. Temperature range -29°C (-20°F) to 93°C (200°F).
- .3 Acceptable Manufacturers:
 - .1 Duro Dyne 1A-22
 - .2 Ductmate

2.3 FASTENERS

- .1 Weld pins 2.0 mm (14 gauge) diameter, length to suit thickness of insulation. Metal retaining clips, 32 mm (1¼") square.
- .2 Acceptable Manufacturers:
 - .1 Duro Dyne
 - .2 Ductmate

2.4 JOINT TAPE

- .1 Poly-Vinyl treated open weave fiberglass membrane 50 mm (2") wide.
- .2 Acceptable Manufacturers:
 - .1 Duro Dyne FT2
 - .2 Ductmate

2.5 SEALER

- .1 Meet requirements of ANSI/NFPA 90A and ANSI/NFPA 90B.
- .2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50. Temperature range -68°C (-90°F) to 93°C (200°F).
- .3 Acceptable Manufacturers:
 - .1 Duro Dyne 1A-94
 - .2 Ductmate

Part 3 Execution

3.1 GENERAL

- .1 Do work in accordance with recommendations of MAIMA Fibrous Glass Duct Liner Standards (FGDLS) or SMACNA duct liner standards.
- .2 Line inside of ducts where indicated.
- .3 Duct dimensions, as indicated, are clear inside duct lining.
- .4 Provide an interior of ductwork from fans from minimum distance of 3 m (10'-0").

3.2 DUCT LINER

- .1 Install in accordance with manufacturer's recommendations, and as follows:
 - .1 Fasten to interior sheet metal surface with 100% coverage of adhesive.
 - .2 In addition to adhesive, install weld pins not less than 2 rows per surface and not more than 300 mm (12") on centres.
- .2 Weld pins are to have cupped or beveled heads to prevent damage to lining surface.
- .3 Store foam liners away from sunlight.

3.3 JOINTS

- .1 Seal all butt joints, exposed edges, weld pin and clip penetrations and all damaged areas of liner with joint tape and sealer. Install joint tape in accordance with manufacturer's recommendations, and as follows:
 - .1 Bed tape in sealer.
 - .2 Apply 2 coats of sealer over tape.
- .2 Replace damaged areas of liner at discretion of Consultant.
- .3 Protect leading and trailing edges of each duct section with sheet metal nosing having 15 mm (1/2") overlap and fastened to duct.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 AMCA 99, Standards Handbook.
- .3 ANSI/AMCA 210, Laboratory Methods of Testing Fans for Certified Aerodynamics Performance Rating.
- .4 AMCA 300, Revised 1987, Reverberant Room Method for Sound Testing of Fans.
- .5 AMCA 301, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
- .6 ANSI/ASHRAE 51, Laboratory Methods of Testing Fans for Certified Aerodynamics Performance Rating.
- .7 ANSI/NFPA 96 – Ventilation Control and Fire Protection of Commercial Cooking Operations.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with general requirements.
- .2 Product data to include fan curves and sound rating data.

1.3 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for incorporation into manual specified in general requirements.

1.4 CERTIFICATION OF RATINGS

- .1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered from independent testing agency signifying adherence to codes and standards in force.
- .2 Provide confirmation of testing.

Part 2 Products

2.1 FANS GENERAL

- .1 Capacity: Flow rate, total static pressure Pa, r/min, W (" w.c., r/min, bhp) model and size and sound ratings as indicated on schedule.
- .2 Statically and dynamically balanced. Constructed in conformity with AMCA 99.
- .3 Sound ratings: Comply with AMCA 301, tested to AMCA 300.

- .4 Performance ratings: Based on tests performed in accordance with ANSI/AMCA 210, and ANSI/ASHRAE 51.
- .5 Bearings: Sealed lifetime of self aligning type with oil retaining, dust excluding seals and a certified minimum rated life of 80,000 100,000 h in accordance with AFBMA L10 life standard. Bearings to be rated and selected in accordance with AFBMA 9 and AFBMA 11.
- .6 Provide vibration isolation hangers/pads for all fans.
- .7 Electrical components and motors within the airstream shall be classified for use in a Class I, Zone 2 system (as defined by the Electrical Safety Code) when connected to ductwork systems served by refrigerant containing air handling systems.
- .8 Provide factory mounted speed control for all direct drive motors.
- .9 Acceptable Manufacturers:
 - .1 Greenheck
 - .2 Penn-Barry
 - .3 Cook
 - .4 Carnes
 - .5 Acme
 - .6 Nutone (Range hood)
 - .7 Broan (Range hood)

2.2 ROOF EXHAUSTERS – UTILITY SET

- .1 Centrifugal V belt or direct driven as indicated.
 - .1 Housing: Galvanized steel [coated steel] housing with motor enclosure.
 - .2 Impeller: Centrifugal backward inclined aluminum wheel.
 - .3 Adjustable motor sheave (for belt drive). Provide with speed controller (for direct drive).
 - .4 15 mm (1/2") mesh 2.0 mm (79 mil) diameter aluminum birdscreen.
 - .5 Automatic gasketted aluminum backdraft dampers.
 - .6 Disconnect switch within fan housing.
 - .7 Continuous curb gaskets, cadmium plated securing bolts and screw, and sound insulating.
- .2 Roof curbs: of same manufacturer as fan. Built to suit duct penetration of roof. Roof curbs for NFPA 96 duct penetrations are to be vented.
- .3 Sleepers: Built-up sleepers, height as required (not less than 150 mm above finished roof), properly flashed and roofed into roofing system.
- .4 Vibration isolators: Suitably sized for weight of fan.

- .5 Size, type, and capacity: As indicated.
- .6 To NFPA 96 requirements where indicated.
- .7 Provide vibration isolators, inertia base, and flexible connection on downstream side of indoor mounted utility set fans.

2.3 RANGE HOOD EXHAUST FANS (USE WITH GUARDIAN FIRE SYSTEM ONLY)

- .1 Centrifugal direct drive 750 mm (30") wide, suitable for under cabinet installation, enamel steel metal housing complete with single 75 W LED equivalent light bulb, colour selected by Consultant.
- .2 Sizes and capacity: As indicated.
- .3 Internal Toggle switch operated fan and light.
- .4 Top or rear side 80 mm x 250 mm (3" x 10") rectangular duct outlet with integral backdraft damper.
- .5 Wall cap complete with spring loaded backdraft damper with neoprene gasket.
- .6 Aluminum mesh cleanable grease filter.
- .7 Acceptable Manufacturers:
 - .1 Broan BU330
 - .2 No alternates.
- .8 Co-ordinate installation with fire suppression system specified elsewhere.

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Provide flexible duct connection for all fans.
- .3 Provide backdraft damper at building exterior penetration.
- .4 Provide and install vibration isolation.
- .5 Provide and install roof curb for all roof mounted fans.
- .6 Provide and install sleepers for utility set style roof mounted fans; provide roof curb for duct penetration.

3.2 WARRANTY

- .1 Warranty Start Date:
 - .1 Warranty period starts as of the date of Ready for Takeover.
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .2 Warranty Duration:
 - .1 Two (2) year warranty period applies.
- .3 Warranty Coverage:
 - .1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

- .1 Submit product data in accordance with general requirements.
- .2 Indicate the following:
 - .1 Capacity.
 - .2 Throw and terminal velocity.
 - .3 Noise criteria.
 - .4 Pressure drop.
 - .5 Neck velocity.

1.2 MAINTENANCE MATERIALS

- .1 Include:
 - .1 Keys for volume control adjustment.
 - .2 Keys for air flow pattern adjustment.

1.3 MANUFACTURED ITEMS

- .1 Grilles, registers, and diffusers of same generic type to be product of one manufacturer.

1.4 CERTIFICATION OF RATINGS

- .1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by them from independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 GENERAL

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

.5 Acceptable Manufacturers:

- .1 E.H. Price
- .2 Nailor
- .3 Krueger
- .4 Titus
- .5 Carnes
- .6 Seiho
- .7 Metalaire
- .8 Tuttle and Bailey

2.2 RETURN AND EXHAUST GRILLES

- .1 General: with opposed blade dampers as indicated, concealed manual operator and gaskets.
- .2 Type, size, and capacity: refer to schedules.

2.3 OPEN MESH SCREEN

- .1 15 mm x 15 mm (½" x ½") open mesh screen fastened on 25 mm (1") border, screw fasten.
- .2 On all open ends of ductwork and where indicated.
- .3 Size: To match ductwork size.

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Install with flat head screws in countersunk holes where fastenings are visible.
- .3 Bolt grilles, registers and diffusers, in place
- .4 Provide concealed safety chain on each grille, register and diffuser in gymnasium, similar game rooms, and on exposed diffusers, and elsewhere as indicated.
- .5 Clean grilles upon completion.
- .6 Paint ductwork beyond grilles, matte black where visible.
- .7 Ensure all grilles, diffusers, etc. match opening sizes as indicated on the drawings and as fabricated on site by the contractor.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ASTM E90, Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions, and Elements.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with general requirements.
- .2 Indicate the following:
 - .1 Pressure drop.
 - .2 Face area.
 - .3 Free area.
 - .4 Colour and finish.

1.3 CERTIFICATION OF RATINGS

- .1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

1.4 TEST REPORTS

- .1 Submit certified data from independent laboratory substantiating acoustic and aerodynamic performance to ASTM E90.

Part 2 Products

2.1 GRAVITY ROOF OUTSIDE AIR INTAKES AND RELIEF VENTS

- .1 Factory manufactured louvred penthouse.
 - .1 3 mm (1/8") thick stormproof extruded aluminum louvers with mitred corners. Brace and support louvres at 1500 mm (5') intervals.
 - .2 2 mm (0.081") thick insulated aluminum sheet roof.
 - .3 Constructed of 50 mm x 50 mm x 6 mm (2" x 2" x ¼") aluminum angles for roof support and corner angle.
 - .4 15 mm x 15 mm x 0.063 diameter (½" x ½" x 1.6" diameter) intercrimp aluminum screen on back of all sides.
- .2 Provide roof curb sized to suit penthouse or flat or sloped roof as required or indicated. Roof curb to be minimum 900 mm (36") above finished roof.
- .3 Maximum throat velocity 3.3 m/s (11 ft/s) intake.

- .4 Maximum loss through unit: 15 Pa (0.06" in w.c.) static pressure.
- .5 Finish: powder coated. Colour selected by Consultant.
- .6 Shape and size as indicated.
- .7 Acceptable Manufacturers:
 - .1 Greenheck WRH
 - .2 Nailor 1720
 - .3 Carnes GLAB
 - .4 Penn Barry
 - .5 Ventex
 - .6 Pottorff

2.2 GOOSENECK HOODS

- .1 Thickness: to ASHRAE and SMACNA.
- .2 Fabrication: to ASHRAE and SMACNA.
- .3 Joints: to ASHRAE and SMACNA and or proprietary manufactured duct joint.
 - .1 Acceptable Manufacturers:
 - .1 Ductmate Canada
 - .2 Exanno Nexus
- .4 Supports: as indicated.
- .5 Complete with integral birdscreen of 2.7 mm (12 gauge) diameter aluminum wire. Use 15 mm (1/2") mesh on exhaust 20 mm (3/4") mesh on intake.
- .6 Vertical or Horizontal backdraft dampers as required.
- .7 Prefabricated roof curb through roof complete with insulation and counter flashing.

Part 3 Execution

3.1 INSTALLATION

- .1 In accordance with manufacturers and SMACNA recommendations.
- .2 Reinforce and brace air vents, intakes and goosenecks as indicated.
- .3 Anchor securely into opening.
- .4 Seal with caulking all around to ensure weather tightness.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 ANSI/NFPA 96, Ventilation Control and Fire Protection of Commercial Cooking Operations.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with general requirements.

1.3 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements

1.4 CERTIFICATION OF RATINGS

- .1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 BOX CANOPY FILTER HOOD

- .1 General Description:
 - .1 The filter hood shall be suitable for all cooking equipment.
 - .2 The hood shall be ceiling hung with a recommended mounting height between 1981 mm (6' - 6") and 2200mm (7'-3") from the finished floor. The hood shall be finished in a No. 4 stainless steel finish on all exposed sides.
- .2 Efficiency:
 - .1 The hood shall be equipped with high efficiency UL/ULC listed baffle grease filters. The exhaust air shall accelerate through multiple turns within the baffle filter.
 - .2 The liquefied grease shall drain down the baffles, along the grease trough, and into a grease cup.
- .3 Spring Air Systems FD-B Hood
 - .1 Max hood flow: refer to schedule.
 - .2 The filter hood shall be box canopy, high efficiency, filter hood, UL/ULC listed, and built in accordance with the NFPA-96. The unit casing shall be a minimum 18 ga. stainless steel on all exposed surfaces.

- .3 The ventilator extractor shall include a full length inlet slot, a centrifugal vortex chamber, and a variable flow baffle. The vortex chamber shall provide a full 270° centrifugal spin around the vortex baffle for maximum grease extraction. The vortex chamber, the baffles, and the fire damper blades, bushings and edge seals shall be fully accessible through the front removable doors within the hood canopy.
- .4 The filter rack shall include a full length stainless steel grease gutter and grease cup.
- .5 The fire damper shall be an arrangement "D", butterfly type, constructed of stainless steel with metal blade and edge seals. The fire damper shall be activated by a fusible link and dead weight arrangement.
- .6 The hood shall have incandescent lights evenly spaced along the length of the hood.
- .7 Controller
 - .1 Provide controller capable of the following:
 - .1 Start/stop of exhaust fan.
 - .2 Start/stop of make-up air unit.
 - .3 Thermal start option.
 - .4 Interlock to fire suppression system.
- .8 Accessories:
 - .1 Stainless steel No. 4 finish fascia panel.
 - .2 Spacer from wall.
- .9 Acceptable Manufacturers:
 - .1 Spring Air
 - .2 Garland
 - .3 Halton

2.2 FIRE SUPPRESSION SYSTEM

- .1 Fire detection and suppression system: ULC listed and labeled, wet chemical pre-engineered fixed nozzle type for appliances, filters and ductwork.
- .2 Automatic gas shut off valve.
- .3 Manual and automatic dump system. Automatic actuation shall be provided by an appropriate number of fuse link detectors mounted in series on a stainless steel wire input line to the control head. Manual actuation shall be provided by turning a handle on the primary head and/or by an optional remote pull station with a dedicated stainless steel input line to the control head.
- .4 Cable and conduit system.
- .5 Bottle capacity to meet demand. Submit sizing with shop drawings.

- .6 The cartridge shall be an integral part of the control head assembly. The wet chemical storage cylinder shall be D.O.T.-rated for stored pressure of 225 psig, and a pressure gauge shall be provided on the cylinder valve for visual inspection.
- .7 Nozzles in exhaust duct, hood plenum, and appliance protection.
- .8 Engineered drawings (stamped) and field review by a Professional Engineer submitted to the consultants and authority having jurisdiction. Same Professional Engineer to provide sign-off for the operation.
- .9 Gas solenoid valve and trim.
- .10 Acceptable Manufacturers:
 - .1 Spring Air
 - .2 Garland
 - .3 Pyro-Chem
 - .4 Halton

2.3 FIRE BLANKET

- .1 100% non-combustible fire retardant glass fibre, non-toxic, non-conductor, cleanable complete with straps.
- .2 Size: 1 m x 1 m (40" x 40").
- .3 Cabinet to be surface mounted, 400 mm x 300 mm (16" x 12").
- .4 Mount on wall in kitchen area where indicated or directed on site by consultant.
- .5 Acceptable Manufacturers:
 - National FB 4040 blanket
 - FB 6078 MC cabinet.

Part 3 Execution

3.1 INSTALLATION

- .1 Install hoods in accordance with manufacturers instructions.
- .2 Install hoods in accordance with NFPA 96 standards.
- .3 Hood height shall be as indicated on architectural kitchen elevations. Contractor shall review manufacturer's installation guide to ensure that the elevation of the hood is within the specified allowable mounting heights prior to installation. Advise consultant prior to installation of any discrepancies.

3.2 EXHAUST SYSTEM TESTING

- .1 Test exhaust and ductwork system in accordance with local authority requirements. Note that NFPA 96 requires light, air, ballon and other tests at the discretion of the local authority. Provide written documentation and verification of acceptance.

- .2 Testing existing systems where modified or altered.
- .3 Provide all equipment to provide testing of system.

3.3 FIRE SUPPRESSION SYSTEM

- .1 Adequate capacity for number of nozzles.
- .2 Nozzles over each appliance.
- .3 Nozzles to protect filter plenum and exhaust duct.
- .4 To automatically shut off gas and/or electricity to appliances upon activation.
- .5 Fusible links where required.

3.4 FIRE SUPPRESSION SYSTEM TESTING

- .1 Dump test system to requirements of local authorities.
- .2 After completion of test recharge system and make operable for owners' use.

3.5 FIRE BLANKET

- .1 Hang blanket on wall in cabinet as indicated, to manufacturers' recommendations.
- .2 Fire blanket next to each NFPA 96 hood mounted on wall.

3.1 WARRANTY

- .1 Warranty Start Date:
 - .1 Warranty period starts as of the date of Ready for Takeover.
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .2 Warranty Duration:
 - .1 Two (2) year warranty period applies.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 All codes, standards, etc. as referenced shall be the latest edition.
- .2 CGSB CAN/CGSB 1.181, Ready Mixed Organic Zinc, Rich Coating.
- .3 ANSI/NFPA-90A, Installation of Air Conditioning and Ventilating Systems.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section general requirements.

1.3 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements.

1.4 MAINTENANCE MATERIALS

- .1 Provide maintenance materials in accordance with general requirements.

1.5 UNIT ASSEMBLY

- .1 Unless stated otherwise, air handling units are to be shipped to the job in one piece, factory assembled. All equipment shall be factory tested prior to shipment.

1.6 MANUFACTURED ITEMS

- .1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards in force.
- .2 The air handling units and major components shall be products of manufacturers regularly engaged in the production of such equipment and with a minimum of fifteen continuous years of proven production experience.
- .3 Manufacturer shall have a fully implemented and auditable quality assurance program, equal to the ISO-9002 Quality Standard.

Part 2 Products

2.1 GENERAL

- .1 Field Factory assembled components to form units supplying air at design conditions as indicated and specified.

.1 Acceptable Manufacturers:

- .1 Spring Air
- .2 Engineered Air
- .3 ICE Western

2.2 UNIT CONSTRUCTION

- .1 Unit casing shall be of minimum 1.3 mm (18 gauge) satin coat galvanized sheet metal. Surfaces shall be cleaned with a degreasing solvent to remove oil and metal oxides and primed with a two part acid based etching primer. Finish coat shall be an electrostatically applied enamel, to all exposed surfaces. All unprotected metal and welds shall be factory coated.
- .2 All walls, roofs and floors shall be of formed construction, with at least two breaks at each joint. Joints shall be secured by sheet metal screws or pop rivets. Wall and floor joints shall be broken in and roof joints broken out (exposed) for rigidity. All joints shall be caulked with a water resistant sealant.
- .3 Units shall be provided with gasketed access doors to the following components: fans and motors; filters; dampers and operators; and access plenums. Access doors shall be large enough for easy access. Provide hinged access doors, fully lined, with a minimum of two (2) Levelock handles (one locking) operable from both sides.
- .4 Casings shall be supported on formed galvanized steel channel or structural channel supports, designed and welded for low deflections. Integral lifting lugs shall be provided for hoisting.
- .5 All units shall be internally insulated with 25 mm (1") thick 24 kg/m³ (1.5 lb./ft³) density, neoprene coated fibre glass thermal insulation.
- 24 kg/m³ (1.5 lb/ft³) insulation shall be secured to metal panels with a fire retardant adhesive and welded steel pins at 400 mm (16") o/c. All longitudinal insulation joints and butt ends shall be covered by a sheet metal break to prevent erosion of exposed edges. Drain pans and all floor areas shall be insulated on the underside.
- .6 Air handling units shall be weatherproofed and equipped for installation outdoors. This shall include generally for the prevention of infiltration of rain and snow into the unit, and: louvres or hoods on air intakes and exhaust openings with 25 mm (1") galvanized inlet screens; rain gutters over all access doors; all joints caulked with a water resistant sealant; roof joints turned up 50 mm (2") with three break interlocking design; outer wall panels extend a minimum of 6 mm (1/4") below the floor panel; drain trap(s) for field installation.

- .7 Provide full perimeter roof mounting curb of heavy gauge sheet metal, minimum of 300 mm (12") high, and complete with wood nailer, neoprene sealing strip, and fully welded "Z" bar with 25 mm (1") upturn on inner perimeter, to provide a complete seal against the elements. External insulation of the roof mounting curb shall be provided by the Roofing Subcontractor.

2.3 FANS

- .1 Centrifugal fans shall be rated in accordance with AMCA Standard Test Code, Bulletin 210. Fan manufacturer shall be a member of AMCA. All fans and fan assemblies shall be dynamically balanced during factory test run. Fan shafts shall be selected for stable operation at least 20% below the first critical RPM. Fan shafts shall be provided with a rust inhibiting coating.
- .2 Drives shall be adjustable on fans with motors 3.73 kW (5 hp) or smaller. On fans with larger motors, fixed drives shall be provided. All drives shall be provided with a rust inhibiting coating. The air balancer shall provide for drive changes (if required) during the air balance procedure.
- .3 All single phase belt drive motor applications shall include rubber isolation for motors. 19kw (1/4 hp) through 1.1kW (1½ hp). Provide internal spring isolation for single phase motors over 1.1kW (1½ hp).
- .4 Fan motors shall be ODP high efficiency.

2.4 GAS HEAT SECTION, INDIRECT FIRED

- .1 General
 - .1 Heating units shall have an indirect natural gas fired heating section that is ETL, C-ETL, approved for both sea level and high altitude areas. The entire assembly shall be approved and labeled by a nationally recognized certification agency.
 - .2 Operating natural gas pressure at units manifold shall be 1750 Pa (7" w.c.).
 - .3 Gas fired units shall be approved for operation in -40°C/-40°F locations.
- .2 Heat Exchanger
 - .1 Heat exchanger shall be a primary drum and multi-tube secondary assembly constructed of titanium stainless steel with multi-plane metal tubulators, and shall be of a floating stress relieved design. Heat exchanger shall be provided with condensate drain connection. The heat exchanger casing shall have 25 mm (1") of insulation between the outer cabinet and inner liner. Blower assemblies close coupled to duct furnace type heat exchangers are not acceptable.

.3 Gas Burner

- .1 The burner assembly shall be a blow through positive pressure type with a combustion air damper interlocked with main gas valve to provide optimum air/fuel ratios at all inputs with 80% or higher efficiency throughout its operating range. Flame surveillance shall be with a solid-state programmed flame relay utilizing a flame rod for gas operation. The burner and gas train shall be in a cabinet enclosure. Insulation in the burner section shall be a heat reflective galvanized steel liner. Burners to be manufactured by Maxon, Ovenpak or Engineered Air. Atmospheric burners or burners requiring power assisted venting are not acceptable.
- .2 Modulating burners shall have a 10:1 turndown providing that the minimum input is at least 100 MJ.
- .3 Controls: An integral control panel shall be completely pre-wired with motor contractors, overloads, control transformer, high limit, combustion air flow switch, terminal block and all necessary relays. The control of the unit shall be provided with electronic control using modulating discharge air sensor.
- .4 Provide warm weather bypass control for all units utilizing modulating discharge air controls, to allow the supply fan to continue operating during the purge cycle whenever ambient temperature is above the burner ambient set point.
- .5 All operating controls and functions shall be factory tested prior to shipment.
- .6 Operating natural gas pressure shall be 7" (1750 Pa) W.C.

2.5 FILTERS

- .1 Filter sections shall be provided with adequately sized access doors to allow easy removal of filters. Filter removal shall be from one side as noted on the drawings.
- .2 For units with filter banks 1825 mm (72") high or less, the filter modules shall be designed to slide out of the unit. Side removal filters shall slide into a formed metal track, sealing against metal spacers at each end of the track.
- .3 50 mm (2") Pleated Panel Disposable Filters: Non-woven re-inforced cotton/poly fabric media with a metal support grid and heavy duty beverage board enclosing frame. The filter media shall have an average efficiency of 30-35%+ on ASHRAE Standard 52.1.

2.6 DAMPERS

- .1 Damper frames shall be u-shaped galvanized metal sections securely screwed or welded to the air handling unit chassis. Pivot rods of 15 mm (1/2") aluminium, shall turn in bronze bushings, fabricated from self-oiling bronze. Rods shall be secured to the blade by means of straps and set screws.
- .2 Blades shall be 1.3 mm (18 gauge) galvanized metal with two breaks on each edge and three breaks on centreline for rigidity. The pivot rod shall "nest" in the centreline break. Damper edges shall interlock. Maximum length of damper between supports shall be 1067 mm (42"). Damper linkage brackets shall be constructed of galvanized metal.

- .3 Two position inlet dampers shall be parallel blade type complete with actuator.

2.7 ON DEMAND FAN CONTROL SYSTEM

- .1 The commercial kitchen energy management controller shall be a controller, providing daily reduction of the commercial kitchen makeup air/supply, and real-time temperature based control of energy target goal management. The system shall include the following components;
- .1 NEMA4x TruFlow touchscreen user interface mounted in CSA certified panel for surface wall mounting.
 - .2 TruFlow HUB panel complete with system PLC, control & power wiring terminals for remote mounting in service space.
 - .3 VFDs (shipped loose)
 - .4 MUA supply fan VFD. Turn VFD over to MUA manufacturer to mount in unit.
- .2 The TruFlow-Lite touchscreen controller shall be complete with Dashboard, System Control, Alarm Status, and Setup & Diagnostic screens.
- .1 The Dashboard screen shall graph energy usage throughout the day measuring energy consumption against user set goals. The Dashboard screen also displays:
 - .1 Makeup air volume
 - .2 High speed override
 - .3 % of goal reduction that is achieved each minute of the day.
 - .2 The System Control screen displays, and provides operator control of, all components of the kitchen ventilation system, including:
 - .1 System enable/disable
 - .2 High speed override
 - .3 The Alarm Status Screen indicates and logs all alarm events which include; high temperature operation, electrical faults, J-couple faults, and supply drive communication error/failure and exhaust/supply drive communication error/failure.
 - .4 The System Setup screen is accessible by the administrator with a secure password to customize the screen to the user, enter reduction goal, operating times and provide system diagnostics.
- .3 The TruFlow-Lite panel is connected to the two roof mounted makeup air units. Each kitchen exhaust hood has a duct mounted J-Couple (temperature sensor). The J-Couple signals the TruFlow-Lite panel to modulate the exhaust air volume to match the cooking operation under the each individual hood. The TruFlow-Lite panel, via software, adjusts the variable speed exhaust motor drive and supply fan signal accordingly. The commercial kitchen ventilation system modulates from 50 to 100% to provide necessary makeup air during kitchen operation. When cooking activities create large quantities of smoke the operator has access to an override button to send the drives and dampers to high at any time.

- .4 Necessary power requirements:
 - .1 Qty (2) 120/1/60, 15A power supplies from breaker panel to the Truflow HUB panel
 - .2 120/1/60 power supply from breaker panel to Truflow Touchscreen.
 - .3 120/1/60 power from TFHUB panel to hood lights.
 - .4 208/3/60 (coordinate with Div 16 for power wiring) power supply from breaker panel to variable speed exhaust fan drive(s) and MUA units.
 - .5 208/3/60 (coordinate with Div 16 for power wiring) power supply from the variable speed drive(s) to the exhaust fans disconnects switch and MUA unit
 - .6 Interlock to shunt trip 120V/1/60, 2 amps maximum.
 - .7 Interlock to fire suppression system 120V/1/60, 2 amps maximum
 - .8 CAT5 connection from TFHUB panel to exhaust fan VFD
 - .9 CAT5 connection from TFHUB panel to TruFlow-LITE panel.
 - .10 4-20mA signal from TFHUB panel to supply fan control panel
 - .11 Interlock J-Cable from TFHUB panel to each duct collar. J-Cable supplied by Spring Air.
- .5 Acceptable Manufacturers:
 - .1 SpringAir
 - .2 Greenheck Variflow System

2.8 CONTROLS

- .1 Controls and gas manifolds shall be contained in a control panel that provides easy access to contained components.
- .2 Provide electronic ignition of pilot through a spark rod and electronically programmed flame supervision controller.
- .3 Safety devices shall include:
 - .1 Flame proving sensor
 - .2 High air velocity sensor
 - .3 Low air velocity sensor
 - .4 High temperature limit
- .4 Unit shall start from exhaust system interlock (by others) wired to unit control terminal strip as indicated on field wiring diagram.
- .5 Unit discharge air temperature shall be maintained constant by a discharge air sensor which shall modulate the main flow ratio gas valve.
- .6 Electronic sensor shall modulate the gas valve through a controller. An electronic temperature selector (remote mounted) shall be capable of adjusting the discharge air temperature set point.

2.9 COMPONENTS

- .1 Incorporate the following components to provide a complete system.
 - .1 Outdoor air intake hood.
 - .2 Filter section.
 - .3 Indirect fired heat exchanger and burner.
 - .4 Supply air blower.
 - .5 TruFlow on-demand MUA fan system.

2.10 ACCESSORIES

- .1 Internal wiring to terminal strip in Nema 1 enclosure with space for DDC controller.
- .2 Dead front disconnect.
- .3 600mm (24") high roof curb.
- .4 Indoor control panel ON/AUTO and temperature dial.
- .5 Discharge air controller/sensor (for installation duct).

2.11 CAPACITY

- .1 Provide unit capacity indicated.

Part 3 Execution

3.1 INSTALLATION

- .1 Fabricate to provide smooth air flow through all components. Limit air leakage to 1% of rated air flow at 2.5 kPa (10" w.c.) suction pressure.
- .2 Apply sealer into all seams prior to assembly. Secure toe angles continuous along entire length of assembly.
- .3 Install to manufacturers requirements.

3.2 FANS

- .1 Install flexible connections at fan outlets. Ensure metal bands of connectors are parallel and not touching when fan is running and when fan is stopped. Ensure that fan outlet and duct are aligned when fan is running.

3.3 START-UP/COMMISSIONING

- .1 Unit manufacture shall perform start-up and commissioning.

3.4 SPARE PARTS

- .1 Two (2) complete sets of filters.
- .2 One (1) set of spare belts.

3.5 WARRANTY

- .1 Warranty Start Date:
 - .1 Warranty period starts as of the date of Ready for Takeover.
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .2 Warranty Duration:
 - .1 Two (2) year warranty period applies.
- .3 Warranty Coverage:
 - .1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 GENERAL

- .1 Conform to general provisions for Mechanical Division in General Requirements section.

1.2 SUBMITTAL

- .1 Submit shop drawings and product data in accordance with general requirements,
.2 Indicate the following: complete specifications, wiring diagrams (showing all interconnections); weight; performance details.
.3 Provide data for inclusion in the Operating and Maintenance manuals in accordance with general requirements.

1.3 REFERENCES

- .1 C.1 CSA B52-2023, Mechanical Refrigeration Code.
.2 C.2 CAN/CSA-C22.2 No 60335 Safety of Household and similar electrical appliances – Heat Pumps, Air-conditioners and dehumidifiers.

Part 2 Products

2.1 HORIZONTAL UNIT VENTILATOR

- .1 Exterior cabinet panels shall be constructed of heavy gauge steel. Units supplied as "heating only" shall be suitable for the future addition of a cooling coil and related components. Units shall be constructed such that testing and trouble-shooting can be accomplished in the end pockets of the unit without affecting the normal airflow pattern through the unit.
.2 Floor mounted units shall have an integral pipe tunnel for convenient crossover of piping or electrical wiring in accordance with local and National Electric Codes (NEC). The front surface shall consist of three separate, removable panels. Control compartment must be accessible without removing the entire front panel. Unit discharge grille shall be welded continuous bar type with round edged steel bars placed for a 10° vertical deflection. Adjustable side deflection vanes shall be located beneath the continuous bar grille for easy adjustment by maintenance personnel]. A 6 mm (1/4") painted galvanized mesh screen shall be furnished and located beneath the discharge grille. Unit top surface shall be supplied with a textured paint surface that resists scuffing and hides fingerprints.

Overall unit depth shall be 550 mm (21 7/8").

- .3 Motors shall be direct drive electronically commutated motors (ECM) and be mounted on rubber isolation. Blowers shall be designed specifically for unit ventilator operation. ECM motors shall be programmed to meet the scheduled airflow at the specified external static pressure with additional speed taps for manual adjustment on site during balancing. Motors shall consist of a brushless, permanently lubricated ball bearing construction for maintenance free operation.
- .4 Hydronic coils are to be constructed with copper tubes and mechanically bonded aluminum corrugated plate fins. Water coils shall be furnished with a threaded drain plug at the lowest point. A manual air vent shall be provided at the high point of the coil on all floor mounted units. An auto air vent shall be provided at the high point of the coil on all ceiling mounted units.
- .5 Unit manufacturer shall provide and install a capillary type auto reset freeze stat across the leaving side of the hot water coil. When tripped, the freeze stat shall be wired to shut the outdoor air dampers.
- .6 Microprocessor-based control for each unit ventilator that must be adaptable to future network system. This control must be pre-engineered, preprogrammed and pretested and shall be factory installed before shipment. The microprocessor-based control shall monitor room conditions and automatically adjust unit operations to maintain these requirements. The control sequence shall be on the basis of ASHRAE Cycle II or ASHRAE Cycle III as selected by owner. The manufacturer shall provide this DDC controller in each unit ventilator.

The direct digital controller shall have the following tenant adjustments as an integral part of the device: room temperature setpoint, minimum percent outdoor air setting, and unoccupied setpoint (offset). Each controller shall be furnished with an LED status/fault indicator on board and a communication port to allow monitoring and adjustment from a portable computer.

Each unit shall be furnished with: Room Sensor and CO2 Sensor.

- .7 Separate room air and outdoor air dampers. The room air damper shall be constructed of aluminum and shall be counterbalanced against back pressure. Outdoor air damper shall be two-piece double wall construction with 15 mm (1/2") thick, 1.5 lb. density fiberglass insulation sandwiched between welded 1.0 mm (20 Ga.) galvanized steel blades for rigidity and to inhibit corrosion. Dampers shall be fitted with neoprene seals along all the sealing edges. Damper bearings shall be made of nylon or other material which does not require lubrication. Dampers shall be factory mounted complete with modulating spring return damper actuator for proportional damper control.
- .8 Integral factory installed face and bypass damper. The face and bypass damper shall be constructed of aluminum and have a dead air space to minimize pickup in the bypass position. The long sealing edges of the damper shall be fitted with silicone rubber impregnated glass cloth seals with blended mohair seals on the ends for long life and positive sealing. Chilled water units shall be arranged to minimize the bypass of humid outdoor air during partial cooling load conditions. The drain pan shall be piped thru the exterior wall grille.

- .9 Drain pan constructed of stainless steel and shall be insulated. A drain outlet shall be provided on both ends of the pan with one outlet capped. The drain hand of connection shall be easily field-reversed by relocating the cap to the opposite end.
- .10 Filters shall be of the manufacturer's standard washable type.
- .11 Unit manufacturer shall provide an external wall louver for the outdoor air intake. The louver and frame shall be of heavy gauge aluminum with 45 deg. blades. The blade profile shall be designed to prevent water penetration. The louver shall have ½" birdscreen attached to the inner face and shall have a minimum free area of 1.1 sq. ft. The finish on the louver shall be a custom color as selected by the consultant.
- .12 Unit manufacturer shall provide a wall sleeve and shall be custom sized to suit the wall depth. The wall sleeve shall include air flow separators to prevent mixing of fresh air, condenser air intake and condenser air exhaust.
- .13 **Unit manufacturer shall provide a decorative exterior aluminum wall grille constructed of heavy gauge aluminum with rectangular holes to match louver blade spacing to maximize the air opening. Grille to be secured to wall louver/exterior wall. The grille finish shall match the louver above. Louvers shall have 2" blade centers.**
- .14 All internal line voltage wiring shall be by the unit manufacturer.
 - .1 A suitably rated unfused disconnect switch shall be factory installed within the unit.
- .15 Controls Components
 - .1 Provide terminal strip ("digital-ready") for standard electric/mechanical controls per Energy Controls.
- .16 Unit Selection and capacity: As per schedule on drawings.
- .17 Acceptable Manufacturers:
 - .1 Daikin
 - .2 Trane
 - .3 Engineered Air

2.2 SYSTEM CONTROL

- .1 Equipment control will be by the BAS system. Coordinate with controls contractor.

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Install equipment exposed to finished areas after walls and ceiling are finished and painted. Avoid damage.

- .3 Protection: Provide finished cabinet units with protective covers during balance of construction.
- .4 Unit Ventilators: Locate as indicated, level and shim units, and anchor to structure. Coordinate with existing wall louvre and radiation cabinet. Adjust existing adjacent surfaces as required for a complete finished installation.
- .5 Hydronic Units: Install with shut-off valve on supply and lockshield balancing valve on return piping. If not easily accessible, extend vent to exterior surface of cabinet for easy servicing.
- .6 Connect drain pan to condensate drain.

3.2 START UP AND INSTRUCTION

- .1 Unit Manufacturer shall provide start up and instruction to the owner.

3.3 TRAINING

- .1 Provide 2 hours training to owner's staff on the care, maintenance and operation of the equipment. Dedicated visit to site is required as it will not be paired with equipment startup.

3.4 WARRANTY

- .1 Warranty Start Date:
 - .1 Warranty period starts as of the date of Ready for Takeover.
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .2 Warranty Duration:
 - .1 Two (2) year warranty period applies.
- .3 Warranty Coverage:
 - .1 Applies to parts and labour.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with general requirements.
- .2 Indicate:
 - .1 Equipment, capacity, piping, and connections.
 - .2 Dimensions, internal and external construction details, recommended method of installation with proposed structural steel support, sizes and location of mounting bolt holes.
 - .3 Special enclosures.
- .3 Primer coat to be off white.
- .4 All hydronic heating shall be by a single manufacturer.

1.2 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 DAMPERS

- .1 Factory built, internal damper, complete with operator, at enclosure air outlet grille for each convection type heating unit not thermostatically controlled. Refer to schedules on drawings.

2.2 CAPACITY

- .1 As indicated.

2.3 EXISTING WALL FIN AND CABINET RADIATION (H-EX)

- .1 Remove existing cover, vacuum existing fin and components.
- .2 Replace damaged components including but not limited to hangers, wall mounting brackets.
- .3 Replace existing control valve where installed and ensure operation.
- .4 Replace isolating valves as indicated.
- .5 Replace existing cabinet. Provide new filler pieces etc., to match existing cabinet.

2.4 FINNED TUBE RADIATION RELOCATED EXISTING

- .1 Heating elements: NPS 32 mm (1 1/4") seamless copper tubing, cut existing elements to suit new length indicated.
- .2 Provide new element hangers: Space brackets 900 mm (36") centres maximum.
- .3 Existing enclosures: 500 mm (20") high steel complete with stamped grille. Provide additional components as required for wall-to-wall installation or complete with die formed end caps having no knock-outs, with inside corners, outside corners, as required. Provide full length channel and sealer strip at top of wall edge. Joints and filler pieces to be flush with cabinet. Support rigidly top and bottom, on new wall mounted brackets. Joints and filler pieces to be clear of grilles located to provide easy access to valves and vents. Provide new access doors for valves. Clean existing cabinet prior to installation.
- .4 Dimensions for enclosures: measure site conditions. Do not scale from drawing.
- .5 Provide for noiseless expansion of all components.
- .6 Expansion compensators: Flexonics at each section by mechanical contractor as specified elsewhere.
- .7 Acceptable Manufacturers:
 - .1 Engineered Air
 - .2 Slant Fin
 - .3 Sigma
 - .4 Dunham-Bush

2.5 CABINET UNIT HEATERS (RECESSED IN WALL)

- .1 Cabinet: Semi-recessed installation as indicated, 1.6 mm (16 gauge) thick steel with rounded exposed corners and edges, removable panels, glass fiber insulation and integral return air outlet and ducted supply air outlet, Arrangement 20.
- .2 Finish with factory applied primer coat.
- .3 Coils: aluminum fins mechanically bonded to copper tubes. Hydrostatically tested to 1 MPa (145 psi).
- .4 Fans: centrifugal double width wheels, statically and dynamically balanced, direct driven, sleeve bearings, resilient mounted.
- .5 Motor: multi-speed, tapped wound permanent split capacitor type with sleeve bearings, built-in thermal overload protection and resilient rubber isolation mounting.
- .6 Filters: removable permanent washable type.
- .7 Capacity and orientation as indicated.

- .8 Control:
 - .1 3 speed switch with integral overloads in cabinet.
 - .2 Control thermostat: by BAS contractor

- .9 Acceptable Manufacturers:
 - .1 Engineered Air CUH Series
 - .2 Slant Fin
 - .3 Sigma
 - .4 Dunham-Bush

2.6 FORCED CONVECTION RADIATORS

- .1 Heating Element: 64 mm x 83 mm (2½"x 3¼") aluminum fins mechanically bonded to 19 mm (¾") nominal I.D. copper tubing suitable for sweat connection fittings.

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Install in accordance with piping layout and reviewed shop drawings.
- .3 Provide for pipe movement during normal operation.
- .4 Maintain sufficient clearance to permit performance of service maintenance.
- .5 Check final location with Consultant if different from that indicated prior to installation. Should deviations beyond allowable clearances arise, request and follow Consultant's directive.
- .6 Valves
 - .1 Install valves with stems upright or horizontal unless approved otherwise.
 - .2 Install isolating ball valves on inlet and balancing valves on outlet of each unit.
- .7 Venting:
 - .1 Install screwdriver vent on cabinet convector, terminating flush with surface of cabinet.
 - .2 Install standard air vent with cock on continuous finned tube radiation.
- .8 Clean finned tubes and comb straight.
- .9 Install flexible expansion compensators as indicated.
- .10 Mount wall mounted convectors at 200 mm (8") above finish floor.

.11 Mount wall mounted radiation at 200 mm (8") above finish floor unless otherwise indicated.

.12 **On fan forced units set discharge patterns and fan speeds to suit requirements prior to acceptance.**

3.2 WARRANTY

.1 Warranty Start Date:

.1 Warranty period starts as of the date of Ready for Takeover.

.2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.

.2 Warranty Duration:

.1 Two (2) year warranty period applies.

.3 Warranty Coverage:

.1 Applies to parts and labour.

END OF SECTION

PART 1 General

1.1 GENERAL REQUIREMENTS

- .1 Conform to General Conditions for Mechanical Trades.
- .2 Related Work Specified Elsewhere.
 - .1 General Conditions for Mechanical Trades
 - .2 Plumbing & Drainage
 - .3 Heating, Ventilation & Air Conditioning
 - .4 Heating, Ventilation & Air Conditioning Equipment
 - .5 Electrical

1.2 DESCRIPTION OF SYSTEM

- .1 Furnish and install all components, devices and control wiring for a fully integrated Energy Management and Environmental Control System incorporating Direct Digital Control (DDC), and equipment monitoring. The system shall control/monitor HVAC and plumbing equipment and systems as specified in this section. The work shall include but is not limited to the following:
 - .1 All necessary hardware, software, control panels, control wiring, field devices, installation, documentation, and owner training as specified.
 - .2 The installed system shall incorporate electronic and digital control devices to perform the control sequences and monitoring outlined herein. Specific control sequence requirements are as detailed elsewhere in this Section of the specification.
 - .3 Control and monitoring of the equipment and systems shown on the drawings (refer also to 'Sequence of Operation' for additional details).
 - .4 Control valves shall be supplied by this Trade but installed in the piping system by the Mechanical Trade complete with transitions and unions as required.
 - .5 Testing, debugging, calibrating, adjustment, programming, and confirmation of total system operation.

1.3 MANUFACTURER AND INSTALLING CONTRACTOR

- .1 The temperature control/programmable device manufacturer shall be Distech, integrated to the WRDSB TAC Vista server/BAS system automation.
- .2 Energy Controls, the local Distech integrator is available at phone 519-893-2638.

- .3 Any new building must be a seamless extension of the current Energy Management and Building Control System.
 - .1 The existing TAC Vista software is, and shall continue to be, the only head-end BAS server for the entire School Board.
 - .2 The head-end server contains the secure Energy Management Settings (i.e. Master Setpoints & Schedules) that are sent to all schools in real-time. The control system must be an extension of the head-end server and be able to be managed exclusively through the Vista head-end server.
 - .3 Monitoring of all school board control systems are done in real-time and must be presented at the exclusive Vista head-end server as first-priority data.
 - .4 The Vista head-end server has all the required controller databases and software to be able to centrally maintain and modify network configuration and controller software for the entire School Board. The Vista head-end server is the only system that can access the LacNet programming variables inside the controllers for real-time configuration of setpoint and time scheduling parameters.
 - .5 The graphics and controller database must be presented inside the Vista head-end server in its native format in order to preserve the real-time speed, integrity and multi-site administration of the entire system.

1.4 SCOPE OF WORK

- 1. Refer to drawings and specification for complete scope.
- 2. Provide new DDC controls for new unit ventilator and associated condensing units.
- 3. Upgrade existing controls in the area of construction.
- 4. Provide new controls for new MUA.
- 5. Provide new controls for commercial kitchen and exhaust fans.
- 6. Thermostats rough-in by Electrical Contractor.
- 7. New cabinet heater
- 8. Ventilation lockout.
- 9. Minimum outside air schedule.
- 10. CO2 controls
- 11. Mechanical cooling 24.5degC (+/- 1degC).
- 12. Trending.
- 13. Summary page in graphics (fan status, MAT, SAT, CO2, Schedule).
- 14. Revision summary control drawings.
- 15. Controller locations shown on graphics.
- 16. Standby schedule for all systems.
- 17. Global humidity used on economizers. Humidity reset of outside air high limit shall be done based on closest three (3) RH sensors.

QUALITY ASSURANCE

- .1 The system components shall be listed by Underwriters Laboratories Inc. and Canadian Standards Association.

- .2 The system control products shall be stored and handled according to manufacturer's recommendations.
- .3 The work shall be performed by skilled technicians all of whom shall be properly trained and qualified for this work.

1.6 SUBMITTALS

- .1 Prior to the installation of any equipment, the Contractor shall provide the Consultant with shop drawings and specifications for all devices and equipment used for the complete system installation. Shop drawings shall include the following:
 - .1 Identified schematic control diagrams for all systems, each diagram indicating or referencing input / output connection points, control components, component catalogue numbers, operation sequence, interlocking and RPU's to which they are connected.
 - .2 Complete network schematic indicating all programmable controllers and data connections.
 - .3 Detailed listing of inputs and outputs of each programmable controller.
 - .4 Control damper schedule indicating damper size, required torque and blade type.
 - .5 Technical data sheets / manufacturer application manuals of each system component.
- .2 Upon completion of the installation and prior to acceptance and Owner training, the Contractor shall furnish the Consultant with three copies of installation and operation manuals for the system. Each manual shall include:
 - .1 Record drawings, including plan layout indicating major device locations and wiring diagrams as finally installed.
 - .2 All shop drawings, incorporating all required revisions to reflect as-built conditions.
 - .3 The Contractor shall also keep one copy of backup programs for the system archived in a software storage vault at their business location.

Part 2 Products

2.1 GENERAL

- .1 The control system shall be a Tour Andover (TAC) Xenta/Distech building automation system (BAS).
- .2 The system shall integrate the operation of intelligent building management controllers distributed into the network.

- .3 The DDC System shall be generally comprised of the following devices to achieve the control functions described in this section:
 - .1 Xenta/Distech programmable controllers
 - .2 Distech input/ output programmable I/O modules.
 - .3 Control relays.
 - .4 Control dampers and valves.
 - .5 Sensors, actuators and other input/output devices.
- .4 Controllers shall execute the application programs, calculations, and commands to provide the control function specified for that unit. Each controller shall include its own micro-computer controller, power supply, input/output modules, termination modules and real time clock.
- .5 Controllers shall be capable of full control functionality and alarm reporting independently or as a part of the DDC network.
- .6 The system shall be stored in flash ram so no batteries are required.
- .7 Each control device shall be modular and expandable to provide additional inputs and outputs and control functionality for that device.
- .8 Each controller shall be able to transfer and receive data via the network for performance of control functions.
- .9 The system shall be modular, permitting expansion by adding hardware and software without changes in communication or processing equipment.
- .10 The complete system shall be capable of communication over a LonWorks network.
- .11 The controllers shall monitor the status of all overrides and include this information in logs and summaries to inform the operator that automatic control has been inhibited.
- .12 Controllers shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all subsidiary equipment and provide both local and remote annunciation of any component failures.
- .13 Controllers shall activate an orderly shutdown of their operation in the event of loss of normal electrical power. Non-volatile memory shall be incorporated for all controller configuration data. The controllers shall automatically resume full operation without manual intervention.

- .14 The controllers shall have sufficient memory to support their own operating system and data bases including:
 - .1 control processes
 - .2 energy management applications
 - .3 alarm management
 - .4 trend data
 - .5 operator input/output
 - .6 remote communications
 - .7 manual override monitoring

- .15 Controllers shall incorporate the following software features:
 - .1 Energy management:
 - .1 Time of Day Scheduling
 - .2 Calendar Based Scheduling
 - .3 Holiday Scheduling
 - .4 Optimal Start and Stop
 - .5 Demand Limiting
 - .6 Heating/Cooling Interlock
 - .2 Alarm Management:
 - .1 Alarm Management shall be provided to monitor, buffer and direct alarm reports to operator devices and memory files. The controllers shall perform alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic and prevent alarms from being lost.
 - .2 All alarm or point change report shall include the points English language description and the time and date of occurrence.
 - .3 The user shall be able to define the specific reaction for each point, the priority level (3 in total) and ability to inhibit alarm reporting for each point.
 - .4 The user shall be able to define conditions under which point changes need to be acknowledged by an operator and logged for analysis at a later date.
 - .5 The user shall be able to print, display or store a unique 60 character alarm message to more fully describe the alarm condition or direct operator response. The message shall be customizable to describe each individual alarm.
 - .6 In web access applications only critical alarms shall initiate a call to a remote operator device, otherwise call activity shall be minimized by time stamping and saving reports until a manual request is received or until the buffer space (minimum 50 alarms) is full.

- .3 Trend Logs:
 - .1 Controllers shall provide an automatic roll-over trend log, which stores records up to an operator-selected number at an operator-selected sampling rate and then overwrites the oldest record with each new record.
 - .2 Sample intervals shall be from 1 minute to 24 hours.
 - .3 Provide graphical and tabular displays.
- .4 Runtime Totalization:
 - .1 The controllers shall automatically accumulate and store runtime hours for binary points with a sampling resolution of 1 minute. The user shall have the ability to define a warning limit to trigger maintenance or user-defined messages.
- .5 Custom Programming:
 - .1 The controllers shall permit user defined custom control processes based on:
 - .1 any system measured data or status
 - .2 any calculated data
 - .3 any results from other processes
 - .4 Boolean logic
 - .2 The custom processes may be triggered by:
 - .1 Time-of-day
 - .2 calendar date
 - .3 events (point alarm etc.)
- .16 The control strategy for each control loop shall be performed by software within the controller. The sequence of events required for each control loop is described for each system in the control sequence.
- .17 Outdoor air temperature indication shall be available at each controller as an integral part of the control strategies for that controller. Should the network transmission of the common outdoor air temperature (or any other common value) fail, then each controller shall use the last good value received.
- .18 Controls and Requirements for VVT Systems
 - .1 Where VVT controls are specified, units are to operate as part of a Variable Volume/Variable Temperature System complete with all necessary controls including zone dampers, temperature sensors, static pressure sensor probes and bypass damper.

2.3 CONTROL PANELS

- .1 Control panels shall be fully enclosed cabinets with all steel construction. Cabinets shall have a hinged door with locking latch or bolt-on cover plate. All cabinet locks shall be common keyed. Cabinets shall be finished with two coats of paint.

2.4 TEMPERATURE SENSORS

- .1 Provide thermistor temperature sensors, not requiring transmitters, to measure temperature.
- .2 Accuracy shall be +/-0.2°C from 0 to 70°C.
- .3 Temperature sensors shall be Greystone EC200 series.
- .4 Space sensors in occupied areas shall be type AE or equal having an integral push button for unoccupied override and an integral slider to adjust set point (LED display not required).
- .5 In corridors and where noted on the drawings, provide stainless steel plate type sensors (push button override and LED display not required), type AS.
- .6 Duct temperature sensors shall be type B having a stainless steel probe length to suit application and ABS enclosure. Duct averaging temperature sensors shall be type FD having an element length to suit application, copper probe and ABS enclosure.
- .7 Immersion temperature sensors shall be type C having a ¼" OD stainless steel probe, 4" long and ABS enclosure. Immersion sensors shall be complete with thermowells. Thermal conductive compound shall be added inside the thermowell to provide optimum thermal transfer from the fluid to sensor. Stainless steel thermowells shall be used for steel pipe and brass thermowells shall be used in copper pipe.

2.5 CARBON DIOXIDE SENSORS

- .1 Sensors shall Greystone CDD series or equal having the following features:
 - .1 0-2000 ppm factory default detection range, field adjustable.
 - .2 Non-dispersive infrared sensing element with self-calibration algorithm.
 - .3 Guaranteed 5 year calibration interval.
 - .4 Powered by either AC or DC source.
 - .5 Accuracy: within 50 ppm or 3% of reading (whichever is greater).
 - .6 Operating humidity range: 0-95% RH.
 - .7 Operating temperature range: 0 to 50°C or greater.
 - .8 Stability: less than 2% full scale in 15 years
 - .9 Response time: less than 2 minutes for 90% step change.
- .2 Duct mounted sensors shall be complete with ABS enclosure complete with sampling tube.
- .3 Space mounted sensors shall be executive space type without LCD display.

2.6 MOTORIZED CONTROL DAMPERS (PROVIDED BY BAS, INSTALLED BY MECH.)

- .1 Control dampers shall be the parallel or opposed blade type as below or as scheduled on drawings.
 - .1 Outdoor and/or return air mixing dampers and face and bypass (F & BP) dampers shall be parallel blade, arranged to direct air-streams toward each other.
 - .2 Other modulating dampers shall be the opposed blade type.
 - .3 Two-position shutoff dampers may be parallel or opposed blade type with blade and side seals.
- .2 Damper frames shall be 13 gauge galvanized steel channel or 1/8 in. extruded aluminum with reinforced corner bracing.
- .3 Damper blades shall not exceed 20 cm (8 in.) in width or 125 cm (48 in.) in length. Blades are to be suitable for medium velocity performance (10 m/s [2000 fpm]). Blades shall be not less than 16 gauge.
- .4 Damper shaft bearings shall be as recommended by manufacturer for application, oil impregnated sintered bronze or better.
- .5 All blade edges and top and bottom of the frame shall be provided with replaceable butyl rubber or neoprene seals. Side seals shall be spring-loaded stainless steel. The blade seals shall provide for a maximum leakage rate of 50 L/s m² (10 cfm per ft²) at 1000 Pa (4 in. w.g.) differential pressure. Provide air foil blades suitable for a wide-open face velocity of 7.5 m/s (1500 fpm).
- .6 Individual damper sections shall not be larger than 125 cm x 150 cm (48 in. x 60 in.). Provide a minimum of one damper actuator per section.
- .7 Modulating dampers shall provide a linear flow characteristic where possible.
- .8 Dampers shall have exposed linkages.

2.7 WATER CONTROL VALVES

- .1 Heating and cooling control valves shall be Belimo CCV series characterized ball valves, complete with chrome plated brass trim and NPT female pipe connections. Radiation valves shall be complete with non-spring return modulating actuators. Control valves for coils heating a portion of outdoor air shall have spring return modulating actuators.
- .2 Control valves shall be sized to provide approximately one half the circuit branch pressure drop to obtain good modulation control but they shall be no smaller than two pipe sizes less than the pipe they are installed in.

Part 3 Execution

3.1 INSTALLATION

- .1 Installation
 - .1 All controllers and components in the system and on the network shall be installed according to manufacturer recommendations, general installation standards for digital controls and in accordance with the approved shop drawings.
 - .2 Locate room sensors in the locations shown on the mechanical drawings. All sensors shall be mounted at barrier free height (3'-11" (1175 mm) above finished floor).
 - .3 All control components for off site system access shall be located where noted on the drawings. The Electrical Contractor shall provide all required connections / cabling for off site access to the web access components.
 - .4 All programmable controllers, web access components, relays and other control components shall be located within control panels. Control Panels shall be wall mounted and shall be located within suspended ceiling spaces or other locations approved by the Consultant.
 - .5 The Electrical Contractor will provide hand-off-auto switches in all starters controlled by the BAS.
- .2 Generally duct mount carbon dioxide sensors shall be used where specified for air handling units; but, for gyms and single zone libraries, a wall mount carbon dioxide sensor shall be mounted next to the room temperature sensor.
- .3 All carbon dioxide levels which are measured by the carbon dioxide sensors shall be made available to the Owner in the form of trend logs. Record readings at 10 minute intervals and keep them for at least 30 days.
- .4 Freeze-stats shall be installed so that their sensing element runs horizontally across the coil face (not diagonally) with no more than 12" vertical drops at the outside coil frame. The full face of the coil shall be covered with no horizontal runs being more than 12" apart. The top and bottom horizontal run shall be within 6" of the coil frame. If more than one freezestat is required they shall be wired in series in order to detect a low temperature in portion of the coil. The sensing elements shall be firmly secured in place to avoid vibration without added air restriction.

3.2 SYSTEM START-UP AND ACCEPTANCE

- .1 Upon completion of installation, test, adjust and calibrate controls provided under this Section.

- .2 On system completion, a demonstration of complete system operation shall be made to the Owner's authorized representative and Consultant.
- .3 The Consultant shall verify through the Owners representatives that the entire system is complete and operating to the satisfaction of the Owner before final acceptance is approved.

3.3 TRAINING

- .1 The Contractor shall provide competent instructors to give full instruction to designated personnel in the adjustment, operation and maintenance of the system installed rather than a general training course. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach. All training shall be held during normal work hours of 8:00 a.m. to 4:30 p.m. weekdays as follows:
- .2 Provide 4 hours of training for Owner's operating personnel. Training shall include:
 - .1 Explanation of drawings, operations, and maintenance manuals
 - .2 Explanation of web access program
 - .3 Explanation of adjustment procedures
 - .4 Trend Analysis

3.4 WARRANTY

- .1 Warranty Start Date:
 - .1 Warranty period starts as of the date of Ready for Takeover.
 - .2 Warranty start dates based on shipment date, start up date, substantial completion date, etc. are not applicable.
- .2 Warranty Duration:
 - .1 Warrant in writing, all provided equipment, accessories, installations, software and firmware against defects in workmanship and materials for a period of two year commencing from the date of Ready for Takeover.
 - .2 Maintain the affected parts operational during repair of defective equipment covered by the warranty.
 - .3 Provide warranty service at no cost to the owner for the guarantee period, this shall include, but not limited to the following:
 - .1 Emergency repair service on regular working hour basis during warranty.
 - .2 Replacing defective parts and components as required.
 - .3 Servicing by factory trained and employed service representatives of system manufacture.
 - .4 System software support.
 - .4 Supplier shall have an in-place support facility within 32 km (20 miles) of the site with technical staff, spare parts inventory and all necessary test and diagnostic equipment.

- .3 Warranty Coverage:
 Applies to parts and labour.

3.5 IDENTIFICATION

- .1 Provide system identification and provide nameplates identifying the following (nameplates shall be keyed to the wiring diagrams):
 - .1 Duct mounted sensors.
 - .2 Control panels (identify as to equipment / systems controlled). Each panel shall include an as-built drawing showing all the connected control points.

3.6 TESTING AND BALANCING

- .1 During the system testing and balancing by the Testing and Balancing Agency, demonstrate the operation of all controls. During balancing procedures, set controls to a fixed mode (bypass damper locked fully closed and all zone dampers locked fully open) to prevent any changes during the balancing procedure.

3.7 ELECTRICAL WIRING

- .1 All wiring shall be installed to the standards specified in the Electrical Division.
- .2 Use Echelon recommended jacket cable for all network wiring, colour-coded to WRDSB standards.
- .3 Run all wiring in EMT conduit where exposed, where running within new concrete block walls and where required by the Ontario Electrical Code. Plenum rated cable shall be used in return air ceiling plenums.
- .4 Control relays necessary for BAS operation shall be provided by the Temperature Control Contractor but all contactors and their power supplies handling power wiring to the equipment shall be by the Electrical Contractor.

Part 4 Sequence of Operation

4.1 GENERAL

- .1 All setpoints shall be adjustable.
- .2 Outdoor air temperature shall be broadcasted to all controllers.
- .3 Heating mode: Heating is enabled between October 15 and April 15 or if the outdoor air temperature is below 10°C. This heating mode is used in all controllers for the building.

- .4 Cooling Mode: Mechanical cooling is enabled if the outdoor air temperature is above 18°C.
- .5 Occupancy mode shall be determined by a weekly schedule with an annual holiday schedule. Each system shall have this schedule but there shall be provision for operating under a general (to the building) schedule as well. An adjustable parameter shall be available to select the local or general schedule for each system.
- .6 Lead/lag: Devices designed for lead lag operation shall operate in automatic lead/lag mode to equalize run time. If the lead unit fails the lag shall automatically start and an alarm shall be generated. The lead unit shall be advanced through the series of devices in sequence every Tuesday at noon.
- .7 Guidance Office heating:
 - First stage heat: perimeter radiation
 - First stage heating through RTU: supply air discharge temperature set to 20°C (lock out on cooling)
 - heat provided from heatpump down to 5°C
 - below 5°C heat is provided by 2 stages of gas heat.

4.2 EQUIPMENT SERVICES

- .1 See the graphical sequence of operations attached (for reference only) at the end of this specification for equipment and systems. Please note that this is not a complete representation of all equipment and systems. Controls contractor to review all drawings and specifications and provide complete controls and sequence.

END OF SECTION

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END OF SECTION

Part 1 General

1.1 GENERAL

- .1 This Section covers items common to Electrical Division 26, as well as Division 27 and Division 28.**
- .2 This section supplements requirements of Division 1.
- .3 Furnish labour, materials, and equipment necessary for completion of work as described in contract documents.

1.2 INTENT

- .1 Mention herein or indication on Drawings of articles, materials, operations, or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated: and, performance of each operation prescribed with furnishing of necessary labour, equipment, and incidentals for electrical work.
- .2 Where used, words "Section" and "Division" shall also include other Subcontractors engaged on site to perform work to make building and site complete in all respects.
- .3 Where used, word "supply" shall mean furnishing to site in location required or directed complete with accessory parts.
- .4 Where used, word "install" shall mean secured in place and connected up for operation as noted or directed.
- .5 Where used, word "provide" shall mean supply and install as each is described above.

1.3 TENDERS

- .1 Submit tender based on specified described equipment or Alternates listed.
- .2 State in Tender, names of all Subcontractors proposed for work under this Division.

1.4 LIABILITY INSURANCE

- .1 This contractor must maintain and produce at the request of the consultant proof of proper insurance to fully protect the owner, the consultant and the contractor from any and all claims due to accidents, misfortunes, acts of God, etc.

1.5 ELECTRICAL SAFETY AUTHORITY

- .1 The contractor is to determine general inspection fees with Electrical Safety Authority and include as part of tender.

- .2 A submission has been made (if required by this scope of project) by the consultant to the Electrical Safety Authority for review of this project. The payment of the required review costs will be coordinated by the consultant. A copy of the Electrical Safety Authority review report will be forwarded to the successful contractor for information and action. Contractor will not be responsible for these review costs.

1.6 DRAWINGS

- .1 Electrical Drawings do not show structural and related details. Take information involving accurate measurement of building from building drawings, or at building. Make, without additional charge, any necessary changes or additions to runs of conduits and ducts to accommodate structural conditions. Location of conduits and other equipment may be altered by the consultant without extra charge provided change is made before installation and does not necessitate major additional material.
- .2 As work progresses and before installing fixtures and other fittings and equipment which may interfere with interior treatment and use of building, provide detail drawings or obtain directions for exact location of such equipment and fitments.
- .3 Electrical drawings are diagrammatic. Where required work is not shown or only shown diagrammatically, install same at maximum height in space to conserve head room (minimum 2200 mm (88") clear) and interfere as little as possible with free use of space through which they can pass. Conceal wiring, conduits and ducts in furred spaces, ceilings and walls unless specifically shown otherwise. Install work close to structure so furring will be small as practical.
- .4 Before commencing work, check and verify all sizes, locations, grades, elevations, levels and dimensions to ensure proper and correct installation. Verify existing/municipal services.
- .5 Locate all electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.
- .6 In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install services so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose.
- .7 Relocate equipment and/or material installed but not co-ordinated with work of other Sections as directed, without extra charge.
- .8 Where drawings are done in metric and product not available in metric, the corresponding imperial trade size shall be utilized.

1.7 INTERFERENCE AND CO-ORDINATION DRAWINGS

- .1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the constructed spaces provided.
- .2 Prepare drawings to indicate co-ordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are co-ordinated.
- .3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.
- .4 Upon consultant's request submit copies of interference drawings to the consultant.
- .5 Due to the nature of the building and the complexity of the building systems provide the following:
 - .1 Interference drawings, showing coordination of architectural, structural, mechanical, and electrical systems for the consultant's review prior to fabrication.
 - .2 Detailed equipment room drawings clearly showing all distribution equipment.
 - .3 Detailed layout drawings clearly showing conduit/feeder runs 78mm diameter or larger, including hangers or tray.
- .6 Provide CAD drawings (minimum file version AutoCAD 2013) in addition to hard copies.

1.8 QUALITY ASSURANCE

- .1 The installations of the division must conform to the latest edition of the Electrical Safety Code as well as its supplemental bulletins and instructions. Provide materials and labour necessary to comply with rules, regulations, and ordinances.
- .2 Complete underground systems in accordance with CSA C22.3 No. 7-94 except where specified otherwise.
- .3 Abbreviations for electrical terms: to CSA Z85-1983.
- .4 In case of differences between building codes, provincial laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify consultant in writing of such differences.

1.9 ALTERNATES AND SUBSTITUTIONS

- .1 Throughout these sections are lists of "Alternate Equipment" manufacturers acceptable to consultant if their product meets characteristics of specified described equipment.
- .2 Each bidder may elect to use "Alternate Equipment" from lists of Alternates where listed. Include for any additional costs to suit Alternated used. Prices are not required in Tender for Alternates listed except where specifically noted as "Separate Price". Complete the Supplementary Tender Form.

- .3 When two or more suppliers/manufacturers are named in the Bid Documents, only one supplier/manufacturer of the products named will be acceptable; however, it is the responsibility of this Division to ensure "Alternate Equipment" fits space allocated and gives performance specified. If an "Alternate Equipment" unit is proposed and does not fit space allotted nor equal specified product in consultant's opinion, supply of specified described equipment will be required without change in Contract amount. Only manufacturers listed will be accepted for their product listing. All other manufacturers shall be quoted as substitution stating conditions and credit amount.
- .4 If item of material specified is unobtainable, state in Tender proposed substitute and amount added or deducted for its use. Extra monies will not be paid for substitutions after Contract has been awarded.

1.10 EXAMINATION

- .1 Site Reviews
 - .1 Examine premises to understand conditions, which may affect performance of work of this Division before submitting proposals for this work.
 - .2 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.
- .2 Drawings
 - .1 Electrical Drawings show general arrangement of fixtures, power devices, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
 - .2 Consider Architectural, Mechanical, and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Electrical Drawings.
 - .3 Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories, which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings and accessories required to meet conditions.
- .3 Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

1.11 SEQUENCING AND SCHEDULING

- .1 It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of Contract Documents. Anything not clear or in conflict will be explained by making application to consultant. Should conditions arise where certain changes would be advisable, secure consultant's approval of these changes before proceeding with work.
- .2 Coordinate work of various trades in installing interrelated work. Before installation of electrical items, make proper provision to avoid interferences in a manner approved by consultant. Changes required in work specified in these sections caused by neglect to do so shall be made at no cost to owner.
- .3 Arrange fixtures, conduit, ducts, and equipment to permit ready access to junction boxes, starters, motors, control components, and to clear openings of doors and access panels.
- .4 Furnish and install inserts and supports required by these sections unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by the electrical trade.
- .5 Adjust locations of ducts, conduits, equipment, fixtures, etc., to accommodate work from interferences anticipated and encountered. Determine exact route and location of each conduit and duct prior to installation.
 - .1 Make offsets, transitions, and changes in direction of ducts, and electrical raceways as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
 - .2 Supply and install pull boxes, etc., as required to affect these offsets, transitions, and changes in direction.

1.12 REQUEST FOR INFORMATION (RFI) PROCEDURES

- .1 RFIs shall be submitted to the consultant minimum two (2) weeks prior to answer being required. Failure to submit and RFI in a timely manner will forfeit delay claims and schedule extension requests by the contractor.
- .2 All RFIs will be submitted with the following information:
 - .1 RFI number
 - .2 Name of project
 - .3 Date of initiation
 - .4 Date response required by (minimum two (2) weeks)
 - .5 Subject
 - .6 Submitter's name

- .7 Drawing/specification reference
- .8 Photograph of the issue (if applicable)
- .9 Description of the issue
- .10 Contractor's proposed resolution

1.13 DRAW BREAKDOWN

- .1 This contractor MUST submit a breakdown of the tender price into classifications to the satisfaction of the consultant, with the aggregate of the breakdown totaling the total contract amount. **Each item must be broken out into material and labour costs.** Progress claims, when submitted are to be itemized against each item of the draw breakdown. This shall be done in table form showing contract amount, amount this draw, total to date, % complete and balance.
- .2 Breakdown shall be as follows:
 - .1 Permits and fees
 - .2 Mobilization (maximum 1%)
 - .3 Demolition
 - .4 Panelboards and miscellaneous distribution equipment
 - .5 Feeder conduits
 - .6 Branch conduits
 - .7 Feeder cables
 - .8 Branch wiring
 - .9 Lighting fixtures (interior)
 - .10 Emergency lighting
 - .11 Fire alarm system devices and verification
 - .12 Starters, contactors, and control devices
 - .13 Wiring for mechanical equipment
 - .14 **Integrated Life Safety System Testing**
 - .15 Commissioning (minimum 3%)
 - .16 Electrical contractor closeout requirements (minimum of 3% but not less than \$2,500.00)
- .3 The breakdown must be approved by the consultant prior to submission of the first draw.
- .4 Breakdowns not complying to the above will not be approved.
- .5 Breakdown must indicate total contract amount.
- .6 **Mobilization amount may only be drawn when all required shop drawings have been reviewed by the consultant.**

1.14 SHOP DRAWINGS AND PRODUCT DATA

.1 General

- .1 Furnish complete catalog data for manufactured items of equipment to be used in the work to consultant for review within 14 days after award of Contract.
- .2 Upon receipt of reviewed shop drawing, product is to be ordered immediately.
- .3 Provide a complete list of shop drawings to be submitted prior to first submission.
- .4 Before submitting to the consultant, review all shop drawings to verify that the products illustrated therein conform to the Contract Documents. By this review, the contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers, and similar data and that it has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The contractor's review of each shop drawings shall be indicated by stamp, date and signature of a qualified and responsible person possessing by the appropriate authorization.
- .5 If material or equipment is not as specified or submittal is not complete, it will be rejected by consultant.
- .6 Additional shop drawings required by the contractor for maintenance manuals, site copies etc., shall be photocopies of the "reviewed" shop drawings. All costs to provide additional copies of shop drawings shall be borne by the contractor.
- .7 **Submit all shop drawings for the project as a package. Partial submittals will not be accepted.**
- .8 Catalog data or shop drawings for equipment, which are noted as being reviewed by consultant or his engineer shall not supersede Contract Documents.
- .9 Review comments of consultant shall not relieve this Division from responsibility for deviations from Contract Documents unless consultant's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.
- .10 Check work described by catalog data with Contract Documents for deviations and errors.
- .11 Shop drawings and product data shall show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances. e.g. access door swing spaces.
- .12 Shop drawings and product data shall be accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Manufacturer test data where requested.
 - .3 Manufacturer to certify as to current model production.
 - .4 Certification of compliance to applicable codes.

- .13 State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. List on catalog covers page numbers of submitted items. Underline applicable data.
- .14 **If a shop drawing is returned “reviewed as noted” this contractor must provide written indication that the comments have been complied with.**
- .15 A partial list of shop drawings includes:
 - .1 Panelboards
 - .2 Fire alarm system devices
 - .3 Luminaires and drivers
 - .4 Emergency battery units, exit signs, and fixtures
 - .5 Starters, contactors, and control devices
 - .6 Firestopping materials
 - .7 Wiring devices
 - .8 Lighting controls
 - .9 Disconnect switches and fuses
 - .10 Co-ordination study and arc flash hazard analysis
 - .11 Integrated Life Safety System Testing Plan (ITP)
- .2 Submissions shall be submitted electronically as per the following directions:
 - .1 Electronic Submissions:
 - .1 Electronically submitted shop drawings shall be prepared as follows:
 - .1 Use latest software to generate PDF files of submission sheets.
 - .2 Scanned legible PDF sheets are acceptable. Image files are not acceptable.
 - .3 PDF format shall be of sufficient resolution to clearly show the finest detail.
 - .4 PDF page size shall be standardized for printing to letter size (8.5"x11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11"x17".
 - .5 Submissions shall contain multiple files according to section names as they appear in Specification.
 - .6 File names shall include consultant project number and description of shop drawing section submitted.
 - .7 Each submission shall contain an index sheet listing the products submitted, indexed in the same order as they appear in the Specification. Include associated PDF file name for each section.

- .8 On the shop drawing use an “electronic mark” to indicate what is being provided.
- .9 **Each file shall bear an electronic representation of the “company stamp” of the contractor. If not stamped the file submission will not be reviewed.**
- .2 Email submissions shall include subject line to clearly identify the consultants’ project number and the description of the shop drawings submitted.
- .3 Electronic attachments via email shall not exceed 10MB. For submissions larger than 10MB, multiple email messages shall be used. Denote related email messages by indicating “1 of 2” and “2 of 2” in email subject line for the case of two messages.
- .4 Electronic attachments via web links (URL) shall directly reference PDF files. Provide necessary access credentials within link or as username/password clearly identified within body of email message.
- .5 On site, provide one (1) copy of the “reviewed” shop drawings in a binder as noted above.
- .6 Contractor to print copies of “reviewed” shop drawings and compile into maintenance manuals in accordance with requirements detailed in this section.

1.15 CARE, OPERATION AND START-UP

- .1 Instruct consultant and operating personnel in the operation, care and maintenance of equipment.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation and ensure that operating personnel are conversant with all aspects of its care and operation.

1.16 VOLTAGE RATINGS

- .1 Operating voltages: to CAN3-C235-83.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.17 PERMITS, FEES, AND INSPECTION

- .1 A submission has been made (if required by this scope of project) by the consultant to the Electrical Safety Authority for review of this project. The payment of the required review costs will be co-ordinated by the consultant. A copy of the Electrical Safety Authority review report will be forwarded to the successful contractor for information and action.
- .2 The contractor is required to include in his tender all required inspection costs by the Electrical Safety Authority. Permit application is the responsibility of the contractor.
- .3 Reproduce drawings and specifications required by Electrical Safety Authority at no cost.
- .4 Notify consultant of changes required by Electrical Safety Authority prior to making changes.
- .5 Furnish Certificates of Acceptance to consultant from Electrical Safety Authority and other authorities having jurisdiction upon completion of work.
- .6 This contractor must furnish any certificates required to indicate that the work completed conforms with laws and regulations of authorities having jurisdiction.

1.18 ADDITIONAL INSTALLED EQUIPMENT

- .1 The electrical contractor is to review all specification sections forming part of the electrical bid documents and include additional equipment or components, as well as all associated installation costs and testing costs as noted, in the electrical bid price.

1.19 MATERIALS AND EQUIPMENT

- .1 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Safety Authority.
- .2 Factory assemble control panels and component assemblies.

1.20 ELECTRIC MOTORS, EQUIPMENT, AND CONTROLS

- .1 Supplier and installer responsibility is indicated in the Equipment Wiring Schedule on electrical drawings.
- .2 Control wiring and conduit is specified in the Electrical specifications except for conduit, wiring and connections below 50 V, which are related to control systems specified in the Mechanical specifications.

1.21 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint outdoor electrical equipment "equipment green" finish.
 - .2 Paint indoor switchgear and distribution enclosures light grey.

- .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean and prime exposed non-galvanized hangers, racks, fastenings, and conduits etc. to prevent rusting.

1.22 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates as follows:
- .2 Nameplates:
 - .1 Lamicoid 3 mm (1/8") thick plastic engraving sheet, black face, white core, mechanically attached with self tapping screws.

NAMEPLATE SIZES

Size 1	9 mm x 50 mm (3/8" x 2")	1 line	3 mm (1/8") high letters
Size 2	12 mm x 70 mm (1/2" x 2 1/2")	1 line	5 mm (3/16") high letters
Size 3	12 mm x 70 mm (1/2" x 2 1/2")	2 lines	3 mm (1/8") high letters
Size 4	20 mm x 90 mm (3/4" x 3 1/2")	1 line	9 mm (3/8") high letters
Size 5	20 mm x 90 mm (3/4" x 3 1/2")	2 lines	5 mm (3/16") high letters
Size 6	25 mm x 100 mm (1" x 4")	1 line	12 mm (1/2") high letters
Size 7	25 mm x 100 mm (1" x 4")	2 lines	6 mm (1/4") high letters

- .3 Wording on nameplates labels to be approved by consultant prior to manufacture.
- .4 Allow for average of twenty-five (25) letters per nameplate.
- .5 Identification to be English.
- .6 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .7 Nameplates for disconnects, starters and contactors must indicate equipment being controlled and voltage.
- .8 Nameplates for transformers must indicate transformer label as indicated and capacity, primary, and secondary voltages.

1.23 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour code: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

1.24 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m (45') intervals.
- .3 Colour bands must be 25 mm (1") wide.

	<u>Prime</u>
Up to 208 V	yellow
209 to 600 V	white
Voice system	green
Data system	orange
Security	brown
Public address	black
Cable TV	blue
Fire alarm	red
- .4 This contractor must paint all system junction boxes and covers in conformance with the above schedule.

1.25 PROTECTION OF OPENINGS

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

1.26 WIRING TERMINATIONS

- .1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.27 MANUFACTURERS AND CSA LABELS

- .1 All labels must be visible and legible after equipment is installed.

1.28 WARNING SIGNS

- .1 To meet requirements of Electrical Safety Authority and consultant.
- .2 Provide porcelain enamel signs, with a minimum size of 175 mm x 250 mm (7" x 10").

1.29 LOCATION OF OUTLETS

- .1 Do not install outlets back-to-back in wall; allow minimum 150 mm (6") horizontal clearance between boxes.
- .2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3 m (10'), and information is given before installation.
- .3 Locate light switches on latch side of doors. Locate disconnect devices in mechanical and elevator machine rooms on latch side of door.

1.30 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise. Coordinate with block coursing (if applicable).
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
 - .1 Local switches: 1100 mm (43.3").
 - .2 Wall receptacles:
 - .1 General: 400 mm (16").
 - .2 Above top of continuous baseboard heater: 200 mm (8").
 - .3 Above top of counters or counter splash backs: 100 mm (4").
 - .4 In mechanical rooms: 1200 mm (48").
 - .3 Panelboards: as required by Code or 1400 mm (56").
 - .4 Voice/Data outlets: At height of adjacent outlet or at 400 mm (16").
 - .5 Fire alarm stations: 1200 mm (3'-11").
 - .6 Fire alarm visual and signal devices: 2250 mm (88 ½").
 - .7 Television outlets: 400 mm (16").
 - .8 Thermostat: 1200 mm (3'-11").
 - .9 Clocks: 2100 mm (84").
 - .10 Heaters: 200 mm (8" AFF) to bottom of heater.
 - .11 Emergency call switches and/or pushbuttons: 900 mm (36").

1.31 LOAD BALANCE

- .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
- .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- .3 Submit, at completion of work, report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

1.32 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete shall be schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm (2") beyond either side.

- .2 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

1.33 FIELD QUALITY CONTROL

- .1 Conduct and pay for following tests:
 - .1 Power distribution system including phasing, voltage, grounding, and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
 - .5 Systems: fire alarm system, communications, security.
- .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 Insulation resistance testing.
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
- .4 Carry out tests in presence of consultant.
- .5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .6 Submit test results for consultant's review.

1.34 EQUIPMENT NAMEPLATE DATA

- .1 Refer to the Equipment Wiring Schedule, Distribution Diagram(s) and Panel Schedules for information regarding the designed electrical connections for all equipment to be connected to the electrical distribution system.
- .2 Refer to the shop drawing submissions of all project divisions and coordinate with all trades and equipment manufacturers throughout the construction period for equipment connection requirements.
- .3 This electrical trade shall be responsible to coordinate any discrepancies on equipment minimum circuit ampacity, maximum overcurrent protection, voltage and phase, between the equipment manufacturer published literature, the equipment shop drawing submission, the project design drawings equipment wiring schedule, and the nameplate data on the equipment. The contractors installing and connecting all equipment shall be responsible for the coordination of this data through the construction period.

- .4 Equipment shall not be connected where the specified maximum overcurrent protection and minimum circuit ampacity values do not meet the requirements of the equipment nameplate data on site.
- .5 Electrical distribution equipment shop drawings shall not be submitted prior to approval of equipment to be connected including, but not limited to, mechanical units, pumps, elevators, etc. Electrical distribution equipment shall not be released into production until all connected equipment requirements are confirmed and included in approved shop drawings.
- .6 Where nameplate data of equipment on site varies from that data listed in the approved equipment shop drawings, the consultant shall be notified in writing, and the equipment shall not be connected until the equipment connection details are confirmed. The final installation must meet the nameplate data of the equipment on site.
- .7 No subsequent allowance for time or money for changes to breakers, wiring and conduit, or equipment sizes will be considered for any consequence related to failure by the electrical trade to coordinate final equipment connection requirements with nameplate data and electrical distribution equipment shop drawings.

1.35 CO-ORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings as indicated on drawings or as determined from co-ordination study.
- .2 Electrical connections to all equipment requiring connection to the electrical distribution system as part of this electrical tender have been specified according to the anticipated equipment manufacturer electrical requirements and the applicable sections of the OESC. This contractor must coordinate electrical connections to all equipment specified to be connected as part of this electrical tender.
- .3 Prior to submitting electrical distribution shop drawings to the consultant, review all shop drawings for all equipment specified for connection to the electrical distribution system to verify that the product electrical connection requirements listed by the manufacturer conform to the equipment electrical connections specified on the electrical design drawings and specifications. Make necessary revisions to breaker ratings associated with the review of all product shop drawings and identify such changes as part of the electrical distribution equipment shop drawing submission.
- .4 Prior to making final equipment connections, this electrical contractor shall examine equipment nameplates at the project site to confirm voltage and phase requirements, minimum circuit ampacity and maximum overcurrent protection values, and bring to the attention of the consultant in writing any connection requirements which may vary from the designed connections or approved electrical distribution shop drawings. No subsequent allowance for time or money for changes to breaker or wire and conduit sizes will be considered for any consequence related to failure to examine site conditions.

1.36 GUARANTEE AND WARRANTY

- .1 At ready for takeover of this project this Contractor must provide a written guarantee indicating that any defects, not due to ordinary wear and tear or improper use which occur within the first **TWO YEARS** from the date of ready for takeover will be corrected at the contractor's expense.
- .2 **If the electrical sub-contractor's office is 50 kilometers (30 miles) or more from the project site, the sub-contractor is to provide a service/warranty work agreement for warranty period with a local electrical sub-contractor approved by consultant. Include copy of service/warranty agreement in warranty section of operation and maintenance manual.**
- .3 Warranty period shall start from date of ready for takeover completion.
- .4 Refer to individual specification sections for information on any special manufacturer's equipment warranties.

1.37 SYSTEM START UP

- .1 Provide consultant with written notice verifying all equipment operation and installation is complete prior to scheduled start-up period.
- .2 Start up shall be in presence of the following: owner or representative, contractor, and manufacturer's representative. Each person shall witness and sign off each piece of equipment. Consultant's attendance will be determined by consultant.
- .3 Arrange with all parties and provide 72 hours notice for start up procedure.
- .4 Simulate system start up and shut down and verify operation of each piece of equipment.
- .5 These tests are to demonstrate that the systems and equipment installed are operational as specified.
- .6 The contractor must describe during the start up session the required maintenance for each piece of equipment according to the manufacturer.
- .7 The contractor must provide all necessary tools (including a digital multimeter) to successfully complete the start up procedure.

1.38 OPERATION AND MAINTENANCE MANUAL

- .1 Provide operation and maintenance data for incorporation into manual as specified in other Sections of this Division.

- .2 Operation and maintenance manual to be approved by, and final copies deposited with, consultant before final inspection.
 - .1 Submit one (1) copy of Operation and Maintenance Manual to consultant for review and approval. Submission of individual data will not be accepted unless so directed by consultant. Submission can be done electronically in PDF format or as a hard copy.
 - .1 Electronic submission/PDF file is required to be bookmarked. Any submission received without bookmarking will be immediately returned as unacceptable.
 - .2 Hard copy submission shall be in a three-ring binder (minimum 50 mm (2") ring) and labelled as 'Operation and Maintenance Manual' with project name and location. Dividers are to be used for binder organization.
 - .2 Make changes as required and re-submit as directed by consultant.
- .3 Each manual must include (in "tabbed" sections) the following:
 - .1 Index
 - .2 List of General, Mechanical, Electrical Contractors and all associated sub-contractor names, addresses and contact numbers.
 - .3 List of suppliers and equipment wholesalers local to the project.
 - .4 Letter of contractor's warranty and guarantee for all parts, equipment and workmanship.
 - .5 WRDSB Project Asset and Warranty Card for all assets replaced, newly installed, and removed.
 - .6 List of manufacturers, spare parts list and source.
 - .7 Copy of typewritten schedules for all new and renovated panels.
 - .8 Copy of all substantial performance final certificates.
 - .9 Copy of electrical shop drawings which have been stamped and reviewed by consultant.
 - .10 Electrical As-built drawings including contractor company's as built stamp.
 - .11 Coordination study/Arc flash hazard study shop drawings
 - .12 Any special warranties on equipment required (i.e. LED lighting, digital lighting control, SPDs, power generation).
 - .13 Certificate of completion from all associated sub-contractors.
 - .14 Cable test results and floor plans containing address labels.
 - .15 System commissioning certificate and report.

- .4 Final Submittals:
 - .1 Upon acceptance of Operation and Maintenance Manual by the consultant, provide the following:
 - .1 Provide two (2) copies of final Operation and Maintenance Manuals, as well as a PDF file of the entire approved manual on a USB stick. Only one (1) USB stick is to be provided containing both the approved manual and as-built drawings.

1.39 AS-BUILT DRAWINGS

- .1 Site records:
 - .1 Contractor shall provide two (2) sets of reproducible electrical drawings. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include field and contract changes to electrical systems.
 - .2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection at all times.
- .2 As-built drawings submittal for review:
 - .1 Identify **each drawing** in lower right-hand corner in letters at least 3 mm (1/8") high as follows: - "AS-BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW ELECTRICAL SYSTEMS AS INSTALLED" (Company Name) (Signature of Contractor) (date).
 - .2 Submit copy to consultant for approval. When returned, make corrections (if any) as directed.
- .3 As-built drawings final submittal:
 - .1 Once approved, submit completed, reproducible paper as-built drawings as well as a scanned PDF file copy on USB stick with Operation and Maintenance Manuals.

1.40 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTIONS

- .1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .2 Manufacturers or their representatives are to provide demonstrations and instructions.
- .3 Use operation and maintenance manual, As-built drawings, audio visual aids, etc. as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.

- .5 Where deemed necessary, consultants may record these demonstrations on video tape for future reference.

1.41 READY FOR TAKEOVER

- .1 Complete the following to the satisfaction of the consultant prior to request for ready for takeover.
 - .1 As-built Drawings
 - .2 Maintenance Manuals
 - .3 System Start up
 - .4 Instructions to Owners
 - .5 Coordination Study / Arc Flash Hazard (including photos of each breaker)
 - .6 Lighting Control System
 - .7 **Outlet cover circuit labels**

1.42 TRIAL USAGE

- .1 Consultant or owner may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

1.43 REVISION TO CONTRACT

- .1 Provide the following for each item in a given change notice:
 - .1 Itemized list of material with associated costs.
 - .2 Labour rate and itemized list of labour for each item.
 - .3 Copy of manufacturers/suppliers invoice if requested.

1.44 EQUIPMENT SUPPORTS

- .1 Equipment supports supplied by equipment manufacturer: shall be installed by the electrical contractor.
- .2 Equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of - Structural Steel Section. Submit structural calculations with shop drawings if necessary.
- .3 Mount base mounted equipment on chamfered edge housekeeping pads, minimum of 100 mm (4") high and 150 mm (6") larger than equipment dimensions all around. This installation of this pad shall be the responsibility of the electrical contractor.
- .4 This contractor shall be responsible for providing all anchor bolts and associated formed concrete bases for lighting standards as detailed.

1.45 SLEEVES

- .1 Pipe sleeves: at points where pipes pass through masonry, concrete, or fire rated assemblies and as indicated.

- .2 Schedule 40 steel pipe.
- .3 Sleeves with annular fin continuously welded at midpoint:
 - .1 Through foundation walls.
 - .2 Where sleeve extends above finished floor.
- .4 Sizes: minimum 6 mm (1/4") clearance all around, between sleeve and conduit.
- .5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors.
- .6 Through foundation walls PVC sleeves are acceptable.
- .7 Fill voids around pipes:
 - .1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.
 - .2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.
 - .3 Fill future-use sleeves with easily removable filler.

1.46 FIRESTOPPING

- .1 Firestopping material and installation within annular space between conduits, ducts, and adjacent fire separation.
- .2 Provide materials and systems capable of maintaining effective barrier against flame, smoke, and gases.
- .3 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.
- .4 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation.
- .5 Provide "firewrap" blanket around services penetrating firewalls. Extent of blanket must correspond to ULC recommendations. In general wrap individual conduits with approved firewrap materials on each side of firewall. Refer to architectural drawings for FT ratings. Provide 1 and/or 2 layers of firewrap with transverse and longitudinal seams overlapped and/or butted (second layer offset from first layer). Cut edges are to be sealed with aluminum foil tape. Provide 50 mm stainless steel banding at 200 mm intervals. Install firewrap to manufacturers' recommendations for proper FT rating. Acceptable manufacturers are 3M Firemaster ductwrap or approved equal.
- .6 The firestopping materials are not to shrink, slump or sag and be free of asbestos, halogens and volatile solvents.
- .7 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

- .8 Firestop materials are to be capable of receiving finish materials in those areas, which are exposed and scheduled to receive finishes.
- .9 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.
- .10 Install material and components in accordance with ULC certification, manufacturers instructions and local authority.
- .11 **Submit product literature and installation material on firestopping in shop drawing and product data manual.**
- .12 Acceptable manufacturers:
 - .1 Rectorseal Corporation (Metacaulk)
 - .2 Proset Systems
 - .3 3M
 - .4 Hilti
 - .5 STI Firestop

Note: Fire stop material must conform to requirements of local authorities having jurisdiction. Contractor to confirm prior to application and ensure material used is compatible with that used by other trades on site.

1.47 PAINTING

- .1 Refer to Section Interior Painting and specified elsewhere.
- .2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.
- .3 Prime and touch up marred finished paintwork to match original.
- .4 Restore to new condition, or replace equipment at discretion of consultant, finishes which have been damaged too extensively to be merely primed and touched up.

1.48 ACCESS DOORS

- .1 Supply access doors to concealed electrical equipment for operating, inspecting, adjusting and servicing.
- .2 Flush mounted 600 mm x 600 mm (24" x 24") for body entry and 300 mm x 300 mm (12" x 12") for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches, and anchor straps.
- .3 Material:
 - .1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by consultant.
 - .2 Remaining areas: use prime coated steel.
 - .3 Fire rated areas: provide ULC listed access doors

- .4 Installation:
 - .1 Locate so that concealed items are accessible.
 - .2 Locate so that hand or body entry (as applicable) is achieved.
 - .3 Installation is specified in applicable sections.
- .5 Acceptable materials:
 - .1 Le Hage
 - .2 Zurn
 - .3 Acudor
 - .4 Nailor Industries Inc.

1.49 DELIVERY, STORAGE, AND HANDLING

- .1 Follow Manufacturer's directions in delivery, storage, and protection, of equipment and materials. Contractor to include all costs associated with delivery storage and handling in tender price.
- .2 Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or mechanical injury, but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.

1.50 REPAIR, CUTTING, CORING AND RESTORATION

- .1 Be responsible for required digging, cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of consultant. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.
- .2 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.
- .3 Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
- .4 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.
- .5 Slots, cores and openings through floors, walls, ceilings, and roofs shall be provided by this contractor but performed by a trade specializing in this type of work. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.51 EXISTING SYSTEMS

- .1 Connections into existing systems to be made at time approved by consultant. Request written approval of time when connections can be made.
- .2 Be responsible for damage to existing plant by this work.

1.52 CLEANING

- .1 Clean interior and exterior of all electrical equipment provided including light fixture lenses.
- .2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition.

1.53 ASBESTOS

- .1 If asbestos is suspected or identified cease all work in the immediate area in accordance with OHSA and notify consultant.
- .2 Each contractor and on site employee of the contractor shall have "asbestos awareness training".
- .3 The contractor shall ensure that employees who may come into contact with asbestos due to the nature of the work that they perform, have received training that enables them to recognize asbestos and that enables them to react in accordance with the Occupational Health and Safety Act and regulations thereto should contact with asbestos occur during the course of their work.
- .4 **It is the responsibility of the contractor to review the asbestos book in the building prior to starting any work.**
- .5 Existing occupied buildings (depending upon their age) may contain asbestos in thermal insulating materials and some manufactured products, such as vinyl asbestos floor tile. Any insulating materials, on pipes, fittings, boilers, tanks, ductwork, etc. may contain asbestos and shall not be disturbed.
- .6 **A survey of each building documenting the location and condition of asbestos-containing materials is available for your mandatory review prior to commencing any work on premises.**

1.54 DISCONNECTION AND REMOVAL

- .1 Disconnect and/or remove equipment as indicated.
- .2 Cap and conceal all redundant and obsolete connections.
- .3 Provide a list of equipment to be removed to the owner, for his acceptance of same. Remove all equipment from site, which the owner does not retain.
- .4 Store equipment to be retained by owner on site where directed by consultant.

1.55 OWNER SUPPLIED EQUIPMENT

- .1 Connect to equipment supplied by the owner and make operable.
- .2 Design drawings are diagrammatic and do not necessarily indicate all specific final connection requirements. For the purposes of bidding, electrical trade shall include but not be limited to provision of a junction box to connect equipment wiring tail, provision of suitable disconnecting means, and flexible connection directly to equipment.

1.56 ENCLOSURES

- .1 This contractor must ensure that all electrical equipment mounted in sprinklered areas is provided with an enclosure in conformance with the Electrical Safety Code.

1.57 INTEGRATED LIFE SAFETY SYSTEM TESTING

- .1 The Integrated Life Safety System Testing Coordinator (ITC) shall be hired by the electrical trade as indicated in specification section 26 01 20.
- .2 This electrical contractor shall work with the project Integrated Life Safety System Testing Coordinator (ITC) and participate in all phases of the Integrated Life Safety Systems testing process as specified within CAN/ULC S1001-11 (2024 Rev2 updates) as well as the electrical and architectural specifications.
- .3 During the **Planning Phase** of the Integrated Life Safety Systems Testing process this electrical contractor shall review the Integrated Testing Plan (ITP) and give written confirmation of this review and acknowledgement of affected systems under his responsibility as required by the electrical specifications per the shop drawing submittal process.
- .4 Prior to the building Integrated Life Safety Systems Testing this electrical contractor shall startup/commission/verify the operation of all systems under the responsibility of this electrical trade. This electrical trade shall give written indication of completed systems and provide copies of all inspection reports, start-up reports, commissioning reports, verification reports, etc. when requested by the ITC during the **Implementation Phase**.
- .5 Upon completion of the building Integrated Life Safety Systems Testing this electrical contractor shall rectify all deficiencies related to all systems under his responsibility during the **Testing Phase** in due time for the ITC to verify and document for the project team.

1.58 EXISTING CONCRETE SLAB X-RAY/SCANNING

- .1 This contractor shall retain the services of a qualified company to provide and X-ray and/or scan of the existing buried services in walls and/or floors prior to starting any work in the affected area.
- .2 Failure to locate existing piping, conduit, rebar etc., shall not relieve this contractor of repair of same prior to installing his service.
- .3 This contractor shall be responsible for all repairs and/or replacement of existing services caused by cutting the existing concrete slabs and/or walls.

**TENDER NO. 26-7875-RFT
GRAND RIVER C.I. RENO
KITCHENER, ON
PROJECT NO. 25-092**

**ELECTRICAL
CONTRACT GENERAL
REQUIREMENTS**

**SECTION 26 01 16
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Part 2 Not Used

Part 3 Not Used

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

- .1 Conform to the General Provisions of Division 1 and Electrical General Requirements Section.
- .2 This project is one of a retrofit nature in part, and which will require extensive demolition.
- .3 Allow for all remedial work in areas indicated on the drawings and as generally defined in the relevant sections of the specifications.

1.2 SCOPE OF WORK

- .1 The scope of work is essentially the selected disconnection and/or removal of services and/or equipment, devices etc. as indicated or required to complete the work.

Part 2 Products

2.1 GENERAL

- .1 This Division is to liaise with the Owners or Consultant for equipment being removed that may be suitable for reuse to that specified or handed over to the owner.
- .2 This Division to take full responsibility for any special tools or equipment required to disassemble or remove material from building.

Part 3 Execution

3.1 GENERAL

- .1 The general requirements are indicated on the drawings and on the outline specification in Division 1.
- .2 The general execution of the demolition is to be carried out in a clean and efficient manner.
- .3 Demolition of existing ceiling, walls etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.
- .4 All openings or holes created by removal of existing electrical systems which are not being reused are to be patched with the same material surrounding surfaces.
- .5 All new holes and openings to facilitate electrical systems are to be patched to match surrounding surfaces.

- .6 Protect all existing furnishings materials and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.
- .7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.
- .8 Where unknown services are encountered immediately advise Consultant and confirm findings in writing.
- .9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, etc., immediately after moving on site. Should for any reason the information obtained necessitates changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.
- .10 Disconnect and/or remove equipment, devices, cabling, services, etc. as indicated.
- .11 Remove all redundant and obsolete systems, connections, and wiring.
- .12 Provide a list of equipment to be removed to the owner, for their acceptance of same. Remove all equipment from site that the owner does not retain.
- .13 Maintain equipment to be retained by owner on site where directed by consultant.
- .14 Demolition of all parts of the work must be completed within the confines of the work area and in such a way as the dust produced and risk to injury of will not adversely affect the building users.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

- .1 Section 21 02 51 – FIRE PROTECTION GENERAL REQUIREMENTS and DIVISION 1
- .2 Section 21 22 11 – CLEAN AGENT FIRE SUPPRESSION SYSTEM and DIVISION 1
- .3 Section 23 02 52 – HVAC GENERAL REQUIREMENTS and DIVISION 1
- .4 Section 23 33 17 – SMOKE CONTROL DAMPERS
- .5 Section 26 01 16 – ELECTRICAL GENERAL REQUIREMENTS and DIVISION 1
- .6 Section 28 31 25 – FIRE ALARM SYSTEM (ADDRESSABLE)
- .7 Applicable building systems in item 1.3.10 and as included in all project DIVISIONS.

1.2 REFERENCES

- .1 OBC-2024, Ontario Building Code Compendium.
- .2 CAN/ULC-1001, Integrated System Testing of Fire Protection and Life Safety Systems.
- .3 CAN/ULC-S524, Installation of Fire Alarm Systems.
- .4 CAN/ULC-S537, Verification of Fire Alarm Systems.
- .5 CAN/ULC-S573, Installation of Ancillary Devices Connected to Fire Alarm Systems
- .6 CAN/ULC-S561, Installation and Service for Fire Signal Receiving Centres and Systems
- .7 CAN/ULC-S112, Standard Method of Fire Test of Fire Damper Assemblies
- .8 NFPA 13, Fire Sprinkler Systems
- .9 NFPA 17A, Standard for Wet Chemical Extinguishing Systems
- .10 NFPA 92, Standard for Smoke Control Systems
- .11 NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

1.3 OVERVIEW

- .1 All work shall be performed in accordance with CAN/ULC-1001 Integrated System Testing of Life Safety and Fire Protection Systems, latest edition.
- .2 The Building Code has adopted CAN/ULC-1001 as the standard to comply with Integrated System Testing of Life Safety and Fire Protection Systems. The scope of this project shall follow the strict guidelines laid out in CAN/ULC-1001 for Integrated Testing Planning, review, and implementation.

- .3 The Integrated Testing Plan (ITP) will provide a full overview of all integration points of life safety and fire protection systems. The ITP will be submitted for review to the design professionals and Authority Having Jurisdiction (AHJ). Upon the successful completion of the ITP and all the respective systems, the Integrated Testing Coordinator (ITC) will provide a schedule to the design professionals, the AHJ, and all required participating members for the ITP to be conducted.
- .4 The ITC will review all drawings, specifications, sequence of operations, and methodology prepared by the design professionals, complete with the contractor's shop drawings and manufacture requirements.
- .5 The ITP shall be coordinated with all sub-contractors and suppliers as outlined in item 1.1.
- .6 The ITC will conduct the ITP and will sign each integrated test form, complete with signatures from each participating member of the integrated systems.
- .7 The ITC shall witness all integrations and not rely on the CAN/ULC-S537 Verification Inspection Report for fire protection system integration testing; however, the ITC may attend the verification to validate the testing.
- .8 The ITC will provide all work and ITP including functional documentation, prescribed in CAN/ULC-1001. Such testing and documentation have been deemed to satisfy OBC 2024 Sentence 3.2.9.
- .9 The ITC will provide PDF and digital media copy of the buildings ITP and Integrated System Report (ITR) for the building owner's use, re-testing, and reproduction purpose.
- .10 The systems applicable to the function testing include but not limited to:
 - .1 Fire Alarm System (including sequence of operations) and Monitoring
 - .2 Kitchen Fire Suppression Systems
 - .3 Smoke Damper Assemblies
 - .4 HVAC Shutdown and ON/OFF/Auto Controls

Part 2 Products

2.1 TESTING AND PLANNING

- .1 The Integrated Testing Process must include following:
 - .1 Planning phase by the testing coordinator.
 - .2 Integrated testing plan review by the design professionals.
 - .3 Integrated testing plan review by the AHJ.
 - .4 Review of sequence of operations.
 - .5 System documentation.

- .6 Integrated System Testing Plan consisting of:
 - .1 Project description.
 - .2 Project contacts including applicable project responsibilities.
 - .3 Overview and description of each integrated system.
 - .4 System integrations and functional objective of each integrated system.
 - .5 Integration matrix of all integrated system complete with integration type, normal mode and off-normal mode.
 - .6 Test protocols and procedures of each integrated system,
 - .7 Notifications.
 - .8 Personnel safety.
 - .9 Phased occupancies.
 - .10 Pre-testing documentation checklist.
 - .11 Pre-testing documentation acknowledgement forms.
 - .12 Testing forms.
 - .13 Ongoing integrated system testing forms.
 - .14 Integrated system testing completion form.
 - .15 Integrated testing notes.

2.2 RESPONSIBILITIES

- .1 General Contractor:
 - .1 Coordinate all responsible sub-contractors.
 - .2 Confirm all respective systems listed in item 1.3.10 are complete and fully operational, prior to the ITC commencing the functional testing.
 - .3 Provide reports for respective systems such as, but not limited to; TSSA elevator inspection reports, start-up reports, commissioning reports, verification reports.
 - .4 Participate in the ITP and provide function testing of equipment within the mechanical, electrical, and fire protection contract packages.
 - .5 Allow for any cost associated to re-testing of the ITP due to failures or insufficient work.
 - .6 Allow for any cost associated with phased occupancy and phased Integrated Testing work.
- .2 HVAC Contractor:
 - .1 The HVAC Contractor shall confirm all mechanical systems listed in item 1.3.10 are complete and fully operational, prior to the ITC commencing the functional testing.

- .2 Provide system reports such as, but not limited to; air balancing reports, TSSA inspection reports, start-up reports, commissioning reports, verification reports. The Mechanical Contractor shall further provide written confirmation that all mechanical systems are installed and operating as intended by the contract documents and sequence of operations.
- .3 Participate in the ITP and provide function testing of equipment within the mechanical contract package.
- .4 Allow for any cost associated to re-testing of the ITP due to failures or insufficient work.
- .5 Allow for any cost associated with phased occupancy and phased Integrated Testing work.
- .3 Fire Protection Contractor:
 - .1 The Fire Protection Contractor shall confirm all fire protection systems listed in item 1.3.10 are complete and fully operational, prior to the ITC commencing the functional testing.
 - .2 Provide system reports such as, but not limited to; NFPA 13 letter, NFPA 20, letter, above ground sprinkler piping letter, below ground sprinkler letter, system designer letter, start-up reports, commissioning reports, verification reports. The Fire Protection Contractor shall further provide written confirmation that all fire protection systems are installed and operating as intended by the contract documents and sequence of operations.
 - .3 Participate in the ITP and provide function testing of equipment within the fire protection contract package.
 - .4 Allow for any cost associated to re-testing of the ITP due to failures or insufficient work.
 - .5 Allow for any cost associated with phased occupancy and phased Integrated Testing work.
- .4 Electrical Contractor:
 - .1 Electrical Contractor to employ the services of the ITC firm as a sub-contractor and include in bid price. Refer to item 2.6.
 - .2 The electrical contractor shall confirm all electrical systems listed in item 1.3.10 are complete and fully operational, prior to the ITC commencing the functional testing.
 - .3 Provide system reports such as, but not limited to; ESA Inspection Certificate, Fire Alarm Verification, TSSA Inspection, Generator Start-up report, commissioning reports, and verification reports. The Electrical Contractor shall further provide written confirmation that all electrical systems are installed and operating as intended by the contract documents and sequence of operations.
 - .4 Participate in the ITP and provide function testing of equipment within the electrical contract package.

- .5 Allow for any cost associated to re-testing of the ITP due to failures or insufficient work.
- .6 Allow for any cost associated with phased occupancy and phased Integrated Testing work.
- .5 Equipment Manufacturers:
 - .1 Where required, shall confirm all respective systems listed in item 1.3.10 are complete and fully operational, prior to the ITC commencing the functional testing.
 - .2 Participate in the ITP and provide function testing of equipment within the respective contract package.
- .6 Design Professionals:
 - .1 The design professional shall include, but not be limited to, the project Architect, Electrical and Mechanical Consultants, Fire Protection Engineer, Elevator Consultant, etc.
 - .2 Shall review the ITP, and upon review, accept the ITP as the agreed ITP for implementation.
 - .3 The design professionals are responsible for design. Upon an unsuccessful test, the failure will be documented and provided to the respective design professionals for review and action.

2.3 NOTIFICATION OF TESTING PLANNING PROCESS

- .1 The ITC shall work with the General Contractor, Owner, sub-contractors, design professionals, and the AHJ to provide a schedule for the implementation of the ITP.
- .2 The ITC shall obtain contact names, contact details, and system responsibilities for all project design professionals.
- .3 The ITC shall provide notification to the integrated testing participants seven (7) days prior to the date and time for the implementing of the ITP.
- .4 Prior to testing, the ITC shall obtain written acknowledgement for acceptance and understanding of the ITP by all project design professionals and contractors per 1001 Section 5 and Appendix B. Include ITP Review & Acceptance acknowledgement sheet in the ITR. **Refer to Figure 1.**
- .5 Prior to testing, the ITC shall obtain written acknowledgement for acceptance testing of site readiness from all project design professionals and contractors per 1001 Section 5 and Appendix B. Failure to obtain acknowledgement prior to implementation of integrated testing may invalidate the results and could result in delays by the design professionals issuing conformance. Include ITP Acceptance Testing acknowledgement sheet in the ITR. **Refer to Figure 2 and Figure 3.**
- .6 In the event of building occupants, the ITC shall provide at a minimum, forty-eight (48) hour notice of the implementation of the integrated testing. Notification shall be provided via written notices posted at each building entrance.

- .7 Partial occupancies shall employ this process for each individual occupancy and shall clearly identify the extent of to which the partial occupancy applies when obtaining written confirmations.
- .8 Figures 1 through 3 of this specification section are indicated as informative and are for information only regarding the intent for required written acknowledgement gathering by the ITC. All designers and trades listed may not apply to all projects. The ITC shall be responsible for determining all required designers and contractors for the project based on the contact information from the ITP.

2.4 TESTING IMPLEMENTATION PROCESS

- .1 Implementation of the integrated test shall follow all job site and personnel safety requirements set out in the contract and General Contractors requirements.
- .2 The ITC shall define:
 - .1 Personnel safety protocols
 - .2 Special hazards
 - .3 Team communications
 - .4 Occupant notification of emergencies
- .3 The integrated system test shall follow the methodology and process outlined in CAN/ULC-1001 as the requirement for this project.
 - .1 Provide the final ITP to the Consultant fourteen (14) days prior to scheduled implementation and test.
- .4 The respective contractors and manufactures are responsible to start-up and function test their respective systems, for observation and witnessing by the ITC. The ITC will record the results, and the respective contractor and manufacture will restore the system to a normal condition. Upon successful testing the contractor and manufacture will initial the respective integrated testing from adjacent to their respective test.
- .5 Upon a failure of a test, the ITC will document the failure and continue with the testing of other integrations. The respective contractor and manufacture will document the failure, notify they design professional, and correct the failure under the direction of the design professional.
 - .1 The ITC will re-test the unsuccessful integration after the correction has been documented and verified.
- .6 Upon a failure of a device (such as a smoke detector), the contractor may immediately replace the device, and the ITC may continue to test the integration. The device failure maybe documented but shall not result in a failed integrated test.
- .7 The ITC shall include in quote costs associated with site testing of all integrated devices. ITPs and testing procedures which include only for a sampling of devices will not be accepted. ITPs and testing procedures which rely solely on inspection reports, start-up reports, commissioning reports, or verification reports, etc. will not be accepted.

- .8 Partial occupancies shall employ this process for each individual occupancy and shall clearly identify the extent to which the partial occupancy applies when obtaining written confirmations.
- .9 Upon successfully completing the ITP, the ITC shall provide the ITR to the design professionals and building owner.

2.5 QUALITY CONTROL

- .1 The ITC must meet the following criteria to be considered acceptable for this project:
 - .1 Firms regular engaged with contractors in function testing, fire alarm verification, sprinkler system testing, annual inspections and maintenance of fire and life safety systems.
 - .2 Firms knowledgeable and experience of the respective Codes and Standards of the particular project, including but not limited to; Building Codes, Fire Codes, ULC Standards, CSA Standards, and NFPA Standards.
 - .3 Firms must be a member in good standing of the Canadian Fire Alarm Association (CFAA).
 - .4 Vendors must be a 3rd party and independent from the fire protection and life safety system installation company present on the project in accordance with ULC Certification Bulletin 2020-08.
 - .5 Firms must maintain operations in the province of Ontario for at least five years.
 - .6 Vendors must be a ULC Listed Integrated Systems Testing Service Provider and posses a ULC Integrated Fire Protection and Life Safety Certification. The ULC Certificate must be valid from the date of project award until the completed Integrated Testing Report. The ULC certification level shall be that which is applicable to the building life safety systems level of complexity for the project.
 - .1 Submit the ULC Certificate upon project award to the Consultant's office complete with Applicant ID Number.

2.6 QUALIFIED INTEGRATED TESTING COORDINATOR

- .1 Bidders may choose from the experienced ITC Firms listed below or local branches of these companies noted in the vicinity of this project and are acceptable as a sub-contractor to the Electrical Contractor:
 - .1 Lonergan Engineering
Aurora, Ontario L4G 3V5
 - .2 Great Lakes Fire Consulting & Engineering Group
Windsor, Ontario
- .2 Other experienced ITC Firms must submit in writing, to the Consultant's office, confirmation of the items listed in the Quality Control criteria above, prior to tender close to be considered as an acceptable bidder.

END OF SECTION

Figure 1 – Example Pre-Test ITP Acknowledgement (Typical Design Professionals): Informative

INTEGRATED SYSTEMS WRITTEN ACKNOWLEDGEMENT REVIEW AND ACCEPTANCE OF INTEGRATED TEST PLAN (EXAMPLE)			
Per Item 5.2.8 and Section B9.1 of CAN/ULC S1001 (latest version), the respective design professionals shall indicate written confirmation to the Testing Coordinator acceptance of the Integrated systems Test Plan according to the intent of the project design documents.			
List of Design Professionals		Company/Representative	Design Responsibility
Architect	Company Name:		
	Designer Name:		
	Signature		
Electrical Engineer	Company Name:		
	Designer Name:		
	Signature		
Mechanical Engineer	Company Name:		
	Designer Name:		
	Signature		
Fire Protection Engineer (sprinkler)	Company Name:		
	Designer Name:		
	Signature		
(typical responsible consultant on project)	Company Name:		
	Designer Name:		
	Signature		

Figure 2 – Example Pre-Test Trade Site Ready Acknowledgement (Typical Project Trades): Informative

PRE-TESTING INTEGRATED SYSTEMS WRITTEN ACKNOWLEDGEMENT (EXAMPLE)			
Per Item 5.3.1.(B) and Section B8.1 of CAN/ULC S1001 (latest version), the respective installing contractors shall indicate written confirmation to the Testing Coordinator that their respective life safety systems have been installed in accordance with the design are ready for integrated testing as outlined within the Integrated Systems Testing Plan.			
List of Installing Trades		Company/Representative	System Responsibilities
General Contractor	Company Name:		
	Name:		
	Signature		
Electrical Contractor	Company Name:		
	Name:		
	Signature		
Mechanical Contractor	Company Name:		
	Name:		
	Signature		
Sprinkler Contractor	Company Name:		
	Name:		
	Signature		
Elevator Contractor	Company Name:		
	Name:		
	Signature		
(typical responsible trade on project)	Company Name:		
	Name:		
	Signature		

Figure 3 – Example Pre-Test Designer Site Ready Acknowledgement (Typical Design Professionals):
Informative

PRE-TESTING INTEGRATED SYSTEMS WRITTEN ACKNOWLEDGEMENT (EXAMPLE)			
Per Item 5.3.1.(A) and Section B8.1 of CAN/ULC S1001 (latest version), the respective design professionals shall indicate written confirmation to the Testing Coordinator that the site is ready for integrated systems testing per the descriptions and integrations outlined within the Integrated Systems Testing Plan.			
List of Design Professionals		Company/Representative	Design Responsibility
Architect	Company Name:		
	Designer Name:		
	Signature		
Electrical Engineer	Company Name:		
	Designer Name:		
	Signature		
Mechanical Engineer	Company Name:		
	Designer Name:		
	Signature		
Fire Protection Engineer (sprinkler)	Company Name:		
	Designer Name:		
	Signature		
(typical responsible consultant on project)	Company Name:		
	Designer Name:		
	Signature		

Part 1 General

1.1 GENERAL

- .1 This Section covers items common to Electrical Division 26, as well as Division 27 and Division 28.**
- .2 This section supplements requirements of Division 1.**

1.2 OCCUPANCY REQUIREMENTS

- .1 The contractor shall provide the following documentation to the consultant's satisfaction prior to receiving occupancy. Failure to provide the proper documentation will result in the occupancy not being granted. List of required documentation:**
 - .1 Final Certificates (required prior to consultant's release of conformance letter).**
 - .1 Electrical Safety Authority.**
 - .2 Emergency Lighting.**
 - .3 Testing of Integrated Fire Protection and Life Safety Systems Report.**
 - .4 Fire Alarm Verification Certificate.**

Part 2 Not Used

Part 3 Not Used

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CSA C22.2 No.0.3-92, Test Methods for Electrical Wires and Cables.
- .2 CAN/CSA-C22.2 No.131-M89(R1994), Type TECK 90 Cable.
- .3 CAN/ULC S319 (latest edition), Standard for Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control, and Data Cables.
- .4 CSA C22.2 No. 123 (latest edition), Metal Sheathed Cables.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 BUILDING WIRES

- .1 Conductors: stranded for 10 AWG and larger.
- .2 Minimum size: 12 AWG.
- .3 Copper conductors: size as indicated, with 600 V insulation of chemically cross-linked thermosetting polyethylene material 90°C (194°F) rated T90 for indoor above grade installations and RW90 for below grade installations.

2.2 TECK CABLE

- .1 Cable: to CAN/CSA-C22.2 No.131.
- .2 Conductors:
 - .1 Grounding conductor: Copper.
 - .2 Circuit conductors: Copper, size as indicated.
- .3 Inner jacket: Polyvinyl chloride material.
- .4 Armour: Aluminum.
- .5 Overall covering: Polyvinyl chloride material.
- .6 Fastenings:
 - .1 One hole steel zinc straps to secure surface cables 50 mm (2") and smaller. Two-hole steel straps for cables larger than 50 mm (2").
 - .2 Channel type supports for two or more cables at 1500 mm (60") centres.
 - .3 Threaded rods: 6 mm (1/4") diameter to support suspended channels.

- .7 Connectors must be suitable for:
 - .1 Installed environment and approved for use with TECK cable.

2.3 ARMoured CABLES

- .1 Conductors: insulated, copper minimum size as indicated above.
- .2 Type: AC90 (minimum size 12 AWG).
- .3 Armour: interlocking type fabricated from aluminum strip.
- .4 Connectors must be suitable for installed environment and approved for use with armoured cable.

2.4 FIRE RATED CABLES

- .1 Cable: to CAN/ULC S319 and CSA C22.2 No. 123.
- .2 Conductors: insulated, copper minimum size as indicated above.
- .3 Type: Fire-resistive 2-hour certified cable MC/RC90 or Mineral Insulated type MI (minimum size 12 AWG unless otherwise noted).
- .4 Armour MC/RC90: Seamless, smooth metal sheath, or seamless, corrugated metal sheath applied over one or more insulated conductors.
- .5 Armour MI: Magnesium oxide powder copper sheath applied over one or more insulated conductors, corrosion resistant.
- .6 Connectors must be suitable for installed environment and approved for use with fire rated cable type.

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

- .1 Install wiring from source to load through raceways as specified.
- .2 Provide separate neutral conductors for all lighting circuits and circuits originating from surge protected panels. Size raceways accordingly.

3.2 INSTALLATION OF TECK CABLE 0 - 1000 V

- .1 Group cables wherever possible on channels.
- .2 Terminate cables in accordance with Wire and Box Connectors - 0 - 1000 V Section.

3.3 INSTALLATION OF FIRE RATED CABLES

- .1 Group cables wherever possible.
- .2 Terminate cables in accordance with manufacturer's recommended installation instructions.

- .3 Cables are to be installed as a single continuous run to maintain fire rating integrity.
- .4 Support cables horizontally or vertically every 1219 mm (48") intervals and on each side of a bend.
- .5 Provide thermoplastic barrier at all mounting locations as per manufacturer's installation instructions.

3.4 INSTALLATION OF ARMoured CABLES

- .1 Group cables wherever possible.
- .2 Terminate cables in accordance with Wire and Box Connectors - 0 - 1000 V Section.
- .3 These cables are to be installed in concealed locations only. These concealed locations are considered to be stud walls and "drops" to stud walls, lighting fixtures, and ceiling mounted devices.
- .4 **These "drops" shall not be permitted to exceed 2.4 m (8'-0"). To limit these "drops" to lengths noted above provide additional branch wiring in conduit.**

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data for cabinets in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 MATERIALS

- .1 Splitters must conform to CSA C22.2 No. 76 (latest edition).
- .2 Junction and pull boxes must conform to CSA C22.2 No. 40 (latest edition)

2.2 SPLITTERS

- .1 Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.
- .2 Main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.
- .3 At least three spare terminals on each set of lugs in splitters less than 400 A.
- .4 Splitter length must match arrangement of equipment unless indicated otherwise.

2.3 JUNCTION AND PULL BOXES

- .1 Welded steel construction with screw-on flat covers for surface mounting.
- .2 Covers with 25 mm (1") minimum extension all around, for flush-mounted pull and junction boxes.

Part 3 Execution

3.1 SPLITTER INSTALLATION

- .1 Install splitters and mount plumb, true and square to the building lines on 21 mm (3/4") painted plywood backboards.

3.2 JUNCTION AND PULL BOXES INSTALLATION

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Install junction and pull boxes so as not to exceed 30 m (100') of conduit run between pull boxes and in conformance with the Electrical Safety Code.

3.3 IDENTIFICATION

- .1 Provide equipment identification in accordance with General Electrical Requirements Section.
- .2 Install size 2 identification labels indicating system name, voltage and phase.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Outlet boxes, conduit boxes, and fittings must conform to CSA C22.2 No. 18 (latest edition).

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm (4") square or larger outlet boxes as required for special devices.
- .3 Gang boxes where wiring devices are grouped.
- .4 Blank cover plates for boxes without wiring devices.
- .5 347 V outlet boxes for 347 V switching devices.
- .6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 SHEET STEEL OUTLET BOXES

- .1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 mm x 50 mm x 64 mm (3" x 2" x 2½") or as indicated. 102 mm (4") square outlet boxes when more than one conduit enters one side with extension and plaster rings as required. Iberville 1104 Series.
- .2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit **in utility rooms**, minimum size 102 mm x 57 mm x 38 mm (4" x 2¼" x 1½"). Iberville 1110 Series.
- .3 102 mm (4") square or octagonal outlet boxes for lighting fixture outlets.
- .4 102 mm (4") square outlet boxes with extension and plaster rings for flush mounting devices in finished tile walls.

2.3 MASONRY BOXES

- .1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

- .1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5 CONDUIT BOXES

- .1 Cast FS or FD feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle **in areas (other than utility rooms) where surface conduit is used.**

2.6 FITTINGS- GENERAL

- .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 32 mm (1- 1/4") and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm (1/4") of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.
- .5 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CSA C22.2 No.65-1956(R1965) Wire Connectors.

Part 2 Products

2.1 MATERIALS

- .1 Pressure type wire connectors: with current carrying parts of copper sized to fit copper conductors as indicated.
- .2 Fixture type splicing connectors: with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3 Clamps or connectors for armoured cable, mineral insulated cable, and flexible conduit, as required.

Part 3 Execution

3.1 INSTALLATION

- .1 Remove insulation carefully from ends of conductors and:
 - .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
 - .2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.
 - .3 Install fixture type connectors and tighten. Replace insulating cap.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA C22.2 No.18-92, Outlet Boxes, Conduit Boxes, and Fittings.
 - .2 CSA C22.2 No.45-M1981(R1992), Rigid Metal Conduit.
 - .3 CSA C22.2 No.56-1977(R1977), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .4 CSA C22.2 No.83-M1985(R1992), Electrical Metallic Tubing.
 - .5 CSA C22.2 No.211.2-M1984(R1992), Rigid PVC (Unplasticized) Conduit.
 - .6 CAN/CSA C22.2 No.227.1, Nema TC-13, Flexible Nonmetallic Tubing.

Part 2 Products

2.1 CONDUITS

- .1 Rigid metal conduit: to CSA C22.2 No.45, aluminum threaded.
- .2 Epoxy coated conduit: to CSA C22.2 No.45, with zinc coating and corrosion resistant epoxy finish inside and outside.
- .3 Electrical metallic tubing (EMT) with couplings: to CSA C22.2 No.83.
- .4 Rigid PVC conduit: to CSA C22.2 No.211.2.
- .5 Flexible metal conduit: to CSA C22.2 No.56, aluminum and liquid-tight flexible metal.
- .6 Flexible PVC conduit: to CAN/CSA C22.2 No.227.1 and Nema TC-13, Electrical nonmetallic tubing (ENT).

2.2 CONDUIT FASTENINGS

- .1 One hole steel straps to secure surface conduits 53 mm (2") and smaller. Two hole steel straps for conduits larger than 53 mm (2").
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits at 1.5 m (5'-0") oc.
- .4 Threaded rods, 6 mm (1/4") diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

- .1 EMT fittings shall be set screw style (zinc alloy).
- .2 Flexible metal conduit fittings shall be screw-in type.
- .3 Liquid type flexible metal conduit fittings shall be sealtite type.

- .4 PVC fittings shall be PVC type complete with PVC adaptors at all boxes.
- .5 Rigid conduit and mineral insulated conduit fittings shall be threaded type.
- .6 Coating: same as conduit.
- .7 Factory "ells" where 90° bends are required for 27 mm (1") and larger conduits.
- .8 Where bushings are noted to be provided they must be "screwed" type fastened to a conduit connector. Push-fit or glued in place bushings will NOT be accepted.

2.4 FISH CORD

- .1 Nylon twine.

Part 3 Execution

3.1 INSTALLATION

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits except in mechanical/ electrical service rooms and in unfinished areas.
- .3 Where devices are to be installed on existing walls in finished area, which cannot be "fished", install feeds in a surface metal raceway equal to Wiremold V700 series. Coordinate surface installations with Consultant prior to rough-in, unless otherwise noted.
- .4 **Use electrical metallic tubing (EMT) for all branch circuits unless specified otherwise.**
- .5 Electrical nonmetallic tubing (ENT) may be used only for branch circuits in non-combustible buildings, in framed wall construction for residential suites, within block walls, and in precast or cast in place walls and floors. **Use of ENT for direct burial, plenum ceilings, or outdoor environments will not be accepted.**
- .6 Use rigid aluminum threaded conduit where specified and up to 2.1 m (7'-0") above finish floor where exposed to mechanical injury.
- .7 Use rigid PVC conduit underground and in kitchen areas.
- .8 Use flexible metal conduit for connection to motors in dry areas, connection to recessed fixtures without a prewired outlet box, connection to surface or recessed fixtures, work in movable metal partitions.
- .9 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations and for connections to kitchen equipment.
- .10 Conduits terminating at electrical equipment in sprinklered areas are to be provided rain-tight insulated compression style connectors.
- .11 **Minimum conduit size for branch circuits shall be 21 mm (3/4").** Single drops from ceiling mounted junction boxes down to a light switch or duplex receptacle may be reduced to 16 mm (1/2").

- .12 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .13 Mechanically bend steel conduit over 27 mm (1") diameter.
- .14 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .15 Install fish cord in empty conduits.
- .16 Run 2- 27 mm (1") spare conduits up to accessible ceiling space from each flush panel. Terminate these conduits in 152 mm x 152 mm x 102 mm (6" x 6" x 4") junction boxes in ceiling space.
- .17 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- .18 Dry conduits out before installing wire.
- .19 Do not install, store, or handle ENT in cold temperatures below -20°C(-4°F). Do not store ENT outside.

3.2 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m (5') clearance.
- .3 Run conduits in flanged portion of structural steel.
- .4 Group conduits wherever possible on suspended or surface channels.
- .5 Do not pass conduits through structural members except as indicated.
- .6 Do not locate conduits less than 75 mm (3") parallel to steam or hot water lines with minimum of 25 mm (1") at crossovers.
- .7 **Do not fasten surface conduit to roof deck. Provide standoffs or supports as manufactured by Caddy or use unistrut trapeze fastened to structure.**

3.3 CONCEALED CONDUITS

- .1 Do not install horizontal runs in masonry walls.
- .2 Do not install conduits in terrazzo or concrete toppings.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

- .1 The studies must be submitted to the Consultant prior to receiving final approval of the distribution equipment shop drawings and/or prior to release of equipment for manufacturing. If formal completion of the studies may cause delay in equipment manufacturing, approval from the Consultant may be obtained for a preliminary submittal of sufficient study data to ensure that the selection of device ratings and characteristics will be satisfactory.
- .2 The studies shall include all portions of the electrical distribution system from the normal power source or sources down to and including the smallest adjustable trip circuit breaker in the distribution system, **as well as mechanical unit equipment**. Normal system connections and those, which result in maximum fault conditions, shall be adequately covered in the study.
- .3 The firm should be currently involved in high- and low-voltage power system evaluation. The study must be performed, stamped and signed by a registered professional engineer in the Province of Ontario. Credentials of the individual(s) performing the study and background of the firm shall be submitted to the Consultant for approval prior to start of the work. A minimum of five (5) years experience in power system analysis is required for the individual in charge of the project.
- .4 The firm performing the study should demonstrate capability and experience to provide assistance during start up as required.

1.2 DATA COLLECTION FOR THE STUDY

- .1 The Contractor shall provide the required data for preparation of the studies. The Consultant performing the system studies shall furnish the Contractor with a listing of the required data immediately after award of the contract.
- .2 The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to release of the equipment for manufacturing.
- .3 Data collected for the study, including correspondence with local utility, shall be included with study report.

Part 2 Products

2.1 SHORT CIRCUIT AND PROTECTIVE DEVICE EVALUATION AND COORDINATION STUDY

- .1 The short-circuit study shall be performed with the aid of a digital computer program and shall be in accordance with the latest applicable IEEE and ANSI standards.
- .2 In the short-circuit study, provide calculation methods and assumptions, the base per unit quantities selected, one-line diagrams, source impedance data including power company system characteristics, typical calculations, tabulations of calculation quantities and results, conclusions, and recommendations. Calculate short-circuit interrupting and momentary (when applicable) duties for an assumed 3-phase bolted fault at each supply switchgear lineup, unit substation primary and secondary terminals, low-voltage switchgear lineup, switchboard, motor control center, distribution panelboard, pertinent branch circuit panelboard, and other significant overcurrent protective device locations throughout the system. Provide a ground fault current study for the same system areas, including the associated zero sequence impedance data. Include in tabulations fault impedance, X to R ratios, asymmetry factors, motor fault contribution, short circuit kVA, and symmetrical and asymmetrical fault currents.
- .3 In the protective device coordination study, provide time-current curves graphically indicating the coordination proposed for the system, centered on conventional, full-size, log-log forms. Include with each curve sheet a complete title and one-line diagram with legend identifying the specific portion of the system covered by that particular curve sheet. Include a detailed description of each protective device identifying its type, function, manufacturer, and time-current characteristics. Tabulate recommended device tap, time dial, pickup, instantaneous, and time delay settings.
- .4 Include on the curve sheets power company relay and fuse characteristics, medium-voltage equipment protective relay and fuse characteristics, low-voltage equipment circuit breaker trip device characteristics, pertinent transformer characteristics, pertinent motor and generator characteristics, and characteristics of other system load protective devices. In addition, include all devices down to the largest branch circuit and largest feeder circuit breaker in each motor control center, and main breaker in branch panelboards.

Include all adjustable settings for ground fault protective devices. Include manufacturing tolerance and damage bands in plotted fuse characteristics. Show transformer full load currents, transformer magnetizing inrush, ANSI transformer withstand parameters, and significant symmetrical fault currents. Terminate device characteristic curves at a point reflecting the maximum symmetrical fault current to which the device is exposed.

- .5 Select each primary protective device required for a delta-wye connected transformer so that its characteristic or operating band is within the transformer characteristics, including a point equal to 58 percent of the ANSI withstand point to provide secondary line-to-ground fault protection. Separate transformer primary protective device characteristic curves from associated secondary device characteristics by a 16 percent current margin to provide proper coordination and protection in the event of secondary line-to-line faults. Separate medium-voltage relay characteristic curves from curves for other devices by at least a 0.4-second time margin.
- .6 Include complete fault calculations as specified herein based on contract documents.
- .7 Submit qualifications of individual(s) who will perform the work for approval prior to commencement of the studies. Provide studies in conjunction with equipment submittals to verify equipment ratings required. Submit the study to Consultant for review prior to delivery of the study to the Owner. Make all additions or changes as required by the reviewer.
- .8 Utilize equipment load data for the study obtained by the Contractor from contract documents, including contract addendums issued prior to bid openings.
- .9 Include fault contribution of all motors in the study. Notify the Consultant in writing of circuit protective devices not properly rated for fault conditions.
- .10 When emergency generator is provided, include phase and ground coordination of the generator protective devices. Show the generator decrement curve and damage curve along with the operating characteristic of the protective devices. Contractor shall obtain the information from the generator manufacturer and include the generator actual impedance value, time constants and current boost data in the study. Do not use typical values for the generator.
- .11 Evaluate proper operation of the ground relays in 4-wire distributions with more than one main service circuit breaker, or when generators are provided, and discuss the neutral grounds and ground fault current flows during a neutral to ground fault.
- .12 For motor control circuits, show the MCC full-load current plus symmetrical and asymmetrical of the largest motor starting current and time to ensure protective devices will not trip during major or group start operation.
- .13 **Evaluate proper rating of applicable mechanical unit equipment based on available fault at unit connection. Mechanical unit equipment in study shall include packaged assemblies identified as, but not limited to, AHUs, MUAs, DOAS, Chillers, and Cooling Towers.**

2.2 ARC FLASH HAZARD ANALYSIS

- .1 The contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E – Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D and CSA Z462-(latest edition).
- .2 The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2004, Annex D.

- .3 When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Alternative methods shall be presented in the proposal.
- .4 The flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway and splitters) where work could be performed on energized parts.
- .5 The Arc-Flash Hazard Analysis shall include all significant locations in 240 volt and 208 volt systems fed from transformers equal to or greater than 125 kVA.
- .6 Safe working distances shall be specified for calculated fault locations based upon the calculated arc flash boundary considering an incident energy of 1.2 cal/cm².
- .7 The Arc Flash Hazard analysis shall include calculations for maximum and minimum contributions of fault current magnitude. The minimum calculation shall assume that the utility contribution is at a minimum and shall assume a minimum motor load. Conversely, the maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.
- .8 Arc Flash computation shall include both line and load side of main breaker calculations, where necessary.
- .9 Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2 seconds based on IEEE 1584-latest edition section B.1.2.
- .10 Arc Flash computation shall include arc flash current magnitude at each circuit breaker 1200A or higher (ARMS capable) to allow the Arc Flash Reduction Maintenance System pickups to be set based on multiples of the per unit secondary arc current monitored by the trip unit.

2.3 STUDY REPORT

- .1 The results of the power system study shall be summarized in a final report. Submit report in accordance with Electrical General Requirements Section as a shop drawing.
- .2 The report shall include the following sections:
 - .1 Descriptions, purpose, basis, and scope of the study.
 - .2 Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short-circuit duties, and commentary regarding same.
 - .3 **Tabulations of mechanical unit equipment ratings as identified on equipment shop drawings versus calculated short-circuit, and commentary regarding same. Short-circuit calculations for mechanical equipment shall be based on unit MCA with conductor sizes as identified on electrical design drawings and not based on equipment MOC.**

- .4 Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same.
- .5 Fault current calculations including a definition of terms and guide for interpretation of computer printout.
- .6 Incident energy and flash protection boundary calculations
 - .1 Arcing fault magnitude
 - .2 Device clearing time
 - .3 Duration of arc
 - .4 Arc flash boundary
 - .5 Working distance
 - .6 Incident energy
 - .7 Hazard Risk Category
 - .8 Recommendations for arc flash energy reduction
 - .9 **Recommendations for Personal Protection Equipment (PPE) level.**

Part 3 Execution

3.1 POWER COMPANY APPROVAL

- .1 Copies of the final report must be submitted to the power company for their review and approval. Approved copies of the report shall be submitted to the Consultant.

3.2 FIELD SETTINGS

- .1 The Contractor shall perform field adjustments of the protective devices as required to place the equipment in final operating condition. The settings shall be in accordance with the approved short-circuit study, protective device evaluation study, and protective device coordination study.
- .2 Necessary field settings of devices and adjustments and minor modifications to equipment to accomplish conformance with the approved short-circuit and protective device coordination study shall be carried out by the Contractor at no additional cost to the Owner.
- .3 At the completion of the project, configure settings and install equipment labels. On company letterhead, the contractor is to prepare a certification letter indicating at minimum:
 - .1 Project
 - .2 Date
 - .3 Device designation
 - .4 Certification of correct settings
 - .5 Certification of correct device labels

- .6 Certification of arc flash hazard equipment labels
- .7 Digital image of each breaker indicating final settings and placement of labels

3.3 ARC FLASH WARNING LABELS

- .1 The vendor shall provide a 3.5 in. x 5 in. thermal transfer type label of high adhesion polyester for each work location analyzed.
- .2 The label shall have an orange header with the wording, "WARNING, ARC FLASH HAZARD", and shall include the following information:
 - .1 Location designation
 - .2 Nominal voltage
 - .3 Flash protection boundary
 - .4 Hazard risk category
 - .5 Incident energy
 - .6 Working distance
 - .7 Personal Protection Equipment (PPE) level
 - .8 Engineering report number, revision number and issue date.
- .3 Labels shall be machine printed, with no field markings.
- .4 Arc flash labels shall be provided in the following manner and all labels shall be based on recommended overcurrent device settings.
 - .1 For each 600, 480 and applicable 208 volt panelboards, one arc flash label shall be provided.
 - .2 For each motor control center, one arc flash label shall be provided.
 - .3 For each low voltage switchboard, one arc flash label shall be provided.
 - .4 For each switchgear, one flash label shall be provided.
 - .5 For medium voltage switches one arc flash label shall be provided
- .5 **Labels shall be field installed by the firm providing the Arc Flashing Hazard Analysis.**

3.4 SERIES RATING LABELS

- .1 Provide Iamcoid labels where recommended by study. **Labels for series rating with panelboards or equipment shall be indicated on feeder breaker as "SERIES RATING BREAKER" and at the panelboard or equipment as "SERIES RATING EQUIPMENT". Refer to section 26 24 16.**

3.5 ACCEPTABLE TESTING FIRMS

- .1 MVA Engineering (519) 668-4698
- .2 GT Woods (905) 272-1696
- .3 Brosz & Associates (905) 472-6660
- .4 K-Tek Electro-services Ltd. (905) 640-0660 ext. 228

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS

- .1 Submit shop drawings for each system in Conformance with The Electrical General Requirements Section.

1.2 PRODUCT/MAINTENANCE DATA

- .1 Submit product/maintenance data for each system for inclusion in maintenance manual conforming to The General Electrical Requirements Section.

1.3 SCOPE

- .1 The scope of this Section will include the following systems.
 - .1 Auxiliary systems rough-in.
 - .2 Security and access control rough-in.
 - .3 Telecommunication network system rough-in.
 - .4 Public address system rough-in.

Part 2 Products

2.1 AUXILIARY SYSTEMS ROUGH-IN

- .1 Outlets where noted shall be single gang boxes unless specified otherwise.
- .2 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.
- .3 Coordinate final outlet locations, quantities, etc. with respective system vendor and owner's representative.

2.2 SECURITY AND ACCESS CONTROL ROUGH-IN

- .1 Provide conduit from device and outlet locations to cable management systems as noted on drawings.
- .2 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.
- .3 Provide grounding of equipment as noted on drawings.
- .4 Security and access control systems installation shall be by Owner's approved vendor as part of separate tender.

2.3 TELECOMMUNICATION NETWORK SYSTEM ROUGH-IN

- .1 Outlets where noted shall be single gang flush mounted in wall or surface raceways.

- .2 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.
- .3 Provide a #6 insulated green ground conductor from main service ground to voice equipment backboard located on drawings.
- .4 Telecommunication Network installation shall be by Owner's approved vendor as part of separate tender.

2.4 PUBLIC ADDRESS SYSTEM ROUGH-IN

- .1 Provide conduit from device and outlet locations to cable management systems as noted on drawings.
- .2 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.
- .3 Public address system installation shall be by Owner's approved vendor as part of separate tender.

Part 3 Execution

3.1 AUXILIARY SYSTEMS ROUGH-IN

- .1 Provide backboard for each system use as noted complete with ground buss connection as specified.
- .2 Outlets are to be installed complete with minimum 21 mm (3/4") conduit to accessible ceiling space or as otherwise detailed.
- .3 Conduits terminated into ceiling spaces must be within 3m (10') of zone conduits when noted.
- .4 Provide insulated bushings on all conduits terminated in ceiling space.
- .5 Ensure specified zone or riser conduits are installed back to equipment backboard.

3.2 SECURITY AND ACCESS CONTROL ROUGH-IN

- .1 Outlets are to be provided for devices with conduit as detailed on drawings.
- .2 Conduits terminated into ceiling spaces must be within 1m of cable management of tray.

3.3 TELECOMMUNICATION NETWORK SYSTEM ROUGH-IN

- .1 Install incoming service ducts and terminate as noted.
- .2 Provide backboard as noted complete with ground connection to main service ground.
- .3 Conduits terminated into ceiling spaces must be within 3m (10') of zone conduits (if applicable).
- .4 Ensure specified zone conduits are installed back to service backboard.

- .5 Outlets are to be installed complete with 25 mm (1") conduit to corridor ceiling space or nearest zone conduit (if applicable).
- .6 Provide insulated bushings on all conduits terminated in ceiling space.

3.4 PUBLIC ADDRESS SYSTEM ROUGH-IN

- .1 Conduits terminated into ceiling spaces must be within 1m (10') of cable management tray.
- .2 Outlets are to be installed complete with 25 mm (1") conduit to corridor ceiling space or nearest cable management tray.
- .3 Provide insulated bushings on all conduits terminated in ceiling space.
- .4 Electrical contractor shall obtain speaker back boxes from School Board vender for installation into ceiling tiles, block walls, etc.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

- .1 Submit product data in accordance with Electrical General Requirements Section.
- .2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

Part 2 Products

2.1 PANELBOARDS

- .1 Panel boards must conform to CSA C22.2 No. 29 (latest edition).
- .2 Panelboards: product of one manufacturer.
- .3 Install circuit breakers in panelboards before shipment.
- .4 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand. **Series rating is acceptable – submit information with shop drawings. Provide lamicaid label on feeder breaker. Lamicaid label to state “Series Rating Breaker.” Lamicaid label to be size 2.**
- .5 Bus and breakers must be rated for [10,000] A (symmetrical) interrupting capacity or as indicated.
- .6 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.
- .7 Panelboard mains, number of circuits, and number and size of branch circuit breakers as indicated.
- .8 Two keys for each panelboard and key panelboards alike.
- .9 Aluminum bus with neutral of same ampere rating as mains.
- .10 Mains must be suitable for bolt-on breakers. Provide main (if applicable) and branch breakers as bolt-on style.
- .11 Trim with concealed front bolts and hinges.
- .12 Trim and door finish must be baked grey enamel.
- .13 All panels regardless of voltage and amperage must be provided with a lockable door.
- .14 Branch circuit panelboards (250 AMP or smaller) must be one of the following:
 - .1 Eaton Cat # POW-R-LINE-C PRL-1 or PRL-2
 - .2 Schneider Electric Cat # NQ Series for up to 240V or NF Series for up to 600V
 - .3 Siemens Cat #Sentron P1 Series

2.2 BREAKERS

- .1 Breakers: to Moulded Case Circuit Breakers Section.
- .2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.
- .3 Main breaker (as specified) must be separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.
- .4 Lock-on devices for fire alarm, stairway, exit and night light circuits.

2.3 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Electrical General Requirements Section.
- .2 Nameplate for each panelboard size 4 engraved description as indicated. In finished areas install label on inside of panel, and in service areas install label on exterior of panel.
- .3 Nameplate for each circuit in distribution panelboards size 2 engraved "name of load" as indicated.
- .4 Complete circuit directory with typewritten legend showing location of each circuit.
Include a copy of the directories in the maintenance manuals.

Part 3 Execution

3.1 INSTALLATION

- .1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.
- .2 Install surface mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard. Plywood shall be 21mm (3/4") fire rated or painted with intumescent fire block paint having a minimum of 1h rating, unless noted otherwise.
- .3 Mount panelboards to height specified in Electrical General Requirements Section or as indicated.
- .4 Connect loads to circuits.
- .5 Connect neutral conductors to common neutral bus.
- .6 Install series rating lamicides adjacent to all breakers utilized to achieve series ratings.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

- .1 Submit product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 BREAKERS GENERAL

- .1 Moulded case circuit breakers must conform to CSA C22.1 No.5.1-M91 (latest edition.)
- .2 Bolt-on moulded case circuit breaker quick-make, quick-break type, for manual and automatic operation.
- .3 Common-trip breakers: with single handle for multi-pole applications.
- .4 Unless otherwise indicated moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

Part 3 Execution

3.1 INSTALLATION

- .1 Install circuit breakers as indicated complete with all necessary mounting hardware and filler panels if necessary.
- .2 Provide lamicoid labels for series rating breakers. Lamicoid label to state "Series Rating Breaker." Lamicoid to be size 2.
- .3 Provide lamicoid labels for ARMS capable breakers. Lamicoid label to state "Arc Flash Reduction Maintenance System Breaker." Lamicoid to be size 2.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 RECEPTACLES

- .1 Receptacles, plugs, and other similar wiring devices must conform to CSA 22.2 No 42 (latest edition).
- .2 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, with following features (20A where noted):
 - .1 Urea molded housing (Colour by architect).
 - .2 Suitable for No. 10 AWG for back and side wiring.
 - .3 Break-off links for use as split receptacles.
 - .4 Eight back wired entrances, four side wiring screws.
 - .5 Triple wipe contacts and rivetted grounding contacts.
- .3 Other receptacles with ampacity and voltage as indicated.
- .4 Receptacles of one manufacturer throughout project.
- .5 Acceptable materials:
 - .1 Tamper resistant
 - .1 Tamper resistant ground fault protected receptacle: Hubbell Cat. #GFTR15
 - .2 Tamper resistant ground fault protected T-slot receptacle: Hubbell Cat. #GFTR20
 - .3 Tamper resistant duplex receptacle complete with dual USB ports: Hubbell Cat. #USB15XXX
 - .4 Automatically Controlled Tamper Resistant Receptacles (Green): Hubbell Cat. #BR15C2GNTR
- .6 Acceptable alternate manufacturers include:
 - .1 Pass & Seymour
 - .2 Leviton

2.2 COVER PLATES

- .1 Cover plates from one manufacturer throughout project.

- .2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.
- .3 Stainless steel, brushed, 1 mm (1/32") thick cover plates for wiring devices mounted in flush-mounted outlet box.
- .4 Sheet metal cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.
- .5 Weatherproof cover plates complete with gaskets and "heavy-duty in use" covers in conformance with the Electrical Safety Authority. Provide product equal to Intermatic Cat. #WP5100C.
- .6 Where noted on plans for exterior weatherproof cover plates at GFCI receptacles on residential balconies above grade, within 760mm of balcony railing, to avoid climbing hazard provide product equal to Intermatic Cat. #WP7000 (low-profile, in-use, extra-duty).
- .7 Provide p-touch labels on cover plates for all receptacles. Labels shall include source panel and branch circuit, including switch leg indicator as applicable for automatically controlled receptacles.

Part 3 Execution

3.1 INSTALLATION

- .1 Receptacles:
 - .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
 - .2 Mount receptacles at height specified in Electrical General Requirements Section or as indicated.
 - .3 Where split receptacle has one portion switched mount vertically and switch upper portion.
- .2 Occupancy sensors:
 - .1 Occupancy sensors shall be set to 5 minutes "delay to off" unless otherwise noted.
- .3 Occupancy sensors and dimmers:
 - .1 Switches with occupancy sensors and dimmers shall be programmed as follows:
 - .1 5 minutes "delay to off" unless otherwise noted.
 - .2 "Auto on" to 50% dimming level.
- .4 Cover plates:
 - .1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
 - .2 Install suitable common cover plates where wiring devices are grouped.
 - .3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

- .5 Dimmer:
 - .1 Dimming Switches
 - .1 Mount devices at height as specified in Electrical General Requirements Section.
 - .2 Install in upright position as per manufacturer's installation instructions.
 - .3 Provide class II 0-10V control wiring from 0-10V dimming switch to each fixture driver in 21mmC.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

- .1 Submit product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 DISCONNECT SWITCHES

- .1 Enclosed manual air break switches must conform to CSA C22.1 No.4 (latest edition).
- .2 Fuseholder assemblies must conform to CSA C22.2 No.39 (latest edition).
- .3 Fusible, and/or non-fusible, horsepower rated disconnect switches, size as indicated.
- .4 Provision for padlocking in off switch position by three locks.
- .5 Mechanically interlocked door to prevent opening when handle in ON position.
- .6 Fuses: size as indicated, to Fuses - Low Voltage Section.
- .7 Fuseholders: relocatable and suitable without adaptors, for type and size of fuse indicated.
- .8 Quick-make, quick-break action.
- .9 ON-OFF switch position indication on switch enclosure cover.
- .10 Disconnects feeding elevator controllers must be equipped with two auxiliary contacts approved by the elevator supplier.

2.2 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Electrical General Requirements Section.
- .2 Indicate name of load controlled on size 4 nameplate.

2.3 ACCEPTABLE MANUFACTURERS

<u>Manufacturer</u>	<u>General Purpose</u>	<u>Weather Proof</u>
Eaton	IHD Series	3HD Series
Schneider Electric	Type A Series	Type R Series
Siemens	ID Series	NFR/FR Series

Part 3 Execution

3.1 INSTALLATION

- .1 Install disconnect switches complete with fuses if applicable.
- .2 Connect auxiliary contacts to elevator controller using conduit, wire and route approved by the elevator supplier.
- .3 Disconnect switches mounted on mechanical rooftop equipment shall be installed minimum 750 mm (30") above finished roof to be protected against damage and weather (snow build up).
- .4 For replacement mechanical rooftop equipment, existing feeder shall be extended as necessary from existing junction point to suit replacement unit disconnecting means to be installed minimum 750 mm (30") above finished roof to be protected against damage and weather (snow build up).

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings in accordance with Electrical General Requirements Section.
- .2 Indicate:
 - .1 Mounting method and dimensions.
 - .2 Starter/contactor size and type.
 - .3 Layout of identified internal and front panel components.
 - .4 Enclosure types.
 - .5 Wiring diagram for each type of starter.
 - .6 Interconnection diagrams.

1.2 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for incorporation into manual specified in Electrical General Requirements Section.
- .2 Include operation and maintenance data for each type and style of starter/contactor.

1.3 MAINTENANCE MATERIALS

- .1 Provide maintenance materials in accordance with Electrical General Requirements Section.
- .2 Provide listed spare parts for each different size and type of starter:
 - .1 1 operating coil.
 - .2 3 fuses.
 - .3 10% indicating lamp bulbs used.

Part 2 Products

2.1 MATERIALS

- .1 Starters: must conform to CSAC22.2 No. 14 (latest edition) and EEMAC E14-1.
- .2 Control transformers must conform to CSAC22.2 No. 66 (latest edition).
- .3 Auto-transformers must conform to CSAC22.2 No 47 (latest edition).
- .4 Contactors must conform to CSA C22.2 No. 14 (latest edition).
- .5 Half size starters will not be accepted. NEMA and IEC rated starters are acceptable.

2.2 MANUAL MOTOR STARTERS

- .1 Single and Three phase manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:
 - .1 Switching mechanism, quick make and break.
 - .2 One or Three overload heaters, manual reset, trip indicating handle.
 - .3 Toggle switch: standard duty labeled "on"/"off".
 - .4 Indicating light: standard duty type and red colour.
 - .5 Locking tab to permit padlocking in "ON" or "OFF" position.

2.3 FULL VOLTAGE MAGNETIC STARTERS

- .1 Magnetic and combination magnetic starters of size, type, rating and enclosure type as indicated with components as follows:
 - .1 Contactor solenoid operated, rapid action type.
 - .2 Motor overload protective device in each phase, manually reset from outside enclosure.
 - .3 Wiring and schematic diagram inside starter enclosure in visible location.
 - .4 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.
- .2 Combination type starters to include fused disconnect switch with operating lever on outside of enclosure to control disconnect, and provision for:
 - .1 Locking in "OFF" position with up to 3 padlocks.
 - .2 Independent locking of enclosure door.
 - .3 Provision for preventing switching to "ON" position while enclosure door open.
- .3 Accessories:
 - .1 Pushbuttons Selector switches standard duty labeled as indicated.
 - .2 Indicating lights: standard duty type and color as indicated.
 - .3 1-N/O and 1-N/C spare auxiliary contacts unless otherwise indicated.
 - .4 1 red pilot light for "stop" or "off" and 1 green light for "start" or "on".

2.4 CONTROL TRANSFORMER

- .1 Single phase, dry type, control transformer with primary voltage as indicated and secondary voltage to suit remote control device, complete with secondary fuse, installed in with starter as indicated.
- .2 Size control transformer for control circuit load plus 20% spare capacity.

2.5 CONTACTORS

- .1 Electrically held and controlled by pilot devices as indicated and rated for type of load controlled.

- .2 Complete with 2 normally open and 2 normally closed auxiliary contacts unless indicated otherwise.
- .3 Mount in CSA Enclosure 1 unless otherwise indicated.
- .4 Include following options in cover:
 - .1 Red indicating lamp.
 - .2 Hand - Off - Auto selector switch.
- .5 Control transformer: mounted in contactor enclosure.
- .6 Contactors must be definite purpose.

2.6 FINISHES

- .1 Apply finishes to enclosure in accordance with Electrical General Requirements Section.

2.7 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Electrical General Requirements Section.
- .2 Manual starter designation label: black plate, white letters, size 1, engraved as indicated.
- .3 Magnetic starter designation label: black plate, white letters, size 2, engraved as indicated.
- .4 Contactor designation label:
black plate, white letters, size 4, indicating name of load controlled.

2.8 ACCEPTABLE MANUFACTURERS

- .1 The acceptable manufacturers are as follows:
 - .1 Allen Bradley
 - .2 Eaton
 - .3 Siemens
 - .4 Group Schneider
 - .5 Klockner Moeller

Part 3 Execution

3.1 INSTALLATION

- .1 Install starters, connect power and control as indicated.
- .2 Ensure correct fuses and overload devices elements installed.

3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Electrical General Requirements Section.
- .2 Operate switches, contactors to verify correct functioning.
- .3 Perform starting and stopping sequences of contactors and relays.
- .4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.
- .5 Install contactors and connect auxiliary control devices.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)
 - .1 ANSI/IEEE C62.41- 1991, Recommended Practices for Surge Voltages in Low-Voltage AC Power Circuits.
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM F1137- 88 (1993), Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.
- .3 United States of America, Federal Communications Commission (FCC)
 - .1 FCC (CFR47) EM and RF Interference Suppression.
- .4 IESNA LM-79-08, IES Electrical Method for the Electrical and Photometric Measurements of Solid State Lighting Products.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings in accordance with Electrical General Requirements Section for all light fixtures supplied under this contract.
- .2 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Consultant.
- .3 Photometric data to include: VCP Table spacing criterion.

1.3 SCOPE

- .1 This contractor is responsible to supply and install all lighting fixtures as scheduled and/or indicated including lamp and those accessories required for a complete lighting system. This contractor must coordinate lighting installations with all other Divisions of this project.
- .2 All fixtures must be CSA approved or approved at this contractor's expense by the Special Inspection Division of the Electrical Safety Authority.

1.4 GUARANTEE

- .1 Guarantees for materials replacement shall be as follows from date of ready for takeover.
 - .1 LED lamps: 3 months
 - .2 LED fixtures, and driver: 5 years.

- .2 The labour required to replace these ballasts, lamps or drivers must be included in the above guarantee, however only for the extent of the contract guarantee and warranty period as noted in Electrical General Requirements.

1.5 EXISTING FIXTURE BALLAST REMOVAL AND DESTRUCTION

- .1 Scope
 - .1 This Contractor is responsible for contracting with an approved company for the dismantling, disposal and removal of all existing fluorescent ballasts and lamps from this project. This process must include but is not limited to the following:
 - .1 Removal of existing ballasts from fixtures by this contractor.
 - .2 This contractor is to compare the ballast number to the PCB ballast identification booklet provided by the disposal company.
 - .3 If the ballast is not contaminated it is to be disposed of by normal means.
 - .4 If the ballast is contaminated provide:
 - .1 Approved interm on site storage area.
 - .2 Approved interm on site storage containers.
 - .3 Any and all necessary on site inspections.
 - .4 All necessary approval certificates (include copies in maintenance manuals).
 - .5 Full dismantling, complete destruction and disposal of all ballasts components.
- .2 Approved Disposal Companies
 - .1 PCB Containment Technology Inc.
75 Wanless Court
Ayr, ON NOB 1E0
Phone: (519) 740-1333 / Fax: (519) 740-2320
- .3 Payment Procedures
 - .1 Cost of complete services of this sub-contractor shall be paid for by this Section. Refer to Allowances and Fees Section for allowance to be carried for this work.

Part 2 Products

2.1 FIXTURE CONSTRUCTION

- .1 Fixtures must be constructed of 20 gauge (minimum) cold rolled steel. All metal edges require smooth finish.
- .2 Light leaks must be prevented by providing gasketting, stops, and barriers.
- .3 Fixtures must be finished in high reflective baked white enamel. This surface must have a reflectance of not less than 85%.

- .4 All fixtures operating on 347 Volts must be provided with an integral disconnecting means.**

2.2 FIXTURE LENS

- .1 Unless otherwise noted fixture lenses shall be as follows:**
- .1 Lens thickness: 3.2 mm (1/8")**
 - .2 Material: injection moulded clear prismatic virgin acrylic**
 - .3 Frame: hinged, latched, steel.**

2.3 LED FIXTURES

- .1 Fixture LEDs must be tested in conformance with IESNA LM80 standard.**
- .2 LEDs must be selected using a binning algorithm to ensure colour and lumen output of a given fixture are consistent, as well as meet or surpass ANSI C78.377 specification for the rated lifetime of the fixture. Colour accuracy between products must be within a 2-step MacAdam ellipse.**
- .3 Luminaires must be tested to IESNA LM79 by an independent approved laboratory.**
- .4 Luminaires must be tested prior to shipping.**
- .5 Luminaires must be ULC certified and approved for use in Canada.**
- .6 Fixtures must maintain a minimum of 90% of their initial light output for 60,000 hours. Submit test results upon request.**
- .7 Lumen values indicated for fixtures in the project documents are to be considered as "absolute" or "delivered" values.**
- .8 Other than for specialty fixtures, and unless otherwise indicated, the maximum driver current is to be 750 mA.**

2.4 STANDARD EXIT LIGHTING UNITS

- .1 Exit lighting units must conform to CSA C860, CSA 22.2 No. 141 (latest edition).**
- .2 Housing: extruded aluminum housing, white finish.**
- .3 Face and back plates: extruded aluminum.**
- .4 Lamps: 2W LED.**
- .5 Operation: 25 year.**
- .6 Units are to be provided with three (3) pictogram legends indicating "left from here", "straight from here", and "right from here".**
- .7 Face plate to remain captive for relamping.**

2.5 SELF-POWERED COMBINATION EXIT/EMERGENCY LIGHTING UNITS

- .1 Exit lighting units must conform to CSA C860, CSA 22.2 No. 141 (latest edition).**

- .2 Housing: Extruded aluminum housing. White Finish.
- .3 Face and back plates: Extruded aluminum.
- .4 Lamps 2W LED (EXIT).
- .5 Operation: 25 year life.
- .6 Units are to be provided with three (3) pictogram legends indicating "left from here", "straight from here", and "right from here".
- .7 Face plate to remain captive for relamping.
- .8 Supply voltage: As noted on drawings.
- .9 Output voltage: 12 V DC.
- .10 Battery: Sealed maintenance free 10 year life.
Note: Battery must be capable of supplying the wattage indicated for a minimum of 30 minutes.
- .11 Charger: Solid state, voltage/current regulated, inverse temperature compensated, short circuit protected, with regulated output of plus or minus 0.01 V for plus or minus 10% V input variation.
- .12 Solid state transfer circuit.
- .13 Signal lights: "AC Power On" condition and "charging" condition.
- .14 Lamp heads: Integral on unit, 345° horizontal and 180° vertical adjustment. Lamp type: minimum 4 watt LED.
- .15 Mounting: Suitable for universal mounting directly on junction box and complete with knockouts for conduit. Removable or hinged front panel for easy access to batteries.
- .16 Cabinet: finish: White.
- .17 Auxiliary equipment:
 - .1 Test switch.

2.6 EMERGENCY LIGHTING UNITS

- .1 Emergency lighting units must conform to CSA C22.2 No 141 (latest edition).
- .2 Supply voltage: As noted on drawings.
- .3 Output voltage: 12 V DC.
- .4 Battery: Sealed, maintenance free, 10 year life.
Note: Battery units must be capable of supplying the wattage indicated for a minimum of 30 minutes.
- .5 Charger: Solid state, multi rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01 V for plus or minus 10% input variations.

- .6 Solid state transfer circuit.
- .7 Low voltage disconnect: Solid state, modular, operates at 80% battery output voltage.
- .8 Signal lights: "AC Power ON" condition and "charging" condition.
- .9 Lamp heads: Integral on unit, 345° horizontal and 180° vertical adjustment. Lamp type: minimum 4 watt LED.
- .10 Cabinet suitable for direct of shelf mounting to wall and complete with knockouts for conduit. Removable or hinged front panel for easy access to batteries.
- .11 Auxiliary equipment:
 - .1 Test switch.
 - .2 Ac input and DC output terminal blocks inside cabinet.
 - .3 Shelf.
 - .4 Cord and plug connection for AC. **(Not applicable on 347 V units).**

2.7 REMOTE EMERGENCY LIGHTING FIXTURES

- .1 Remote emergency lighting fixtures must conform to CSA C22.2 No141 (latest edition).
- .2 Fixtures shall be small "micro" size or recessed style as indicated in the Light Fixture Schedule.
- .3 Fixtures must be adjustable type heads with canopy.
- .4 Fixtures are to be provided with protective lexan cube when specified in the Light Fixture Schedule.
- .5 Unless otherwise indicated surface mounted fixtures in washrooms, locker rooms, changerooms, and gymnasiums must be provided with wire guard.

2.8 ACCEPTABLE LIGHTING MANUFACTURERS

- .1 Refer to the light fixture schedule as indicated on drawings.

Part 3 Execution

3.1 INSTALLATION

- .1 Locate and install luminaires as indicated. Luminaires are not to be supported from the roof deck. Provide additional unistrut support channel and/or support from structure. Co-ordinate with consultant on site.
- .2 Ball align hangers must be provided for rod suspended fixtures.
- .3 Fixtures surface mounted to suspended ceilings must be secured through ceiling assembly to cross member supports. These supports are to be steel channels or angles independently secured **to structure** using # 12 "jack" chain. Each chain must be secured so no fixture weight is added to the ceiling assembly.

- .4 Plaster frames/flange kits must be provided by this Division for fixtures recessed in plaster and/or drywall ceilings.
- .5 Where specified, fixtures to be chain hung shall be hung using "jack" chain with a capacity to suit the fixture weight. Branch circuit wiring feeding these fixtures shall be AC90 cable "ty-wrapped" at 900 mm (36") intervals along length of drop. Final appearance must be neat and professional.
- .6 Install exit lighting units with illuminated faces and chevrons/arrows indicating path(s) of exit as indicated. Unless otherwise noted install exit fixtures at 2400 mm (8'-0") above finished floor.
- .7 Install emergency lighting units and associated remote mounted fixtures as indicated.
- .8 Direct "heads" on units and remote mounted fixtures to illuminate path(s) of exit.
- .9 Install emergency lighting units and remote fixtures at 300 mm (12") below finished ceiling, unless indicated otherwise.
- .10 Provide a 15 A 120 V duplex receptacle (connected to circuit indicated) adjacent to unit. **Not applicable on 347 V units. This receptacle connection is to be no lower than 8'-0" (2400 mm) AFF.**
- .11 **Special installation: Secure fixtures to structure to conform to the Electrical Safety Code using "jack chain" NOT ceiling suspension wire. Where coreslab is used, suspension point must be independent of the one used for suspension of the ceiling assembly. As an alternate to jack chain the contractor may use a pre-manufactured aircraft cable suspension and fastening system as manufactured by Gripple (Gripple Cat. #HF02-10F2). Provide minimum 2 per fixture.**
- .12 All battery units are to be provided with a visible lamicoid label indicating the unit number as per drawings.

3.2 WIRING

- .1 Connect luminaires to lighting circuits as indicated.
- .2 Connect exit fixtures to exit lighting circuits and unit equipment (if applicable).
- .3 Connect unit equipment to circuits as indicated.
- .4 All wiring of remote emergency fixtures shall be minimum #10 T90 for each circuit and run in conduit. Wiring must be sized in conformance with manufacturer's recommendations for distances required.

3.3 LUMINAIRE ALIGNMENT

- .1 Align luminaires mounted in continuous rows to form straight uninterrupted line.
- .2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.4 DELIVERIES

- .1 Fixtures are to be completely assembled at the manufacturer's plant and delivered to the project site in original unitized containers. Ensure that a dry, protected and secure space is available for proper storage before scheduling delivery of fixtures.

3.5 TESTING/CERTIFICATION

- .1 At the completion of the project and in the presence of the consultant, test all exit and emergency fixtures. On company letterhead, the contractor is to prepare a chart indicating:
 - .1 Project
 - .2 Date
 - .3 Equipment type
 - .4 Certification of correct connection
 - .5 Certification of correct operation
 - .6 Duration of test in minutes (minimum 90)
 - .7 Actual period of testing (time of day)

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE).
- .2 Underwriter Laboratories of Canada (ULC).
- .3 International Electrotechnical Commission.
- .4 International Organization for Standardization (ISO).
- .5 National Electrical Manufacturers Association (NEMA).

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings in accordance with Section 26 01 16.
- .2 Submit composite wiring diagrams and control schedule for each room control circuit type as proposed to be installed. Include load type, sequence of operation, sensor parameters, time delays, sensitivities and daylighting set points.
- .3 Catalog cut sheets with performance specifications demonstrating compliance with specified requirements.

1.3 SCOPE

- .1 This contractor is responsible to supply and install all equipment and control wiring as specified for the digital occupancy and daylight control systems. This contractor must coordinate these control systems with the lighting fixtures being supplied for the project to ensure intended function as specified.
- .2 Control Intent: Control Intent includes, but is not limited to:
 - .1 Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, etc.
 - .2 Initial sensor and switching zones.
- .3 All equipment must be CSA approved or approved at this contractor's expense by the Special Inspection Division of the Electrical Safety Authority.
- .4 Reference section 26 51 13 for Lighting information.
- .5 Reference section 26 05 75 for line voltage occupancy sensors and switches (hard wired analog).

1.4 SYSTEM DESCRIPTION AND OPERATION

- .1 The Digital Lighting Control (room level) as defined under this section covers the following equipment:
 - .1 Digital Room Controllers – Self-configuring, digitally addressable one, two or three relay controllers.
 - .2 Digital Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.
 - .3 Digital Switches – Self-configuring, digitally addressable pushbutton switches, dimmers, and scene switches with two-way active infrared (IR) communications.
 - .4 Digital Photosensors – Single-zone closed loop sensors with two-way active infrared (IR) communications can provide switching or dimming control for daylight harvesting.
 - .5 Configuration Tools – Handheld remote for room configuration provides two-way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from an accessible location.

1.5 LIGHTING CONTROL APPLICATIONS

- .1 Provide a minimum application of intended lighting control functions as detailed on design drawings and specified herein. Control functions shall include the following:
 - .1 Space Control Requirements – Provide occupancy/vacancy sensors with Manual-ON functionality in all spaces except toilet rooms, storerooms, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors.
 - .2 Bi-Level Lighting – Provide single zone, multi-level controls in any enclosed office, conference room, meeting room, and training room in all enclosed spaces except where variable dimming or multi-zone switching is used.
 - .3 Daylit Areas – All luminaires closest to the daylight source, and zoned separately from other fixtures in the space, shall be controlled separately from luminaires outside of daylit zones. Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.

1.6 WARRANTY

- .1 Provide a five-year complete manufacturer's warranty on all products to be free of manufacturers' defects.
- .2 The labour required to replace these products must be included in the above warranty, however only for the extent of the contract guarantee and warranty period as noted in Electrical General Requirements.

1.7 QUALITY ASSURANCE

- .1 Manufacturer: Minimum 10-years experience in manufacture of lighting controls.

Part 2 Products

2.1 MANUFACTURERS

- .1 Basis of design product: WattStopper Digital Lighting Management (DLM). Acceptable alternates are subject to compliance and prior approval with specified requirements of this section, as one of the following:
 - .1 Cooper Controls (Wavelinx).
 - .2 Acuity Controls (nlight).
- .2 Substitutions:
 - .1 All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by the design professional a minimum of 7 working days prior to the bid date and must be made available to all bidders.
 - .2 By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring.

2.2 DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR SYSTEM

- .1 Wall or ceiling mounted (to suit installation) passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor. Furnish the Company's system which accommodates the square-foot coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors and accessories which suit the lighting and electrical system parameters.
- .2 Digital Occupancy Sensors shall provide calibration and electronic documentation for the following features:
 - .1 Digital calibration and pushbutton programming for the following variables:
 - .1 Sensitivity – 0-100% in 10% increments
 - .2 Time delay – 1-30 minutes in 1 minute increments
 - .3 Test mode – Five second time delay
 - .4 Detection technology – PIR, Ultrasonic or Dual Technology activation and/or re-activation.
 - .5 Walk-through mode
 - .6 Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.
 - .2 Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.

- .3 Device Status LEDs including:
 - .1 PIR Detection
 - .2 Ultrasonic detection
 - .3 Configuration mode
 - .4 Load binding
- .4 Manual override of controlled loads.
- .5 One or two RJ-45 port(s) for connection to DLM local network.
- .3 Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.
WattStopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC

2.3 DIGITAL WALL SWITCHES

- .1 Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5, and 8 button configuration; colour per architect, compatible with wall plates with decorator opening. Wall switches shall include the following features:
 - .1 Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
 - .2 Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
- .2 Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required to achieve multi-way switching.
- .3 The following switch attributes may be changed or selected using a wireless configuration tool:
 - .1 Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
 - .2 Individual button function may be configured to Toggle, On only or Off only.
 - .3 Individual scenes may be locked to prevent unauthorized change.
 - .4 Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads.
- .4 Two RJ-45 ports for connection to DLM local network.
- .5 Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required to achieve multi-way switching.
- .6 WattStopper product numbers: LMSW-101, LMSW-102, LMSW-103, LMSW-104, LMSW-105, LMSW-108, LMDM-101.

2.4 DIGITAL POWER PACKS (ROOM CONTROLLERS)

- .1 Room Controllers automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room Controllers shall be provided to match the room lighting load and control requirements. The controllers will be simple to install and will not have, dip switches, potentiometers or require special configuration. The control units will include the following features:
 - .1 Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.
 - .2 Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf unit without requiring any configuration or setup.
 - .3 Device Status LEDs to indicate:
 - .1 Data transmission
 - .2 Device has power
 - .3 Status for each load
 - .4 Configuration status
 - .4 Quick installation features including:
 - .1 Standard junction box mounting
 - .5 Plenum rated
 - .6 Manual override and LED indication for each load
 - .7 120 VAC, 60 Hz operation.
 - .8 Zero cross circuitry for each load.
- .2 On/Off Room Controllers shall include:
 - .1 One or multiple relay configuration to suit control details
 - .2 Efficient 150 mA switching power supply
 - .3 Sufficient sensor connection points to suit indicated function without the requirement for additional hardware
 - .4 Discrete model listed for connection to receptacles, for schedule-based control of plug loads within the space.
 - .1 One relay configuration only.
 - .2 Automatic-ON/OFF configuration.
 - .3 Optional Network Bridge for BACnet MS/TP communications
 - .5 Three RJ-45 DLM local network ports.
 - .6 WattStopper product numbers: LMRC-101, LMRC-102, LMPL-101, LMPL-201.
- .3 On/Off Room/Dimming enhanced Room Controllers shall include:
 - .1 One or multiple relay configuration to suit control details.
 - .2 Efficient 250 mA switching power supply.

- .3 One 0-10 volt analog output per relay for control of compatible ballasts and LED drivers.
- .4 The following dimming attributes may be changed or selected using a wireless configuration tool:
 - .1 Establish preset level for each load from 0-100%.
 - .2 Set high and low trim for each load.
 - .3 Set lamp burn in time for each load up to 100 hours.
- .5 Four RJ-45 DLM local network ports.
- .6 Optional Network Bridge for BACnet MS/TP communications.
- .7 WattStopper product numbers: LMRC-211, LPMC-212, LPMC-213, LMPL-201, LMRC-311, LMRC-312, LMRC-313.

2.5 DIGITAL ROOM CONTROL SYSTEMS

- .1 Digital occupancy and daylight control system designed to control a small area of a building (room level). Digital devices connect to the room controller(s) using CAT 5e cables (LMRJ) with RJ-45 connectors which provide both data and power to room devices. Features of the system shall include:
 - .1 Plug n' Go automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.
 - .2 Simple replacement of any device in the system with a standard off the shelf unit without requiring commissioning, configuration or setup.
 - .3 Push n' Learn configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices which are part of the local system.
 - .4 Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.

2.6 CONFIGURATIONS TOOLS

- .1 A configuration tool facilitates optional customization of digital lighting control system featuring infrared communications.
- .2 Features and functionality of the wireless configuration tool shall include:
 - .1 Two-way infrared (IR) communication with DLM IR-enabled devices within a range of approximately 30 feet.
 - .2 Read, modify and send parameters for occupancy sensors, daylighting sensors, room controllers and buttons on digital wall switches.
 - .3 Save up to nine occupancy sensor setting profiles and apply profiles to selected sensors.

- .3 WattStopper Product Numbers: LMCT-100, LMCI-100/LMCS-100

Part 3 Execution

3.1 INSTALLATION

- .1 Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated.
- .2 When using wire for connections other than the DLM local network (LMRJ Cat 5e with RJ-45 connectors), provide detailed point to point wiring diagrams for every termination. Provide wire specifications and wire colors to simplify contactor termination requirements.
- .3 Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings.
- .1 Adjust time delay so that controlled area remains lighted for 5 minutes after occupant leaves area.
- .4 Install power packs in accessible maintenance areas unless noted otherwise. Provide access doors if power packs are installed above drywall ceilings.
- .5 It shall be the contractor's responsibility to locate and aim sensors in the correct location required for complete and proper coverage within the range of coverage as per the manufacturer's recommendations. The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective rooms.
- .6 Provide written or computer-generated documentation on the commissioning of the system including room by room description including:
- .1 Sensor parameters, time delays, sensitivities, and daylighting setpoints.
- .2 Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
- .3 Load Parameters (e.g. blink warning, etc.)
- .7 Re-commissioning – After 30 days from occupancy re-calibrate all sensor time delays and sensitivities to meet the Owner's Project Requirements. Provide a detailed report to the Architect / Owner of re-commissioning activity.

3.2 FACTORY COMMISSIONING

- .1 Upon completion of the installation, the system shall be commissioned by the manufacturer's factory authorized representative who will verify a complete fully functional system.
- .2 The electrical contractor shall provide both the manufacturer and the electrical engineer with ten working days written notice of the system startup and adjustment date.

- .3 Upon completion of the system commissioning the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.
- .4 Factory commissioning shall include functional testing and documentation of the control system conforming to the "Functional Testing" requirements included in the current ASHRAE standard. This cost shall be included in the Tender Price.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CAN/ULC-S524 (latest edition), Installation of Fire Alarm Systems.
- .2 ULC-S525 (latest edition), Audible Signal Appliances for Fire Alarm Systems.
- .3 CAN/ULC-S526 (latest edition), Visual Signal Appliances, Fire Alarm.
- .4 CAN/ULC-S527 (latest edition), Control Units, Fire Alarm.
- .5 CAN/ULC-S528 (latest edition), Manual Pull Stations.
- .6 CAN/ULC-S529 (latest edition), Smoke Detectors.
- .7 CAN/ULC-S530 (latest edition), Heat Actuated Fire Detectors, Fire Alarm.
- .8 CAN/ULC-S531 (latest edition), Smoke Alarms.
- .9 CAN/ULC-S536 (latest edition), Inspection and Testing of Fire Alarm Systems.
- .10 CAN/ULC-S537 (latest edition), Verification of Fire Alarm Systems.
- .11 CAN/ULC-S552 (latest edition), Inspection, Testing and Maintenance of Smoke Alarms.
- .12 CAN/ULC-S553 (latest edition), Installation of Smoke Alarms.
- .13 OBC-2024, Ontario Building Code Compendium.

1.2 DESCRIPTION OF EXISTING SYSTEM

- .1 The existing addressable system includes:
 - .1 An addressable control panel as manufactured by **[Edwards EST]** to carry out fire alarm and protection functions including receiving alarm signals, initiating general alarm, supervising system continuously, actuating zone annunciators, and initiating trouble signals.
 - .2 Trouble signal devices.
 - .3 Power supply facilities.
 - .4 Addressable manual alarm stations.
 - .5 Addressable automatic alarm initiating devices.
 - .6 Audible and visual signal devices.
 - .7 End-of-line devices.
 - .8 Annunciator(s).
 - .9 Ancillary devices.
 - .10 Interface and zone modules.
 - .11 Remote trouble indicator.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

- .1 This system is subject to review by local building department officials, local fire department officials. **Therefore, submission of verification certificate and field technician device verification sheets is required prior to inspection by these officials. Schedule accordingly.**

1.4 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Electrical General Requirements Section.
- .2 Include:
 - .1 New components.
 - .2 Complete wiring diagram for control panel replacements.

1.5 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for Fire Alarm System for incorporation into manual specified in Electrical General Requirements Section.
- .2 Include:
 - .1 Operation and maintenance instructions for complete fire alarm system to permit effective operation and maintenance.
 - .2 Technical data - illustrated parts lists with parts catalogue numbers.
 - .3 Copy of approved shop drawings.
 - .4 List of recommended spare parts for system.

1.6 TRAINING

- .1 Arrange and pay for on-site demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system. **Obtain written receipt of training session and include in maintenance manual.**

1.7 SYSTEM OPERATION

- .1 The existing Fire Alarm Sequence of Operation shall remain as currently programmed and to include new devices and zones per design drawings.
- .2 Refer to Fire Alarm Sequence of Operation for specific fire alarm sequence functions which generally include the following:
 - .1 Activation of audible and visual signal devices.
 - .2 Cause alarm and supervisory zone of alarm device to be indicated on control panel and remote annunciator(s).
 - .3 Cause system trouble indications.
 - .4 Activate auxiliary functions.
 - .5 Transmit signal to fire department via monitoring station.
 - .6 Log the alarm in the historical alarm log file.

.7 System silence parameters.

.8 System reset parameters.

1.8 PERFORMANCE CRITERIA

- .1 These specifications describe the minimum functional requirements for an electronically supervised, microprocessor based, fully integrated system. The initial installation shall include all the necessary electronic hardware, software and memory for a completely operable system in accordance with these specifications.

1.9 QUALITY ASSURANCE

- .1 Each and all items of the fire alarm system shall be listed as the products of a single manufacturer under the appropriate category by the Underwriter's Laboratories of Canada and shall bear the "U.L.C." label.
- .2 Each and all items of the fire alarm system shall be covered by a one year parts and labour warranty covering defects resulting from faulty workmanship and materials. The warranty shall be deemed to begin on the date the system is accepted by the Project Manager on issuance of the substantial performance certificate for the project.
- .3 All control equipment must have Transient Protection Devices to comply with U.L.C. requirements.

Part 2 Products

2.1 GENERAL

- .1 It is the intention of this renovation to maintain the existing addressable fire alarm system control panel and remote annunciator, as well as existing signal and detection devices, while expanding the system to include additional control panel components, additional signal devices, and additional detection devices as shown on design drawings to suit the project scope.
- .2 For information & coordination purposes, the following fire alarm manufacturer representative contact information is provided to the bidding trade:
- .1 Troy Life & Fire Safety Ltd. (Edwards)
Ross McKay (519)-778-5839

2.2 ADDRESSABLE MANUAL ALARM STATIONS

- .1 Manual alarm stations shall be addressable, single action, non-coded, semi-flush mounted type. Pull stations shall be break-glass style. Contacts are to activate when the handle is pulled down.
- .2 Addressable pull station electronics shall be mounted to the back plate of the station. The station's address will be set at the time of installation. Device addressing shall be accomplished by either an electrical or mechanical means.

- .3 stations are to be equipped with tamperproof guard equal to Stopper II Cat. # STI-1100.

2.3 CONVENTIONAL MANUAL ALARM STATIONS

- .1 Manual alarm stations: pull lever, style, wall mounted semi-flush type, non-coded single pole normally open contact for single stage, English signage.
- .2 Where noted on drawings, stations are to be relocated to code required mounting height via the use of surface raceway and surface device box.

2.4 INTELLIGENT DETECTORS-GENERAL OPERATION

- .1 Addressable devices shall use simple to install and maintain decade, numbered 0 to 9, address switches. Detectors that have expanded addressing will have decade switch numbered from 0 to 15 for the most significant digit to allow detector addressing from 1 to 250.
- .2 Device addressing shall be accomplished by either an electrical or mechanical means.
- .3 Detectors shall be intelligent (analog) and addressable and shall connect with two wires to the fire alarm control panel signalling line circuits.
- .4 Addressable smoke detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.
- .5 The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. Sensitivity shall be automatically adjusted by the panel on a time-of-day basis.
- .6 Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.
- .7 The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature.
- .8 The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
- .9 Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (PHOTO, THERMAL).

- .10 Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.
- .11 Detectors shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. LEDs shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.
- .12 Addressable devices shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. LED(s) shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.
- .13 The sensors shall be of a low profile design and ULC listed for both ceiling and wall mount applications.
- .14 Automatic smoke sensors shall be equipped with a dust cover, which shall be removed at the time of verification to prevent dust and dirt entering the smoke chamber during construction.
- .15 A magnetic test switch shall be provided to test detectors and modules. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.

2.5 INTELLIGENT MULTI-DETECTOR

- .1 The intelligent multi-detector shall be an addressable device, which is designed to monitor photoelectric, ionization, and thermal technologies in a single sensing device. This detector shall utilize advanced electronics which react to smaller products of combustion found in fast flaming fires (ionization), slow smouldering fires (photoelectric), and heat (thermal) all within a single sensing device.
- .2 The multi-detector shall include two bicolor LEDs, which flash green in normal operation and turn on steady red in alarm.
- .3 Detectors are to be provided with relay base where noted on the drawings.
- .4 Separately mounted photoelectric ionization and heat detectors in the same location are not acceptable alternatives.

2.6 FIXED TEMPERATURE HEAT DETECTOR

- .1 These heat detectors shall have a low mass thermistor heat sensor and operate at a fixed temperature. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the/ time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. The heat detector shall have a nominal alarm point rating of 57°C (135°F). The heat detector shall be rated for ceiling installation at a minimum of 21.3m (70') centres and be suitable for wall mount applications.

2.7 FIXED TEMPERATURE / RATE OF RISE HEAT DETECTOR

- .1 These heat detectors shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm, The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable. The intelligent heat detector shall have a nominal fixed temperature alarm point rating of 57°C (135°F) and a rate-of-rise alarm point of 9°C (15°F) per minute. The heat detector shall be rated for ceiling installation at a minimum of 21.3m (70') centres and be suitable for wall mount applications.

2.8 PHOTOELECTRIC SMOKE DETECTOR

- .1 The intelligent photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to sense changes in air samples from its surroundings. The integral microprocessor shall dynamically examine values from the sensor and initiate an alarm based on the analysis of data. The detector shall continually monitor any changes in sensitivity due to the environmental affects of dirt, smoke, temperature, aging, and humidity. The photo detector shall be rated for ceiling installation at a minimum of Soft (Olin) centres and be suitable for wall mount applications.
- .2 The percent smoke obscuration per foot alarm set point shall be field selectable to any of five sensitivity settings ranging from 1.0% to 3.5%. The photo detector shall be suitable for operation in the following environment:
 - .1 Temperature: 0°C to 49°C (32°F to 120°F)
 - .2 Humidity: 0-93% RH, non-condensing
 - .3 Elevation: no limit
- .3 Detectors are to be provided with relay base where noted on the drawings.

2.9 STANDARD DETECTOR MOUNTING BASES

- .1 Provide standard detector mounting bases suitable for mounting on North American 1-gang, 85mm (3 ½ ") or 100 mm (4") octagon box and 100 mm (4") square box. The base shall, contain no electronics, support all detector types and have the following minimum requirements:
 - .1 Removal of the respective detector shall not affect communications with other detectors.
 - .2 Terminal connections shall be made on the room side of the base. Bases which must be removed to gain access to the terminals shall not be acceptable.

2.10 INTELLIGENT DUCT SMOKE DETECTOR

- .1 The smoke detector housing shall accommodate an intelligent photoelectric detector (as noted above) that provides continuous analog monitoring and alarm verification from the panel.
- .2 When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.
- .3 Duct smoke detector sensor assemblies shall be complete with duct housing, photoelectric smoke detector, 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.
- .4 The system shall automatically indicate when an individual duct sensor needs cleaning.

2.11 CONVENTIONAL AUTOMATIC ALARM INITIATING DEVICES

- .1 Thermal fire detectors: fixed temperature, non-restorable, rated 57°C (135°F) or 88°C (194°F) as indicated.
- .2 Thermal fire detectors, combination fixed temperature and rate of rise, non-restorable fixed temperature element, self-restoring rate of rise, fixed temperature 57°C (135°F) or 88°C (194°F), rate of rise 8.3°C (15°F) per minute.
- .3 Smoke detector: ceiling mounted, photo electric type, visual alarm indicator, complete with relay base where noted.
- .4 Smoke detector: photo electric type air duct type with sampling tubes with protective housing.
 - .1 Plug-in type with fixed base.
 - .2 Wire-in base assembly with integral red alarm LED, and terminals for remote alarm LED.

2.12 AUDIBLE/VISUAL SIGNAL DEVICES

- .1 Horn: flush mounted temporal horn, 24Vdc operation, 94 dBA rating at 3 m (10'), red finish, FM and ULC listed.
- .2 Mini Horns: flush mounted temporal mini horn, 24Vdc operation, selectable HIGH/LOW setting 94.5 dBA (high)/89.8 dBA (low) at 3 m (10'), white or red coverplate, FM and ULC listed. Suitable for mounting on a single gang box.
- .3 Strobe: semi-recessed, 24Vdc operation, complete with selectable 15/30/75/110 candela output (unless otherwise noted set at 75 cd), synchronized strobe, red finish, FM and ULC listed. Suitable for mounting on a single gang box.

NOTES:

- .1 **Any surface mounted signal devices must be provided with suitable backboxes supplied by the manufacturer.**
- .2 **Provide synchronization modules to suit signal devices (if required by manufacturer).**
- .3 **Set signal devices in classrooms to LOW setting.**

2.13 END OF LINE RESISTORS

- .1 End-of-line resistors for signalling circuits shall be sized to ensure the correct supervisory current flows in each circuit.
- .2 End-of-line resistors shall be mounted on a stainless steel plate for mounting on a standard single gang box and bear the ULC label.

2.14 REMOTE ANNUNCIATOR PANELS

- .1 It is the intention of this renovation to maintain the existing remote annunciator panel and update the zone indicators to reflect additional zones as indicated on drawings as part of the project scope.

2.15 INTELLIGENT MODULES – GENERAL OPERATION

- .1 The modules shall have a minimum of 2 diagnostic LED's mounted behind a finished coverplate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing up to 24 diagnostic codes, which can be retrieved for troubleshooting assistance. Input and output circuit wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment:
 - .1 Temperature: 0°C to 49°C (32°F to 120°F).
 - .2 Humidity: 0-93% RH, non-condensing.

2.16 MONITOR MODULE

- .1 The monitor modules shall have the following operating characteristics:

A flashing LED indicates that the module is in communication with the control panel.
The LED latches steady on alarm (subject to current limitations on the loop).
- .2 The monitor modules shall have the following features:

Nominal operating voltage: 15 to 32 VDC.
Maximum current draw: 5.1 mA (LED on)
Average operating current: 400 uA (LED flashing)
EOL resistance: 47K ohms.
Temperature range: 0°C to 49°C (32°F to 120°F)
Humidity range: 10% to 93% noncondensing
Dimensions: 114.3mm (4.5") high x 101.6 mm (4") wide x 31.75 mm (1.25") deep. Mounts to a 101.6 mm (4") square x 53.975 mm (2.1/8") deep box.

2.17 ISOLATOR MODULE

- .1 Fault isolator modules shall be provide to automatically isolate wire-to-wire short circuits on an SLC loop. The fault isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop. If a wire-to wire short occurs, the fault isolator module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the fault isolator module shall automatically reconnect the isolated section of the SLC loop. The fault isolator module shall not require any address-setting, and its' operations shall be totally automatic. It shall not be necessary to replace or reset a fault isolator module after its normal operation. The fault isolator module shall mount in a standard 10.16 cm (4") deep electrical box, in a surface-mounted backbox, or in the fire alarm control panel. It shall provide a single LED which shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

2.18 CONTROL MODULE

- .1 Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay.
- .2 The control module NACs may be wired for Style Z or Style Y (Class A/B) with up to 1 Amp of inductive A/V signal, or 2 Amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% or all auxiliary relay or NACs may be energized at the same time on the same pair of wires.
- .3 The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 Amps at 30 VDC.

2.19 SYSTEM WIRING

- .1 Maintain existing device wiring where noted on drawings for replacement devices.
- .2 The system wiring must be FSA rated in conformance with the Electrical Safety Code to suit the type of installation.
- .3 Wiring shall be minimum #18 AWG twisted shielded pair in conduit. "Securex 2" armoured cable will be permitted to be used for "drops" to devices on accessible ceilings.
- .4 As indicated on system riser diagram initiating device wiring shall be run in a loop with a home run from the last device to the control panel (Class 'A' configuration). Wiring from the "loop" module to conventional devices must be supervised, run in conduit, and conform to the standards of the Electrical Safety Code.
- .5 Signal wiring is to be cross connected in a class 'B' configuration.
- .6 Install isolator modules and end of line resistors in service rooms no higher than 2.4 M AFF. Provide location of these devices at the time of shop drawing submission.
- .7 **These are the basic wiring requirements for system operation. Prior to tender close manufacturer and contractor are to confirm all necessary wiring specifications and requirements.**

2.20 APPROVED EQUIPMENT

<u>DEVICE</u>	<u>EDWARDS</u>
<u>Control Panel</u>	
	EST
<u>Intelligent Devices</u>	
Control Module	SIGA-CR
Isolator Module	SIGA-IM
Monitor Module	SIGA-CT Series
Smoke Detectors	SIGA-PS
Manual Alarm Stations 1-Stage	SIGA-270

Conventional
and Auxiliary Devices

Mini Horn	Genesis G1R-HD
Mini Horn complete with strobe	Genesis G1R-HDVM
Strobe	G1R-VM
Ceiling Speaker /Strobe (white)	GCF-S2VM

Part 3 Execution

3.1 INSTALLATION

- .1 Install new and replacement components in accordance with CAN/ULC-S524 (latest edition) and approved manufacturers manuals and wiring diagrams. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation, All wiring shall be of the type recommended by the Electrical Safety Code, approved by local authorities having jurisdiction for the purpose, and shall be installed in dedicated conduit throughout.
- .2 Locate and install manual alarm stations and connect to alarm circuit wiring.
- .3 Locate and install detectors and connect to alarm circuit wiring. **Do not mount detectors within 1 m (39") of air outlets.** Maintain at least 600 mm (24") radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.
- .4 Connect alarm circuits to main control panel.
- .5 Locate and install signal devices and connect to signalling circuits.
- .6 Connect signalling circuits to main control panel.
- .7 Install end-of-line devices at end of applicable alarm and signalling circuits.
- .8 Locate and install remote relay units to control fan shut down.
- .9 Connect fire suppression systems to control panel.
- .10 Provide 120V power and fire alarm connections to all fire smoke dampers c/w integral smoke detector. Connect all fire / smoke damper integral detector outputs to monitor modules for alarm condition and for monitoring of AC power to smoke damper as trouble condition at fire alarm panel based on module address. Coordinate exact location and connection requirements with mechanical contractor prior to rough-in. All fire smoke dampers c/w integral smoke detectors shall be provided and installed by mechanical contractor.

3.2 PROTECTION

- .1 Contractor is to ensure all fire protection system detectors are protected from dust, dirt, humidity, and water at all times during construction. This applies to detectors installed, stored on site or stored in storage containers. Any detectors that are damaged or dirty shall be replaced at the contractor's expense.

3.3 FIELD QUALITY CONTROL

- .1 The system shall be installed and fully tested under the supervision of trained manufacturer's representative. The system shall be demonstrated to perform all the functions as specified.

3.4 ACCEPTABLE INSTALLER

- .1 The fire alarm / life safety system specified herein shall be installed by an Authorized Electrical Contractor who is CFAA certified.

3.5 EXAMINATION

- .1 Prior to the commencement of any of the work detailed herein, an examination and analysis of the area(s) where the Fire Alarm / Life Safety System and all associated components are to be installed shall be made.
- .2 Any of these area(s) which are found to be outside the manufacturers' recommended environments for the particular specified products shall be noted on a Site Examination Report which shall be given to the Building Owners Representative, and the Consultant.
- .3 Any shorts, opens, or grounds found on existing wiring shall be corrected prior to the connection of these wires to any panel component or field device.

3.6 DEMONSTRATION

- .1 Each of the intended operations of the installed Fire Alarm / Life Safety System shall be demonstrated to the Building Owners' Representative and the Consultant.

3.7 SYSTEM TEST

- .1 Perform tests in accordance with General Electrical Requirements Section and CAN/ULC-S537-(latest edition) Standard for the Verification of Fire Alarm Systems.
- .2 Fire alarm system:
 - .1 Test each device and alarm circuit to ensure noted devices transmit alarm to control panel and actuate general alarm and ancillary devices.
 - .2 Check annunciator panels to ensure zones are shown correctly.
 - .3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of system.

- .4 Class A circuits.
 - .1 Test each conductor on all circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .2 Test each conductor on all circuits for capability of providing alarm signals during ground-fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .5 Class B circuits
 - .1 Test each conductor on all circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .3 The control panel shall continuously perform as automatic self-test routine on each sensor, which will functionally check the sensor electronics and ensure the accuracy of the valves being transmitted to the control panel.
 - .4 Automatic testing will occur at a rate of one sensor every four minutes.
 - .5 The sensor's average analogue value is the average of the last 2000 recorded analogue entries of its chamber.
 - .6 Any sensor that fails this test shall indicate a '**SELF-TEST ABNORMAL**' trouble condition with the sensor's address at the control panel.
 - .7 The system shall automatically indicate when an individual sensor needs cleaning. When the sensor's average value reaches a predetermined value, a '**DIRTY SENSOR**' trouble condition shall be audibly and visually indicated at the local control panel for that sensor. IF a '**DIRTY SENSOR**' indication is left unattended and its average value increases to a second predetermined value, an '**EXCESSIVELY DIRTY SENSOR**' trouble condition shall be indicated at the local control panel for that sensor. To prevent false alarms, these '**DIRTY**' conditions shall in no way decrease the amount of smoke obscuration necessary to generate an alarm condition.
 - .8 An operator having a proper access level, shall have the capability to manually access the following information from the control panel:
 - .1 Primary Status
 - .2 Device Type
 - .3 Present Average Value
 - .4 Present Sensitivity Selected*
 - .5 Highest Peak Detection Values (HVP)*
 - .6 Sensor Range (Normal, Dirty, Excessively Dirty)
- * Values shall be in 'percent of smoke obscuration' format so that no interpretation is required by the operator.

3.8 AUDIBILITY TESTING

- .1 It is the intention of this renovation to have the audibility tested in portions of the building within the scope of the project as indicated on drawings.
- .2 Audibility Testing:
 - .1 The contractor is to coordinate an audibility test prior to occupancy of the facility. The test is to be performed by the representatives of the fire alarm manufacturer in the presence of the consultant. The test report is to be in chart form indicating:
 - .1 Project
 - .2 Date of test
 - .3 Room name and number
 - .4 Ambient dB level
 - .5 Alarm dB level
 - .6 Name of testing technician
 - .2 The test results are to be submitted to the consultant for review prior to issuing to owner's representatives and/or authorities having jurisdiction.

3.9 INTEGRATED LIFE SAFETY SYSTEM TESTING

- .1 This electrical contractor shall participate in integrated testing of this life safety system in conformance with Electrical General Requirements. Include all associated costs in tender.

3.10 ADDITIONAL INSTALLED FIRE ALARM SYSTEM COMPONENTS

- .1 The electrical contractor is to include in their bid the cost to add two (2) additional signaling devices to be installed and verified in locations as directed by the consultant. Note: This installation and verification and subsequent audibility test will be occurring after the initial audibility testing is complete.
- .2 The electrical contractor is to include in their bid the cost to add three (3) additional fire smoke damper connections and 120V loss of power trouble signal with associated module and including two (2) additional isolation modules to be installed and verified as directed by the consultant.

END OF SECTION

26-7875-RFT - Grand River Collegiate Institute Family Studies Rooms & Rosemount Wing Renovation

Opening Date: April 10, 2026 5:30 PM

Closing Date: May 4, 2026 2:00 PM

Schedule of Prices

* Denotes a "MANDATORY" field

Do not enter \$0.00 dollars unless you are providing the line item at zero dollars to the Board.

Bid Price Form

The amounts stipulated on the Bid Price Form(s) are intended to cover the cost of the complete Work as described in this Procurement and must remain fixed and firm for the term of the Contract unless otherwise specified in this Procurement.

All prices shall be in Canadian Funds, Free On Board (FOB) Destination, and Freight Prepaid (Board locations). and shall be exclusive of Harmonized Sales Tax (HST) but shall include all materials, labour, equipment, disbursements, expenses, insurance, bonding, customs charges, freight, shipping and handling costs, travel costs and all other charges of every kind attributable to the Work and Services provided.

Bid Price includes Cash Allowance

Line Item	Description	Unit of Measure	Quantity	Bid Price *	Total
1	As per scope of work outlined in 26-7875-RFT Grand River Collegiate Institute Family Studies Rooms & Rosemount Wing Renovation	Lump Sum	1		
Subtotal:					

Summary Table

Bid Form	Amount
Bid Price Form	
HST (13%)	\$ 0.00
Total Contract Amount:	

Bid Questions

Bidder Instructions

Answer all questions that are marked Mandatory.

Bill S-211 - This enactment enacts the Fighting Against Forced Labour and Child Labour in Supply Chains Act, which imposes an obligation on certain government institutions entities to ensure measures are taken to prevent and reduce the risk that forced labour or child labour is used by suppliers or in their supply chains. The Board principles align with Bill S-211. Please confirm that your organization will comply with this Act. YES or NO. If no, please explain.

As per the "Ontario Business" definition as per the BOBI Act is a supplier, manufacturer or distribution of any business structure; conducts its activities on a permanent basis in Ontario; and has either a) its headquarters or main office in Ontario, or b) at least 250 full-time employees in Ontario at the time of the applicable procurement process. Does your company qualify as an Ontario Business under the BOBI Act? YES or NO

is your company a Canadian business? YES or NO

Is your company a U.S. business, as defined by the Ontario Treasury Board / Management Board of Cabinet (TB/MBC) as a supplier, manufacturer or distributor of any business structure (includes a sole proprietorship, partnership, corporation or other business structure) that: has its headquarters or main office located in the U.S., and has fewer than 250 full-time employees in Canada at the time of the applicable procurement process? Yes or No. (Comments are allowed).

Specifications

Bidder's Contact Information

A Project Manager and Site Supervisor to manage and supervise the Work, must be named in this form. A dedicated Site Supervisor shall be in full-time attendance at the Place of the Work while the Work is being performed. Personnel will be subject to Board approval and may not be changed without prior written approval from the Board.

Note: resumes are required to be uploaded in the document section.

Title	Name	E-mail	Cell Phone Number	
Project Manager				*
Site Supervisor				*

Documents

It is your responsibility to ensure the uploaded file(s) is/are not defective or corrupted and are able to be opened and viewed by the Owner. If the attached file(s) cannot be opened or viewed, your Bid Submission may be rejected.

- Project Manager * (mandatory)
- Site Supervisor * (mandatory)
- Certificate of Recognition (COR) Certification * (mandatory)

BONDING UPLOAD SECTION

Refer to the Bonding Requirements Section of the Terms and Conditions.

Instructions to Bidders

Bidders shall upload their electronically verifiable and enforceable (e-Bond) format for Bid Deposit Bond and Agreement to Bond separately in this section. If both Bonds are in the same file, please upload it to both fields and indicate one is a copy.

Tender # and Project Title must be included on the Bonds.

Bonding requirements are based on the total base bid amount, inclusive of all applicable taxes.

- Bid Deposit Bond * (mandatory)
- Agreement to Bond * (mandatory)

Addenda, Terms and Conditions

I/We have read and understand this Bid Solicitation document, and agree to perform the Work required in accordance with this Bid

Solicitation document, including all addenda, at the price(s) detailed in the Bid.

I/We confirm that:

1. The person named in this Bid is authorized to sign and electronically submit this Bid through the Bidding System.
2. I/We meet all mandatory requirements of the Bid Solicitation document.
3. The bid will remain open for a specified acceptance period after the Closing Time. The Board may, at any time within this period, accept the Bid whether or not any other Bid has previously been accepted.
4. All prices provided in the Bid will remain fixed and firm for the duration of the term of the agreement, unless specified otherwise.
5. All prices provided in my/our Bid are in Canadian funds and include all charges of every kind attributable to the Work. Harmonized Sales Tax will be extra and not shown, unless specified otherwise.
6. To the best of my/our knowledge and belief:
 - a) the information provided in the Bid is correct; and
 - b) the Bid is made without any comparison of figures or arrangement with any other individual, corporation or person submitting a Bid for the same Work and is in all respects fair and without collusion or fraud.
7. I/We comply with the all applicable Board policies, provincial, and federal laws, and are aware of the Board's "Principles of Business Conduct" and will comply.
8. I/We agree and understand that the recommendation to award the Work may be subject to the approval from the Board as well as availability of funds.
9. I/We agree to be bound by the terms and conditions of the Bid Solicitation document and submit this Bid on behalf of the Bidder.

☐ I have the authority to bind the Bidder.

The Bidder/Proponent is to declare any actual, potential or perceived conflict of interest that could arise from submitting the Bid/Proposal.

Do you have a potential conflict of interest?

☐ Yes ☐ No

The Bidder acknowledges and agrees that the addendum/addenda below form part of the Bid Solicitation Document.

Please check the box in the column "**I have reviewed this addendum**" below to acknowledge each of the addenda.

File Name	I have reviewed the below addendum and attachments (if applicable)	Pages
There have not been any addenda issued for this bid.		